

AL-FARABI KAZAKH
NATIONAL UNIVERSITY



INFORMATION
about publication activity
DEPARTMENT OF CHEMISTRY AND CHEMICAL TECHNOLOGY

| № | Наименование публикации | Выходные данные (doi статьи) | Аннотация статьи | Ссылка для цитирования (Ф.И.О., название статьи, название, номер и/или выпуск, том журнала, страницы, doi статьи) |
|----------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Аналитической, коллоидной химии и технологии редких элементов | | | | |
| 1. | Assessing air quality changes in large cities during COVID-19 lockdowns: The impacts of traffic-free urban conditions in Almaty, Kazakhstan | DOI: 10.1016/j.scitotenv.2020.139179 | ABSTRACT : Number of cities worldwide experienced air quality improvements during COVID-19 lockdowns; however, such changes may have been different in places with major contributions from nontraffic related sources. In Almaty, a city-scale quarantine came into force on March 19, 2020, which was a week after the first COVID-19 case was registered in Kazakhstan. This study aims to analyze the effect of the lockdown from March 19 to April 14, 2020 (27 days), | Kerimray, A., Baimatova, N., Ibragimova, O.P., Bukenov, B., Kenessov B., Plotitsyn, P., Karaca, F. Assessing air quality changes in large cities during COVID-19 lockdowns: The impacts of traffic-free urban conditions in Almaty, Kazakhstan // Science of the Total Environment, 2020, 730, 139179 DOI: 10.1016/j.scitotenv.2020.139179 |

| | | | | |
|--|--|--|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| | | | <p>on the concentrations of air pollutants in Almaty. Daily concentrations of PM_{2.5}, NO₂, SO₂, CO, O₃, and BTEX were compared between the periods before and during the lockdown. During the lockdown, the PM_{2.5} concentration was reduced by 21% with spatial variations of 6–34% compared to the average on the same days in 2018–2019, and still, it exceeded WHO daily limit values for 18 days. There were also substantial reductions in CO and NO₂ concentrations by 49% and 35%, respectively, but an increase in O₃ levels by 15% compared to the prior 17 days before the lockdown. The concentrations of benzene and toluene were 2–3 times higher than those during in the same seasons of 2015–2019. The temporal reductions may not be directly attributed to the lockdown due to favorable meteorological variations during the period, but the spatial effects of the quarantine on the pollution levels are evidenced. The results demonstrate the impact of traffic on the complex nature of air pollution in Almaty, which is substantially contributed by various nontraffic related sources, mainly coal-fired combined heat and power plants and household heating systems, as well as</p> | |
|--|--|--|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|

| | | | | |
|----|----------------------------------------------------------------------------------------------------------|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | possible small irregular sources such as garbage burning and bathhouses. | |
| 2. | On the sulphidation of anthropogenic copper raw materials with elemental sulfur | DOI: | <p>ABSTRACT :</p> <p>The object of this research refers to the sulphidation of mine tailings from Zhezkazgan concentrating mill (ZhCM) and mixed copper ore deposits of Bozschakol. The initial materials used are analyzed by X-ray Diffraction. The sulphidation process is carried out at temperature values ranging from 300°C to 800°C aiming to follow the influence of the heat on the process studied. The results show that the interval of 300°C-400°C is the best. The effect of changing the sulphur mass percentage during the sulphidation process is discussed. The reuse of mine tailings to extract valuable metals and the environmental hazards decrease are also investigated. © 2020 University of Chemical Technology and Metallurgy</p> | <p>Serikbayeva, A., Berdikulova, F., Zhumakynbay, N., Toktarbay, Z., Ismailova, A., Myrzakhmetova, N. On the sulphidation of anthropogenic copper raw materials with elemental sulfur // Journal of Chemical Technology and Metallurgy, 55(1), c. 228-232, 2020</p> |
| 3. | Study of polarization characteristics of corrosion films on magnesium in sulfate-containing electrolytes | DOI: 10.3390/app10041406 | <p>ABSTRACT :</p> <p>In this article, the results of studying the polarization characteristics of magnesium covered with corrosion film in aqueous solutions of MgSO₄ and Na₂SO₄ are presented. The absence of a corrosion-free magnesium surface was shown; in this connection, it was proposed to interpret the larger values of Tafel's coefficients obtained in the experiment from the point</p> | <p>Abildina, A.K., Argimbayeva, A.M., Kurbatov, A., Bakhytzhon, Y. Rakhymbay, G. Wark, Michael, Bottke, P. Study of polarization characteristics of corrosion films on magnesium in sulfate-containing electrolytes // Applied Sciences (Switzerland), 10(4),1406, 2020 DOI: 10.3390/app10041406</p> |

| | | | | |
|----|------------------------------------------------------------------------------------------|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>of view of limiting the electrochemical process by charge transfer in the film phase. Charge transfer in corrosion films obeys the regularities of particle movement in high electric fields, and it is not only cationic. According to the impedance measurements, the resistance of the oxide and hydroxide layer of the magnesium-based corrosion film in the studied solutions was calculated. The largest contribution to the restriction of charge transfer in the initial stages of corrosion is made by a dense primary film defining the polarization resistance. Correlation of transfer parameters in high electric fields with thickness and resistance of corrosion film was demonstrated.</p> | |
| 4. | Electrochemical separation of molybdenum and tungsten using aqueous-organic electrolytes | DOI: 10.18321/ectj980 | <p>ABSTRACT : Molybdenum is one of the valuable metals for the industry; its special properties make it extremely urgent to study the process of separation of molybdenum from other impurities. The article considers the optimization of electrochemical separation of molybdenum from Mo-W system. The electrochemical dissolution of molybdenum and tungsten in solutions of LiCl and NH₄NO₃ in dimethylsulfoxide was studied using polarization curves and calculation of the efficiency of anodic dissolution of molybdenum in the presence</p> | <p>Kudreeva, L.K., Kurbatov, A.P., Kamysbayev, D.K., Kalyyeva, A.R., Zhumasheva, N.Z., Abilev, M.B., Serikbayev, B.A., Dauletbay, A. Electrochemical separation of molybdenum and tungsten using aqueous-organic electrolytes // Eurasian Chemico-Technological Journal, 2020, 22(3), стр. 227-233 DOI: 10.18321/ectj980</p> |

| | | | | |
|-----------|-------------------------------------------------------|---------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | of tungsten. The electrolyte with a composition of 0.5 M LiCl; 5.2 M dimethylsulfoxide; 32.2 M water was selected as an effective solution for the electrochemical separation of molybdenum in the potential range of 1.0–2.2 V. Results obtained in this study can be used for the development of selective separation method in the molybdenum production. © 2020 Eurasian Chemico-Technological Journal. | |
| 5. | Solid polymer electrolytes for energy storage systems | DOI: 10.1016/j.matpr.2020.07.106 | ABSTRACT : In this work, nine composite polymer electrolytes (CPE) based on polyvinylidene fluoride (PVdF) with different fillers PVdF-PEG (PVP)-X (where X = Li ₂ SO ₄ , NaCl, LiCl, LiF) were synthesized at the room temperature. The composition of composite polymer electrolytes providing the highest ionic conductivity was determined. The effect of the polyvinylpyrrolidone (PVP) on the ionic conductivity of the film was established. The ionic conductivities of the obtained polymer electrolytes were calculated. Solid polymer electrolyte with the composition PVDF + NMP + LiCl shows the highest ionic conductivity which is equal to $6.07 \cdot 10^{-1} \text{ Ohm}^{-1} \text{ cm}^{-1}$ © 2020 Elsevier Ltd. | Kenessova, A.K., Seilkanova, G.A., Kurmanbayeva, T.S., Ussipbekova, E.Zh., Kurbatov, A.P. Solid polymer electrolytes for energy storage systems // Materials Today: Proceedings, 2020, 31, стр. 588-591 (Conference Paper) DOI: 10.1016/j.matpr.2020.07.106 |
| 6. | Interaction of metal ions with humic acids of | DOI: 10.1080/17458080.2020.1810240 | ABSTRACT : | Dauletbay, A., Serikbayev, B.A., Kamysbayev, D.K., Kudreeva, L.K. |

| | | | | |
|--|---------------------------|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | brown coals of Kazakhstan | | <p>This paper investigates interaction processes of the Fe^{3+}, Cu^{2+}, Ni^{2+}, and Co^{2+} cations with humic acids isolated from brown coals of Ekibastuz basin. It was demonstrated that the sorption of heavy metal ions by humic acids (HA) depends on the concentration and nature of cations and decreases in the order of $\text{Fe}^{3+} > \text{Cu}^{2+} > \text{Ni}^{2+} > \text{Co}^{2+}$; while increase in the concentration of humic acids (HA) results in the higher yield of ions and metals. The occurrence of ion exchange and complexation reactions in metal-humic acid systems is confirmed by the appearance of new bands and the shift of the absorption bands corresponding to stretching and deformation vibrations of carboxylate ions, C = O and OH groups. The occurrence of these processes is also evidenced by spectrophotometric data, as well as a decrease in the pH of the solution due to deprotonation of humic acids during these reactions. Thus, based on the data on the degree of sorption of metal cations by humic acids, the results of infra-red spectroscopy and spectrophotometry, it can be concluded that the Fe^{3+}, Ni^{2+}, Co^{2+}, Cu^{2+} cations interact with HA by the ionic mechanism and by the complexation mechanism with electron-donating functional groups. Electrochemical studies</p> | <p>Interaction of metal ions with humic acids of brown coals of Kazakhstan Journal of Experimental Nanoscience, 2020, 15(1), c. 406-416 DOI: 10.1080/17458080.2020.1810240</p> |
|--|---------------------------|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

| | | | | |
|----|--------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>of the Cu²⁺–humic acid system carried out by the method of cyclic voltammetry also indicate the occurrence of the interaction of humic acid with copper cations. Modification of humic acid with copper ions shows the electrochemical activity of copper immobilized on the surface of dispersed humic acid, which is important for the implementation of electrocatalytic reactions on modified glassy carbon-humic electrodes. © 2020 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group</p> | |
| 7. | <p>Application of Nanoheterogeneous Molybdenum Sulfide Catalysts to the Hydrofining of the Semicoking Tar of Coal from the Shubarkul Deposit</p> | <p>DOI: 10.3103/S0361521920040060</p> | <p>ABSTRACT : The hydrofining of semicoking coal tar from the Shubarkul deposit (Republic of Kazakhstan) in the presence of nanoheterogeneous molybdenum sulfide catalyst systems (Mo content, 0.025–0.12%) was studied in order to intensify processing technology. The catalysts were in situ prepared in the coal tar with the addition of a sulfidizing agent—elemental sulfur in an amount of 0.03–0.09 wt % on a raw material basis. It was found that the effective Mo content of the catalyst was 0.025%, and the amount of sulfur was 0.03%, which made it possible to obtain a maximum yield of total liquid products (76.8%), which mainly contained diesel fuel</p> | <p>Smagulova N.T., Kairbekov Z.K., Maloletnev A.S., Kudreeva L.K., Sabitova A.N. Application of Nanoheterogeneous Molybdenum Sulfide Catalysts to the Hydrofining of the Semicoking Tar of Coal from the Shubarkul Deposit / Solid Fuel Chemistry, 2020. – №4. – pp. 214-218 DOI: 10.3103/S0361521920040060</p> |

| | | | | |
|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | fractions, at 5 MPa and 400°C. © 2020, Allerton Press, Inc. | |
| 8. | Synthesis, structure and electrochemical performance of Eldfellite, NaFe(SO ₄) ₂ , doped with SeO ₄ , HPO ₄ and PO ₃ F | DOI: 10.1016/j.jssc.2020.121395 | ABSTRACT : NaFe(SO ₄) ₂ materials partially substituted with SeO ₄ ²⁻ , HPO ₄ ²⁻ and PO ₃ F ²⁻ were prepared and investigated as possible cathode materials for sodium-ion batteries. Neutron diffraction and Raman spectroscopy studies confirmed the successful incorporation of SeO ₄ ²⁻ and HPO ₄ ²⁻ , while the Raman studies suggested that significant hydrolysis of PO ₃ F ²⁻ had occurred during the synthesis. The effective diffusion coefficients were determined from conductivity and electrochemical kinetics studies, showing low Na ion diffusion. Galvanostatic and cyclic voltammetry investigations demonstrated more significant degradation and a narrowing of the electrochemical stability window for the doped materials, which was most significant for the SeO ₄ and HPO ₄ doped samples. Therefore, while doped NaFe(SO ₄) ₂ were successfully prepared, the best electrochemical performance was shown for the undoped system. © 2020 Elsevier Inc. | Trussov, I.A., Kokhmetova, S.T., Driscoll, L.L., Smith, R., Berry, F.J., Marco, J.F., Galejeva, A.K., Kurbatov, A.P., Slater, P.R. Synthesis, structure and electrochemical performance of Eldfellite, NaFe(SO ₄) ₂ , doped with SeO ₄ , HPO ₄ and PO ₃ F // Journal of Solid State Chemistry, 2020, 289, 121395 DOI: 10.1016/j.jssc.2020.121395 |
| 9. | Spatiotemporal variations and contributing factors of | DOI: 10.4209/aaqr.2019.09.0464 | ABSTRACT : In this study, spatial and temporal patterns of PM ₁₀ , PM _{2.5} , NO ₂ , SO ₂ , and CO in Almaty, | Kerimray, A., Azbanbayev, E., Kenessov, B., Plotitsyn, P., Alimbayeva, D., Karaca, F. |

| | | | | |
|--|--------------------------------------|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | air pollutants in almaty, Kazakhstan | | <p>the largest city of Kazakhstan, in the period between 2013 and 2018 are explored. Severe degradation of air quality was observed from the data that were used in this study. Annual averages of PM_{2.5}, PM₁₀, and NO₂ concentrations exceeded the WHO annual limits by 5.3, 3.9, and 3.2 times, respectively. The maximum levels were observed in the winter, while the minimum levels in the summer. Winter-to-summer difference was more noticeable for PM_{2.5} than for other pollutants. The winter pollution peaks demonstrate the high contribution of large-and small-scale coal combustion for heating, which could be exacerbated with lower winds and possible more frequent thermal inversions. There was a negative correlation between elevation and levels of SO₂, PM_{2.5}, and PM₁₀, while no correlation was observed for NO₂ and CO, indicating that the former group could be mainly contributed by point sources located predominantly at lower elevations (e.g., power plants) and the latter group mainly originated from nonpoint sources distributed evenly across the city (e.g., transport). Urgent measures are needed to reduce emissions from the coal-fired power plant and from the domestic heating stoves. © The Author(s).</p> | <p>Spatiotemporal variations and contributing factors of air pollutants in almaty, Kazakhstan // Aerosol and Air Quality Research, 2020, 20(6), стр. 1340-1352 DOI: 10.4209/aaqr.2019.09.0464</p> |
|--|--------------------------------------|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

| | | | | |
|-------------------|------------------------------------------------------------------------------|-----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>10.</p> | <p>Trends and health impacts of major urban air pollutants in Kazakhstan</p> | <p>DOI: 10.1080/10962247.2020.1813837</p> | <p>ABSTRACT : The air quality in cities in Kazakhstan has been poorly investigated despite the worsening conditions. This study evaluates national air pollution monitoring network data (Total Suspended Particle-TSP, NO₂, SO₂, and O₃) from Kazakhstan cities and provides estimates of excess mortality rates associated with PM_{2.5} exposure using the Global Exposure Mortality Model (GEMM) concentration-response function. Morbidity rates associated with PM₁₀ exposure were also estimated. Annual average (2015-2017) population-weighted concentrations were Kazakhstan cities was 157, 51, 29, and 41 µg m⁻³ for TSP, NO₂, SO₂, and O₃ respectively. We estimated a total of 8134 adult deaths per year attributable to PM_{2.5} (average over 2015–2017) in the selected 21 cities of Kazakhstan. The leading causes of death were ischemic heart disease (4080), stroke (1613), lower respiratory infections (662), chronic obstructive pulmonary disease (434), lung cancer (332). The per capita mortality rate attributable to ambient air pollution (per 10⁵ adults per year) was less than 150 in nine cities, between 150 and 204 in nine cities, and between 276 and 373 in three industrial cities (Zhezkazgan, Temirtau, and Balkhash). Implications:</p> | <p>Kerimray, A., Assanov, D., Kenessov, B., Karaca, F. Trends and health impacts of major urban air pollutants in Kazakhstan // Journal of the Air and Waste Management Association, 2020, 70(11), стр. 1148-1164 DOI: 10.1080/10962247.2020.1813837</p> |
|-------------------|------------------------------------------------------------------------------|-----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

| | | | | |
|-----|---------------------------------------------------------------------------------------------------------------------------------|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | Quantitative information on the health impacts of air pollution can be useful for decision-makers in Kazakhstan to justify environmental policies and identify policy and funding priorities for addressing air pollution issues. This information can also be useful for policymakers by improving the quality of government-funded environmental reports and strategic documents, as they have many shortcomings in terms of the selection of air quality indicators, identification of priority pollutants, and identification of sources of pollution. This study has high significance due to the lack of data and knowledge in Central Asia, especially Kazakhstan | |
| 11. | Pseudocapacitive effect of carbons doped with different functional groups as electrode materials for electrochemical capacitors | DOI: 10.3390/en13215577 | <p>ABSTRACT :</p> <p>In this study, RF-based un-doped and nitrogen-doped aerogels were produced by polymerisation reaction between resorcinol and formaldehyde with sodium carbonate as catalyst and melamine as the nitrogen source. Carbon/activated carbon aerogels were obtained by carbonisation of the gels under inert atmosphere (Ar) followed by activation of the carbons under CO₂ at 800 °C. The BET analysis of the samples showed a more than two-fold increase in the specific surface area and pore volume of carbon from 537 to 1333</p> | Mirzaeian, M., Abbas, Q., Hunt, M.R.C., Hall, P. Pseudocapacitive effect of carbons doped with different functional groups as electrode materials for electrochemical capacitors // Energies, 2020, 13(21), 5577 DOI: 10.3390/en13215577 |

| | | | | |
|------------|-----------------------------------------------------------|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|
| | | | <p>m²g⁻¹ and 0.242 to 0.671 cm³g⁻¹ respectively after nitrogen doping and activation. SEM and XRD analysis of the samples revealed highly porous amorphous nanostructures with denser inter-particle cross-linked pathways for the activated nitrogen-doped carbon. The X-Ray Photoelectron Spectroscopy (XPS) results confirmed the presence of nitrogen and oxygen heteroatoms on the surface and within the carbon matrix where improvement in wettability with the drop in the contact angle from 123° to 80° was witnessed after oxygen and nitrogen doping. A steady drop in the equivalent series (RS) and charge transfer (RCT) resistances was observed by electrochemical measurements after the introduction of nitrogen and oxygen heteroatoms. The highest specific capacitance of 289 Fg⁻¹ with the lowest values of 0.11 Ω and 0.02 Ω for RS and RCT was achieved for nitrogen and oxygen dual-doped activated carbon in line with its improved surface chemistry and wettability, and its enhanced conductivity due to denser inter-particle cross-linked pathways. © 2020 by the authors.</p> | |
| 12. | Improvement of the pseudocapacitive performance of cobalt | DOI: 10.3390/en13195228 | <p>ABSTRACT : Cobalt oxide nanopowders are synthesized by the pyrolysis of aerosol particles of</p> | <p>Mirzaeian, M., Akhanova, N., Gabdullin, M., Kalkozova, Z., Tulegenova, A., Nurbolat, S.,</p> |

| | | | | |
|--|-------------------------------------------------------|--|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | oxide-based electrodes for electrochemical capacitors | | <p>water solution of cobalt acetate. Cobalt nanopowder is obtained by subsequent reduction of obtained cobalt oxide by annealing under a hydrogen atmosphere. The average crystallite size of the synthesized porous particles ranged from 7 to 30 nm, depending on the synthesis temperature. The electrochemical characteristics of electrodes based on synthesized cobalt oxide and reduced cobalt oxide are investigated in an electrochemical cell using a 3.5 M KOH solution as the electrolyte. The results of electrochemical measurements show that the electrode based on reduced cobalt oxide (Re-Co₃O₄) exhibits significantly higher capacity, and lower Faradaic charge-transfer and ion diffusion resistances when compared to the electrodes based on the initial cobalt oxide Co₃O₄. This observed effect is mainly due to a wide range of reversible redox transitions such as Co(II) ↔ Co(III) and Co(III) ↔ Co(IV) associated with different cobalt oxide/hydroxide species formed on the surface of metal particles during the cell operation; the small thickness of the oxide/hydroxide layer providing a high reaction rate, and also the presence of a metal skeleton leading to a low series resistance of the electrode.</p> | <p>Abdullin, K. Improvement of the pseudocapacitive performance of cobalt oxide-based electrodes for electrochemical capacitors // Energies, 2020, 13(19), 5228 DOI: 10.3390/en13195228</p> |
|--|-------------------------------------------------------|--|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

| | | | | |
|-------------------|-----------------------------------------------------------------------------------------------------|--------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>13.</p> | <p>Current state and future prospects for electrochemical energy storage and conversion systems</p> | <p>DOI: 10.3390/en13215847</p> | <p>ABSTRACT : Electrochemical energy storage and conversion systems such as electrochemical capacitors, batteries and fuel cells are considered as the most important technologies proposing environmentally friendly and sustainable solutions to address rapidly growing global energy demands and environmental concerns. Their commercial applications individually or in combination of two or more devices are based on their distinguishing properties e.g., energy/power densities, cyclability and efficiencies. In this review article, we have discussed some of the major electrochemical energy storage and conversion systems and encapsulated their technological advancement in recent years. Fundamental working principles and material compositions of various components such as electrodes and electrolytes have also been discussed. Furthermore, future challenges and perspectives for the applications of these technologies are discussed. © 2020 by the authors. Licensee MDPI, Basel, Switzerland.</p> | <p>Abbas, Q., Mirzaeian, M., Hunt, M.R.C., Hall, P., Raza, R. Current state and future prospects for electrochemical energy storage and conversion systems // Energies, 2020, 13(21), 5847</p> |
| <p>14.</p> | <p>STABILIZATION OF MELON CLOUDY JUICE</p> | <p>DOI: 10.15587/1729-4061.2020.210503</p> | <p>ABSTRACT : In the production of natural fruit juices, the uniform distribution of fruit pulp particles</p> | <p>Tazhibayeva, S., Tyussyupova, B., Khamitova, I., Toktarbay, Z., Musabekov, K., Daribayeva, G.</p> |

| | | | | |
|--|-------------------------|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | WITH BIOPOLYMER AGAR | | <p>in the volume is of great importance, which determines the aggregate stability of the system. To maintain the aggregate stability of fruit juices, stabilizers are used, which are polymers or surfactants. In this regard, the influence of natural polymer agar on the stability of melon juice containing particles of melon pulp has been studied. The initial melon juice had a pH of 5.78 and a titrated acidity of 970.29 mg of citric acid/L, the content of soluble solids in it corresponded to 10.08 TSS Brix. Samples of melon juice with concentrations of 50, 70 and 90 % were used for research. The study of the stability of melon juice in the presence of agar was carried out for 6 days on the Turbiscan device (France). It is shown that at concentrations of agar introduced into melon juice of 0.005 % and 0.01 %, the system retains its aggregate stability, but when switching to a concentration of 0.02 %, the stability of the system decreases. The size of melon pulp particles changes accordingly. If the addition of agar concentration of 0.05 % and 0.01 % to the melon pulp reduces the particle size of the melon pulp, then an increase in the agar concentration to 0.02 % causes a certain increase in the particle size of the fruit pulp. This effect of agar concentration on the aggregate stability of</p> | <p>STABILIZATION OF MELON CLOUDY JUICE WITH BIOPOLYMER AGAR // Eastern-European Journal of Enterprise Technologies, 2020, 4(11-106), стр. 31-38 DOI: 10.15587/1729-4061.2020.210503</p> |
|--|-------------------------|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

| | | | | |
|-----|----------------------------------------------------------------------------------|-----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | melon juice is explained by the fact that at low concentrations, polymer macromolecules, covering the surface of melon pulp particles, protect them from sticking. When the polymer concentration increases, melon pulp particles begin to stick together due to the coupling of loops and tails of agar macromolecules adsorbed on their surface | |
| 15. | Wetting ability of a phytopreparation and their associates with polyelectrolytes | DOI: 10.31788/RJC.2020.1315566 | <p>ABSTRACT :</p> <p>In this work, the wetting ability of the VK phytopreparation and its associates with polyelectrolytes were studied. VK is a complex of biologically active substances (BAS) isolated from Alhagi (family-Fabaceae Lindl). The association of a phytopreparation with Polyhexamethylene guanidine hydrochloride (PHMG) occurs due to hydrogen bonds stabilized by hydrophobic interactions of non-polar groups of a polyelectrolyte. Therefore, intensive compaction of macromolecules of the phytopreparation-PHMG complex takes place and the viscosity of the mixture of solutions is greatly reduced. In this case, the surface of the complex will be enriched (saturated) with polar groups, which causes a decrease in the contact angles of solutions of associates compared with the phytopreparation, as well as the fraction of the occupied surface. PHMG and</p> | Yessimova, O., Kumargaliyeva, S., Kerimkulova, M., Mussabekov, K., Toktarbay, Z. Wetting ability of a phytopreparation and their associates with polyelectrolytes // Rasayan Journal of Chemistry, 2020, 13(1), стр. 481-487 DOI: 10.31788/RJC.2020.1315566 |

| | | | | |
|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>phytopreparation have a weak hydrophilizing effect on the surface of Teflon. The composition of the reagents under consideration suggests a certain imbalance in the hydrophilic and lipophilic properties of macromolecules towards the polar part. The low values of the surface fraction and their associates show that a sufficiently rarefied adsorption layer forms on the surface of quartz and Teflon.</p> | |
| 16. | <p>Polymeric ionic liquid sorbent coatings in headspace solid-phase microextraction: A green sample preparation technique for the determination of pesticides in soil</p> | <p>DOI: 10.1016/j.microc.2020.104996</p> | <p>ABSTRACT : In this work, a green approach utilizing novel polymeric ionic liquid (PIL) coatings for headspace solid-phase microextraction (HS-SPME) of four current-use pesticides from soil samples was studied for the first time. Epoxiconazole, fluroxypyr, metribuzin, and oxyfluorfen were the target pesticides. Three PIL coatings containing 1-vinylbenzyl-3-hexadecylimidazolium bis[(trifluoromethyl)sulfonyl]imide (PIL1 and PIL2) and 1-vinyl-3-(10-hydroxydecyl)imidazolium bis[(trifluoromethyl)sulfonyl]imide (PIL3) monomers, and 1,12-di(3-vinylbenzylimidazolium)dodecane bis[(trifluoromethyl)sulfonyl]imide (PIL1) and 1,12-di(3-vinylbenzimidazolium)dodecane bis[(trifluoromethyl)sulfonyl]imide (PIL2)</p> | <p>Orazbayeva, D., Koziel, J.A., Trujillo-Rodríguez, M.J., Anderson, J.L., Kenessov, B. Polymeric ionic liquid sorbent coatings in headspace solid-phase microextraction: A green sample preparation technique for the determination of pesticides in soil // Microchemical Journal, 157,104996, 2020 DOI: 10.1016/j.microc.2020.104996</p> |

| | | | | |
|--|--|--|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| | | | <p>and PIL3) crosslinkers were employed in this study. The performance of these PIL coatings was evaluated and compared with commercial SPME coatings based on polydimethylsiloxane/divinylbenzene (PDMS/DVB) and polydimethylsiloxane (PDMS) at the different extraction temperatures (50–90 °C) and sampling times (15–60 min). HS-SPME at 90 °C for 60 min provided the highest sensitivity and adequate reproducibility for the majority of analytes. Despite having a lower thickness, PIL2 and PIL3 coatings provided similar extraction effectiveness of analytes, and 24–247% higher coating volume-normalized responses compared to the commercial PDMS/DVB coating. The use of the PIL1 sorbent coating resulted in excellent linearity ($R^2 = 0.995–0.999$) and lower detection limits (0.06–0.4 ng g⁻¹) for all analytes. The optimized method provides acceptable recoveries of spiked concentrations with better performance (84–112%) achieved with the PIL1 coating. Compared to other known methods for target pesticides in soil, the proposed method provides the highest compliance with the principles of green analytical chemistry evaluated using Analytical Eco-Scale and Green Analytical Procedure Index tools.</p> | |
|--|--|--|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|

| | | | | |
|-------------------|---------------------------------------------------------------------------------|----------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>17.</p> | <p>Modern trends in the formation of the quality system of higher education</p> | <p>DOI: 10.1051/e3sconf/202015909013</p> | <p>ABSTRACT : The trends in the formation, development of the quality assurance system of education, reveals the prerequisites for the creation and theoretic-pedagogical basis of the formation of the quality assurance system of education, and the history of the development of mechanisms to ensure the quality of higher education are considered in the article. The world integration processes, the international practice of forming a national system for ensuring the quality of higher education are considered. The chronology of reforms and transformations taking place in the field of education is also given. Based on a comparative-historical analysis of the formation of the quality assurance system of higher education in European countries, two periods are identified and characterized: the period before the Bologna processes; period - after the Bologna processes. Based on the analysis of world experience, the division of the existing systems of assessment of higher education into different types is shown.</p> | <p>Minazheva G. Modern trends in the formation of the quality system of higher education // E3S Web of Conferences Volume 159 (2020) The 1st International Conference on Business Technology for a Sustainable Environmental System (BTSES-2020) Almaty, Kazakhstan, March 19-20, 2020. Proceeding DOI: 10.1051/e3sconf/202015909013</p> |
| <p>18.</p> | <p>High performance stretchable Li-ion microbattery</p> | <p>DOI: 10.1016/j.ensm.2020.07.005</p> | <p>ABSTRACT : The recent advances in wearable technologies had caused a surge in the demand for stretchable Li-ion microbatteries. Herein, a special design</p> | <p>Nasreldin, M., Delattre, R., Calmes, C., ...Tocnaye, J.-L.D.B.D.L., Djenizian, T. High performance stretchable Li-ion microbattery //</p> |

| | | | | |
|-----|----------------------------------------------------------------------------------------------------------------------------------|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>based on micropillar electrodes supported on metallic serpentines has been investigated to achieve the fabrication of a functioning device. Besides achieving high areal capacity values like 2.5 mA h cm^{-2} at $C/10$ (i.e. 0.07 mA cm^{-2}), the micropillars make the system reversibly stretchable. Electrochemical tests revealed excellent performance when the stretchable micropower source was subjected to different mechanical strains. Indeed, 73% of the capacity is retained over 100 cycles under 30% strain and all fatigue tests showed that capacity retention remain higher than 70%.</p> | <p>Energy Storage Materials, 2020, 33, c. 108-115 DOI: 10.1016/j.ensm.2020.07.005</p> |
| 19. | <p>Changes in temperature inside an optomechanical model of the human eye during emulated transscleral cyclophotocoagulation</p> | <p>DOI: 10.1364/BOE.385016</p> | <p>ABSTRACT : Currently, many diseases of the eye are treated by laser surgery. An understanding of light propagation and the heating of eye tissue during laser exposure is crucial to improving the outcome of these procedures. Here, we present the development of physical and computational models of the human eye by combining optical light propagation and thermal characteristics. For the physical model, all parts of the eye, including cornea, lens, ciliary body, sclera, aqueous and vitreous humors, and iris, were fabricated using a 3D printed holder and modified polydimethylsiloxane. We also present a computational model based on</p> | <p>Regal, S., Troughton, J., Delattre, R., Djenizian, T., Ramuz, M. Changes in temperature inside an optomechanical model of the human eye during emulated transscleral cyclophotocoagulation // Biomedical Optics Express, 2020, 11(8), c. 4548-4559 DOI: 10.1364/BOE.385016</p> |

| | | | | |
|------------|------------------------------------------------------------------------------------------------------------------|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>finite element analysis that allows for a direct comparison between the simulation and experimental measurements. These models provide an opportunity to directly assess the rise in temperature in all eye tissues. The simulated and physical models showed good agreement for the transmission of light at varying incident angles. The heating of optical components was investigated in the retina and the ciliary body during simulated laser surgery. Temperature increases of 45.3°C and 30.6°C in the retina and ciliary bodies, respectively, were found in the physical model after 1 minute of exposure to 186 mW of 850 nm laser radiation. This compared to 29.8°C and 33.9°C increases seen under the same conditions in the simulation model with human eye parameters and 48.1°C and 28.7°C for physical model parameters. These results and these models are very promising for further investigation of the impact of laser surgery. © 2020 Optical Society of America under the terms of the OSA Open Access Publishing Agreement</p> | |
| 20. | All-solid-state lithium ion batteries using self-organized TiO ₂ nanotubes grown from Ti-6Al-4V alloy | DOI: 10.3390/molecules25092121 | <p>ABSTRACT : All-solid-state batteries were fabricated by assembling a layer of self-organized TiO₂ nanotubes grown on as anode, a thin-film of polymer as an electrolyte and separator, and a layer of composite LiFePO₄ as a cathode. The synthesis of self-organized</p> | <p>Sugiawati, V.A., Vacandio, F., Djenizian, T. All-solid-state lithium ion batteries using self-organized TiO₂ nanotubes grown from Ti-6Al-4V alloy // Molecules, 2020, 25(9), molecules25092121 DOI: 10.3390/molecules25092121</p> |

| | | | | |
|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>TiO₂ NTs from Ti-6Al-4V alloy was carried out via one-step electrochemical anodization in a fluoride ethylene glycol containing electrolytes. The electrodeposition of the polymer electrolyte onto anatase TiO₂ NTs was performed by cyclic voltammetry. The anodized Ti-6Al-4V alloys were characterized by scanning electron microscopy and X-ray diffraction. The electrochemical properties of the anodized Ti-6Al-4V alloys were investigated by cyclic voltammetry and chronopotentiometry techniques. The full-cell shows a high first-cycle Coulombic efficiency of 96.8% with a capacity retention of 97.4% after 50 cycles and delivers a stable discharge capacity of 63 $\mu\text{Ah cm}^{-2} \mu\text{m}^{-1}$ (119 mAh g⁻¹) at a kinetic rate of C/10.</p> | |
| 21. | <p>TiO₂ nanotube layers decorated with Al₂O₃/MoS₂/Al₂O₃ as anode for li-ion microbatteries with enhanced cycling stability</p> | <p>DOI: 10.3390/nano10050953</p> | <p>ABSTRACT : TiO₂ nanotube layers (TNTs) decorated with Al₂O₃/MoS₂/Al₂O₃ are investigated as a negative electrode for 3D Li-ion microbatteries. Homogenous nanosheets decoration of MoS₂, sandwiched between Al₂O₃ coatings within self-supporting TNTs was carried out using atomic layer deposition (ALD) process. The structure, morphology, and electrochemical performance of the Al₂O₃ /MoS₂/Al₂O₃-decorated TNTs were studied using</p> | <p>Tesfaye, A.T., Sopha, H., Ayobi, A., ...Macak, J.M., Djenizian, T. TiO₂ nanotube layers decorated with Al₂O₃/MoS₂/Al₂O₃ as anode for li-ion microbatteries with enhanced cycling stability // Nanomaterials, 2020, 10(5), 953 DOI: 10.3390/nano10050953</p> |

| | | | | |
|------------|----------------------------------------------------------------------------------------------------------------------------------|-------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | scanning transmission electron microscopy, energy dispersive X-ray spectroscopy, X-ray photoelectron spectroscopy, and chronopotentiometry. Al ₂ O ₃ /MoS ₂ /Al ₂ O ₃ -decorated TNTs deliver an areal capacity almost three times higher than that obtained for MoS ₂ -decorated TNTs and as-prepared TNTs after 100 cycles at 1C. Moreover, stable and high discharge capacity (414 μAh cm ⁻²) has been obtained after 200 cycles even at very fast kinetics (3C). | |
| 22. | Editorial: Advances in Porous Semiconductor Research | DOI: 10.3389/fchem.2020.00122 | ABSTRACT : | Djenizian, T., Voelcker, N.H. Editorial: Advances in Porous Semiconductor Research // Frontiers in Chemistry, 2020, 8, 122 DOI: 10.3389/fchem.2020.00122 |
| 23. | Direct pre-lithiation of electropolymerized carbon nanotubes for enhanced cycling performance of flexible li-ion micro-batteries | DOI: 10.3390/polym12020406 | ABSTRACT : Carbon nanotubes (CNT) are used as anodes for flexible Li-ion micro-batteries. However, one of the major challenges in the growth of flexible micro-batteries with CNT as the anode is their immense capacity loss and a very low initial coulombic efficiency. In this study, we report the use of a facile direct pre-lithiation to suppress high irreversible capacity of the CNT electrodes in the first cycles. Pre-lithiated polymer-coated CNT anodes displayed good rate capabilities, studied up to 30 C and delivered high capacities of 850 mAh g ⁻¹ | Sugawati, V.A., Vacandio, F., Yitzhack, N., Ein-Eli, Y., Djenizian, T. Direct pre-lithiation of electropolymerized carbon nanotubes for enhanced cycling performance of flexible li-ion micro-batteries // Polymers, 2020, 12(2), 406 DOI: 10.3390/polym12020406 |

| | | | | |
|------------|-------------------------------------------------------------------|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | ¹ (313 $\mu\text{Ah cm}^{-2}$) at 1 C rate over 50 chargedischarge cycles. | |
| 24. | Flexible and Stretchable Microbatteries for Wearable Technologies | DOI: 10.1002/admt.202000412 | <p>ABSTRACT :</p> <p>Soft microbatteries should rapidly emerge on the world market owing to the spectacular rise of wearable technologies that are needed to be powered. The field of applications is actually very large as the main sectors that will be impacted include Internet-of-things, printed electronics, e-textile, medical devices, smart cards,... These specific micropower sources have to show high electrochemical performance and sustain various mechanical strains. They also have to fulfill harsh criteria in terms of size and fabrication processes to ensure their integration in functional devices. In this report, achievements on structural design, fabrication strategies, and performances of flexible and stretchable microbatteries are reviewed. The different strategies proposed to improve electrochemical and mechanical properties: creation of new designs, investigation of alternative microstructuring techniques, involvement of new nanomaterials, etc., are highlighted. The future prospects of these recent technologies are also discussed.</p> | <p>Nasreldin, M., de Mulatier, S., Delattre, R., Ramuz, M., Djenizian, T. Flexible and Stretchable Microbatteries for Wearable Technologies // Advanced Materials Technologies, 2020 DOI: 10.1002/admt.202000412</p> |
| 25. | Electrochemical synthesis and corrosion | DOI: 10.18321/ectj992 | ABSTRACT : | Ye.G. Bakhytzhan, A.M.Argimbayeva, G.S. Rakhymbay, |

| | | | | |
|------------|----------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | properties of POA-MoO ₄ - coating in 3.5% NaCl | | 2- Polyanisidine (POA) and polyanisidine-molybdate (POA – MoO ₄) coatings have been successfully synthesized on steel grade CT3 from aqueous solutions of oxalic acid by electrochemical method using cyclic voltammetry. The morphology and composition of these films were characterized by scanning electron microscopy (SEM) and energy-dispersive X-ray (EDAX) methods. It was proven that the introduction of MoO ₄ into 2- the polyanisidine matrix raised the corrosion resistance of the POA coating and also improved its adhesion properties. The protective properties of steel grade CT3 with 2- POA and POA – MoO ₄ films were studied using potentiodynamic polarization in 3.5% 2- NaCl solution. The results showed that MoO ₄ ions improve anti-corrosion properties of POA films. | R. Dzh. Jumanova, Kh. Avchukir, B.D.Burkitbayeva «Electrochemical synthesis and corrosion properties of POA-MoO ₄ - coating in 3.5% NaCl»// Eurasian Chemico-Technological Journal, - 2020, Vol.22 – №4 стр. 305–313 DOI: 10.18321/ectj992 |
| 26. | Conductive polymer/SiO ₂ composite as an anticorrosive coating against carbon dioxide corrosion of mild steel. A simulation study | DOI: 10.18321/ectj991 | ABSTRACT : In this work corrosion of mild steel affected by carbon dioxide was studied using a simulation model developed by Nordsveen M. and Nesic S. Using this comprehensive model of the uniform corrosion made possible to predict of corrosion rate of steel in the carbonic acid medium and the influence of different conditions on the anticorrosive property of coated electrode has been investigated. 1D model of | Avchukir K., Burkitbayeva B., Conductive polymer/SiO ₂ composite as an anticorrosive coating against carbon dioxide corrosion of mild steel. A simulation study // Eurasian Chemico-Technological Journal. Volume 22, Number 4, – 2020, In press. DOI: 10.18321/ectj991 |

| | | | | |
|------------|-------------------------------------------------------------------------------------------------------------------------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>corrosion process includes Butler-Volmer and Tafel equations and takes into account both the kinetics of anodic dissolution of an iron and electrochemical discharge of carbonic acid, water and hydrogen ions. The model has been created in COMSOL Multiphysics software and further improvement of this model allowed studying the influence of parameters such as solution composition, the partial pressure of CO₂, temperature and flow velocity of the solution on the corrosion rate of the steel. The results of numerical simulation demonstrate that the use of conductive polymer-polypyrrole/SiO₂ composite as an anti-corrosive resin coating reduces the corrosion rate of mild steel by 7 times or more, depending on pH, temperature and flow rate. Furthermore, increasing of flow velocity from 0.1 to 10 m/s affects to the removal of corrosion products from the surface of mild steel and as a result corrosion rate raises from 0.3 to 0.45 mm/year at a temperature of 80 °C and pH=4.</p> | |
| 27. | <p>Antagonistic activity and mechanism of a novel <i>Bacillus amyloliquefaciens</i> MB40 strain against fire blight</p> | <p>DOI: 10.1007/s42161-020-00515-4</p> | <p>ABSTRACT : Fire blight caused by <i>Erwinia amylovora</i> is an important disease affecting most types of rosaceous trees and represents a significant threat to fruit cultivation in many parts of the world. The effectiveness</p> | <p>Shemshura, O., Alimzhanova, M., Ismailova, E., ...Daugaliyeva, S., Sadanov, A. Antagonistic activity and mechanism of a novel <i>Bacillus amyloliquefaciens</i> MB40 strain against fire blight // <i>Journal of Plant</i></p> |

| | | | | |
|--|--|--|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|
| | | | <p>of antagonistic bacteria <i>Bacillus amyloliquefaciens</i> strain MB40 to inhibit the growth of <i>Erwinia amylovora</i> strain 1E IMIV was evaluated under in vitro conditions. <i>B. amyloliquefaciens</i> MB40 was isolated from leaves of fire blight host mature apple trees (cultivar 'Zarya Alatau') sampled in the Almaty region of Kazakhstan. Local isolate of the fire blight causative agent <i>E. amylovora</i> was used as pathogen inoculum in laboratory trials. <i>Erwinia amylovora</i> and <i>Bacillus amyloliquefaciens</i> were identified using morphological and biochemical tests, and the pathogenicity of <i>E. amylovora</i> 1E IMIV was demonstrated in a bioassay on immature pear fruits. <i>B. amyloliquefaciens</i> MB40 showed high antagonistic activity against the pathogen. Biological efficiency of the applied culture broth of <i>B. amyloliquefaciens</i> was 90.6% (95% confidence interval [CI] = 74.1 to 107.2). Analysis of active substances produced by the antagonistic bacterium disclosed high amounts of acetoin (3-hydroxybutanone) - $53.7 \pm 1.8\%$ and and 2,3-butanedione - $34.4 \pm 3.6\%$. The inhibitory activity of the latter was demonstrated. The possible mechanism of its action is discussed, suggesting that <i>B. amyloliquefaciens</i> MB40 is a novel antibacterial strain with potential</p> | <p>Pathology, 2020, 102(3), стр. 825-833 DOI: 10.1007/s42161-020-00515-4</p> |
|--|--|--|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|

| | | | | |
|------------|----------------------------------------------------------------------------------|--------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | application in controlling <i>E. amylovora</i> in fruit growing. | |
| 28. | Pahs-degrading bacteria isolated from oilcontaminated soil of Western Kazakhstan | DOI: 0971765X | <p>ABSTRACT : This work has been aimed at isolating and studying active destructor strains of polycyclic aromatic hydrocarbons. The strains capable of growing on naphthalene and fluorene as the only source of carbon and energy were isolated from oil-contaminated soil of Western Kazakhstan using the Enrichment Culture Technique. Studying the 16S rRNA gene sequence has shown that all active strains belong to the <i>Pseudomonas</i> and <i>Bacillus</i> genera. Using the gas chromatographic method, it has been shown that naphthalene was completely degraded in two to five days, and fluorene – in 15 days. The <i>Bacillus haynesii</i> 21WDT strain has been capable of degrading both naphthalene and fluorene.</p> | <p>Faizulina, E.R., Aitkeldiyeva, S.A., Tatarkina, L.G., ...Spankulova, G.A., Sadanov, A.K. Pahs-degrading bacteria isolated from oilcontaminated soil of Western Kazakhstan // Ecology, Environment and Conservation, 2020, 26(2), стр. 648-653 DOI: 0971765X</p> |
| 29. | Degradation of petroleum hydrocarbons with thermotolerant microorganisms | DOI: 10.31788/RJC.2020.1325580 | <p>ABSTRACT : In the oil-producing regions of Kazakhstan located in a climatic zone with the predominance of high temperatures, an acute problem of environmental pollution by oil hydrocarbons is noted. This work was aimed at studying the degradation of crude oil by thermotolerant oil-oxidizing strains of microorganisms isolated from the soil in Atyrau region. Oil-oxidizing microorganisms were isolated by the</p> | <p>Aitkeldiyeva, S.A., Faizulina, E.R., Tatarkina, L.G., ...Spankulova, G.A., Sadanov, A.K. Degradation of petroleum hydrocarbons with thermotolerant microorganisms // Rasayan Journal of Chemistry, 2020, 13(2), стр. 1271-1282 DOI: 10.31788/RJC.2020.1325580</p> |

| | | | | |
|------------|----------------------------------------------------------------------------------------------------------------|-------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>method of cumulative cultures. The destruction of oil was determined using the gravimetric method and gas chromatography with mass spectrometry. The identification of active strains was carried out by sequencing of the 16S rRNA gene. The research results showed that P1-35-14 and P2-50-2 cultures were active at 35°C and 50°C, respectively, while K-3 culture demonstrated high activity at both temperatures. All three strains were the most actively decomposed by n-alkanes of crude oil, such as Tridecane, Dodecane, n-Heptadecane, Pentadecane, Hexadecane, n-Heneicosane, and showed good destruction activity toward aromatic compounds m-Xylene and Naphtalene. According to the results of sequencing the 16S rRNA gene, they were allocated to <i>Rhodococcus fascians</i> K-3, <i>Gordonia amicalis</i> P1-35-14, and <i>Brevibacillus borstelensis</i> P2-50-2 types. These strains are considered to be promising for the biological products development for bioremediation of oil-contaminated soils in an arid climate.</p> | |
| 30. | Preparation and regulation of structural-mechanical properties of biodegradable films based on starch and agar | DOI: 10.15587/1729-4061.2020.213226 | <p>ABSTRACT : The problem of recycling polymer waste is one of the most actual problems. One way to solve this problem is to create biodegradable food packaging. By mixing</p> | Tazhibayeva S., Tyussyupova B., Yermagambetova A., Kokanbayev A., Musabekov K. Preparation and regulation of structural-mechanical properties of biodegradable films |

| | | | | |
|--|--|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>solutions of starch and agar at different mass ratios of polymers in the presence of glycerol, biodegradable films are obtained. Their structural and mechanical characteristics are determined. It is shown that the values of strength, modulus of elasticity and puncture resistance of films are maximal at the mass ratio of agar/starch 7-9. A comparison of the roughness of the films obtained from starch, agar and their mixture showed that the greatest roughness is possessed by films based on starch. The introduction of agar into the films of starch leads to a significant reduction in their roughness. To regulate the structural and mechanical properties of films, it is proposed to use Ca and Mg salts. The influence of Ca^{2+} and Mg^{2+} ions on the strength and deformation characteristics of biofilms was studied. It is shown that Ca^{2+} ions monotonically increase the strength characteristics of starch-agar films, while the curves of changes in these parameters in the presence of Mg^{2+} ions have maxima at a concentration of 0.5 %. The difference in the effect of Ca^{2+} and Mg^{2+} ions on the structural and mechanical properties of films is explained by the hydration degree of these ions. The biodegradability of starch-agar films was controlled by</p> | <p>based on starch and agar // Eastern-European Journal of Enterprise Technologies, ISSN 1729-3774. – №5/6 (107), 2020.- P. 40-48. DOI: 10.15587/1729-4061.2020.213226</p> |
|--|--|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

| | | | | |
|------------|--------------------------------------------------------------------------------------------------------------|-------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | changing their IR spectra. The most significant changes are observed in the intensity and localization of peaks corresponding to O-H, C-H and C-C bonds, which can be evidence of changes in the structure of films due to the destruction of the grid of hydrogen bonds and hydrophobic interactions, as well as the break of hydrocarbon chains and the destruction of the skeleton of carbohydrate molecules | |
| 31. | A research of colloidal silver's immobilization in bionanocomposites of natural polymers and montmorillonite | DOI: 10.15587/1729-4061.2020.216995 | <p>ABSTRACT :</p> <p>Currently, colloidal silver particles are used in the creation of electronic, optical, and sensor devices of a new generation. Silver-containing bionano-composites (BNCs) were synthesized by immobilization of colloidal montmorillonite particles containing colloidal silver in a composition of sodium alginate and sodium salt of carboxymethylcellulose. Silver-containing montmorillonite particles Ag-Mt were obtained by replacing Na⁺ ions in layered silicate galleries with Ag⁺ ions, followed by the transformation of silver ions into silver particles. The introduction of Ag⁺ ions into the montmorillonite structure is justified by infrared spectroscopy. When studying the strength of bionanocomposite films, it was found that with an increase in the content of Ag-Mt particles in their</p> | <p>Kuanyshebek Musabekov, Botagoz Zhakyp, Sagdat Tazhibayeva, Nurlan Musabekov, Ayagoz Yergaliyeva</p> <p>Research of colloidal silver's immobilization in bionanocomposites of natural polymers and montmorillonite// Eastern-European Journal of Enterprise Technologies. ISSN 1729-3774. – 2020. - №6/6 (108), стр. 93–101</p> <p>DOI: 10.15587/1729-4061.2020.216995</p> |

| | | | | |
|-----|---------------------------------------------------|-------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|
| | | | <p>composition, the strength increases and the deformation decreases. It is found that the equilibrium values of the swelling constant are set in ~30 minutes. At the same time, with an increase in the Ag-Mt content in the bionanocomposite from 3 % to 10 %, the value of the equilibrium swelling coefficient (K_{swell}) decreases by 2.8 times. The replacement of Na^+ ions with Ag^+ ions in the montmorillonite structure is accompanied by a decrease in the swelling of bionanocomposites, which is explained by the lower hydration of Ag^+ ions compared to Na^+ ions. As another reason for the decrease in the swelling of bimonanocomposites with an increase in the proportion of Ag-Mt in their composition, enhancing their ability to structure formation in the presence of a clay mineral is indicated. The kinetics of the release of Ag^+ ions from bionanocomposites into saline has been studied. It is shown that the release of Ag^+ ions increases with increasing pH of the medium © 2020. Kuanyshbek Musabekov, Botagoz Zhakyp, Sagdat Tazhibayeva, Nurlan Musabekov, Ayagoz Yergaliyeva This is an open access article under the CC BY license</p> | |
| 32. | Study on the influence of emulsification property | DOI: 10.1016/j.petro.2019.106627 | ABSTRACT : | Kang, W., Sarsenbekuly, B., Turtabayev, S., Aidarova S., |

| | | | | |
|--|-------------------------------------------------------------------|--|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | of functional polymers on enhanced oil recovery and its mechanism | | <p>Functional polymer flooding has been proven to be capable to improve oil recovery by mobility control and emulsification. However, the contribution degree of emulsification function of polymer flooding to oil recovery has not been clarified. This work experimentally investigated the ability of two functional polymers (RH-4 and KLP-6) with emulsification property and common polymer (HPAM) to enhance oil recovery. The steady shear viscosity, viscoelasticity and emulsification property of polymers were measured by rheometer and bottle tests, respectively. The core displacement experiments and etched glass micro-model were conducted to measure the oil recovery and the mechanism. The results showed that under the same viscosity of the three polymers, RH-4 and KLP-6 with emulsification property exhibited higher improvement of oil recovery over the emulsification-free HPAM polymer due to their higher washing efficiency. And in heterogeneous formation, the KLP-6 polymer obtained the highest recovery which can be attributed to the higher sweep volume by Jamin effect of the emulsified oil droplets. This work establishes a theoretical foundation for the</p> | <p>Gabdullin M., Ospanova, Z., Issakhov, M. Study on the influence of emulsification property of functional polymers on enhanced oil recovery and its mechanism // Journal of Petroleum Science and Engineering, 2020, 185, 106627 DOI: 10.1016/j.petrol.2019.106627</p> |
|--|-------------------------------------------------------------------|--|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

| | | | | |
|------------|-------------------------------------------------------------------------------------------------------------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | application of functional polymers in oil fields. | |
| 33. | Effect of proteolytic enzymes on the biological degradability of gelatin-based films | DOI: | ABSTRACT : Biodegradable films based on gelatin were obtained. Glycerine is used as a plasticizer of films. The effect of proteolytic enzymes: pepsin and chymosin on the biodegradability of films was studied. It is shown that the specific activity of pepsin in relation to gelatin films is higher than that of chymosin. Structural and mechanical characteristics of gelatin films in the presence of pepsin and chymosin were determined. It is shown that with an increase in the concentration of enzymes, the strength, modulus of elasticity and deformation increase, which indicates the softening and decomposition of films. The destructive effect of enzymes on gelatin films is also shown by the change in the roughness of the films, which increases in the presence of enzymes, especially in the case of pepsin. © International Research Publication House | Tyussyupova, B.B., Tazhibayeva, S.M., Musabekov, K., Mussatay, Y., Kokanbaev, A. Effect of proteolytic enzymes on the biological degradability of gelatin-based films // International Journal of Engineering Research and Technology, 2020, 13(11), сtp. 3699–3704 |
| 34. | ENVIRONMENTAL ASSESSMENT OF THE IMPACT OF TECHNOGENIC FACTORS ON THE SOIL MESOFAUNA OF THE SOUTH-EAST OF KAZAKHSTAN AND | DOI: 18196608 | ABSTRACT : A lot of research is devoted to soil fauna, which is especially harmful on cultivated lands, and its changes with different methods of cultivating cultivated plants. The patterns of changes in the mesofauna on the dry and irrigated lands were | Tukenova, Z., Akylbekova, T., Alimzhanova, M., Ashimuly, K., Saparov, A. ENVIRONMENTAL ASSESSMENT OF THE IMPACT OF TECHNOGENIC FACTORS ON THE SOIL MESOFAUNA OF THE SOUTH-EAST OF KAZAKHSTAN AND DEVELOPMENT |

| | | | | |
|--|---------------------------------------------------------------------|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | <p>DEVELOPMENT BIOINDICATIVE AND INDICATIVE FACTORS</p> | | <p>studied. The experiment, in contrast to the available works in the scientific literature, will be based on the study of the impact of technogenic factors on the mesofauna of soils in southeast Kazakhstan. Studying the soil mesofauna will make it possible to solve many cardinal problems of systematics, phylogeny, evolutionary patterns, and other issues of soil zoology. The abundance and distribution of individual groups of the soil population is significantly affected by such indicators of the soil environment as the thickness of the litter and the content of humus in the soil. There is a tendency to positively correlate the characteristics of soil zoocenosis with soil moisture. pH and soil temperature, but their influence is significant only for certain groups of mesofauna, such as earthworms of the genus Lumbricus, larvae of desert beetles, weevils and clickers. The significance of all factors considered is different for different representatives of soil invertebrates. The results showed accumulation of heavy metals (Zn, Pb, Cd, Cu) in the soil of southeastern Kazakhstan (Saimasai village) that cadmium representatives of the soil mesofauna accumulate in these quantities in the smallest amounts. The revealed features of the accumulation of HM in soil in the</p> | <p>BIOINDICATIVE AND INDICATIVE FACTORS // ARPN Journal of Engineering and Applied Sciences, 2020, 15(22), стр. 2706– 2712 DOI: 18196608</p> |
|--|---------------------------------------------------------------------|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|

| | | | | |
|-----|--------------------------------------------------------|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>territory of the village of Saimasai indicate that the lead-zinc association is characteristic of the residential area, and the lead-cadmium association is characteristic of Sadovaya and Rysbekov streets, Pb (residential and Rysbekov) and Cd (Sadovaya) occupy a leading position. The geochemical series (Kc) of the accumulation of toxic elements of hazard classes 1 and 2 in the soil of the Saimasai village was established: Pb30> Cd20> Zn15.8> Cu1.7. Thus, the conclusion is made that the absence of the overall Saimasai soil pollution coefficient (64.5) reflects a high level of pollution in accordance with the generally accepted gradation of urban pollution, that is, dangerous levels of pollutants, in particular heavy metals.</p> | |
| 35. | Analysis of green technology development in Kazakhstan | DOI: 10.32479/ijeep.10897 | <p>ABSTRACT : Although Kazakhstan is a fossil fuel rich country, policymakers desire to develop a green and sustainable economy and to contribute to the global energy transition. To understand the overall situation in green technology development in the industrial sector, we conducted the first countrywide study in Kazakhstan. In this paper, we present the results of the large survey on the use of “green technologies” by industrial companies in every region of the country. We aggregate the 380 reported cases of the use of green</p> | <p>Abdildin, Y.G., Nurkenov, S.A., Kerimray, A. Analysis of green technology development in Kazakhstan // International Journal of Energy Economics and Policy, 2021, 11(3), стр. 269–279 DOI: 10.32479/ijeep.10897</p> |

| | | | | |
|-----|-------------------------------------------------------------------------------------------|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>technologies by sectors like energy production, waste management, and others. We found the largest number of cases accumulated in the waste management sector, and the smallest in green building construction. Our work shows that only 266 out of 877 (~30%) industrial organizations in Kazakhstan utilize some form of green technology. Based on detailed analysis of 141 organizations, the Karagandy, East Kazakhstan, Aktobe, and Atyrau regions reported the largest number of applications of green technologies among the 17 administrative-territorial units of Kazakhstan. We also discuss barriers to the diffusion of clean technologies. We believe that this work will be of interest to politicians, environmentalists, and practitioners who are concerned about the impacts of global warming.</p> | |
| 36. | The effects of COVID-19-related driving restrictions on air quality in an industrial city | DOI: 10.4209/aaqr.200663 | <p>ABSTRACT : To slow the spread of COVID-19, the state of emergency was announced in Kazakhstan on March 16, 2020. Ust-Kamenogorsk instituted COVID-19 lockdown measures on April 2, 2020. The restrictions reduced the flow of traffic in the city but did not have a major impact on the large industries and power plants. In the areas with a complex profile of emission sources, traffic restriction measures alone may hardly tackle serious air pollution. This natural experiment allowed us to test how the reduction in transport movement affects air quality in Ust-Kamenogorsk, as there is a tendency to hold transport as being a major</p> | <p>Assanov, D., Kerimray, A., Batkeyev, B., Kapsalyamova, Z. The effects of COVID-19-related driving restrictions on air quality in an industrial city // Aerosol and Air Quality Research, 2021, 21(9), 200663 DOI: 10.4209/aaqr.200663</p> |

| | | | | |
|-----|------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>cause of air pollution in Ust-Kamenogorsk. This study analyzes concentrations of four major air pollutants and meteorological parameters in Ust-Kamenogorsk from March 1 to May 15 in 2016–2020. Using the fixed effects model, we find that restrictions have decreased the levels of CO by 21–23 percent, increased the levels of TSP by 13–21 percent, and had no significant effect on SO₂ and NO₂ concentrations in the city. It implies that heavy pollution in the city with SO₂, NO₂, TSP are mainly caused by non-transportrelated sources.</p> | |
| 37. | <p>Why energy access is not enough for choosing clean cooking fuels? Evidence from the multinomial logit model</p> | <p>DOI: 10.1016/j.jenvman.2021.112539</p> | <p>ABSTRACT : The transition to sustainable energy requires an assessment of drivers of the use of clean and dirty fuels for cooking. Literature highlights the importance of access to clean fuel for switching from dirty fuels to clean fuels. Though access to cleaner fuels, such as electricity promotes clean fuel use, it does not necessarily lead to a complete transition to the use of clean fuels. Households continue using traditional fuels in addition to the clean fuels. The main objective of this paper is to explain the choice of dirty cooking fuels even when access to electricity is provided. We use nationally representative household survey data to study the household energy use decisions in three middle-income countries, namely, India, Kazakhstan, and the Kyrgyz Republic. The study discusses the role of access to natural gas, free fuel, convenience or multi-use of fuels featured by the heating system installed, built-in environment, and other socio-economic factors in household fuel</p> | <p>Kapsalyamova, Z., Mishra, R., Kerimray, A., Karymshakov, K., Azhgaliyeva, D. Why energy access is not enough for choosing clean cooking fuels? Evidence from the multinomial logit model // Journal of Environmental Management, 2021, 290, 112539 DOI: 10.1016/j.jenvman.2021.112539</p> |

| | | | | |
|-----|------------------------------------------------------------------|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | choice for cooking. The results show that access to natural gas increases the likelihood of opting for clean fuel, while the availability of free fuel in rural areas and the coal-based heating system promote the use of solid fuels. | |
| 38. | Air quality and industrial emissions in the cities of Kazakhstan | DOI: 10.3390/atmos12030314 | <p>ABSTRACT :</p> <p>Industrial emissions are of major concern, especially in developing countries. Hence, there is a need for studies that investigate the trends in industrial emissions in these countries. The purpose of this study is to discuss trends in industrial emissions in Kazakhstan and the air pollution level in its industrial cities. Data on emission limit values from the permitting documents of twentyone power plants and nine metallurgical enterprises of Kazakhstan were analyzed. Eight cities (out of fourteen) had a “high” level of atmospheric air pollution according to the Air Pollution Index in 2019. Most of the considered enterprises increased their emission limit values compared to previous permitting period. At some cities there is a lack of monitoring stations, indicating the need for improving the spatial coverage of the air quality monitoring network in the industrial cities of Kazakhstan. The location of industrial plants far outside the cities could reduce the exposure of the urban population to air pollution. Kazakhstan urgently needs to adopt stringent emissions standards for coal-fired power plants and heavy industrial plants. The national air quality standards and definitions of</p> | <p>Assanov, D., Zapasnyi, V., Kerimray, A. Air quality and industrial emissions in the cities of Kazakhstan // Atmosphere, 2021, 12(3), 314 DOI: 10.3390/atmos12030314</p> |

| | | | | |
|-----|--------------------------------------------------------------------------------------------------------------|---------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | air pollutants need to be updated based on the latest scientific knowledge. | |
| 39. | What determines coal consumption for residential heating in Kazakhstan and the Kyrgyz Republic? | DOI: 10.1080/14486563.2021.1989328 | ABSTRACT : Solid fuels, such as coal and firewood, account for a large share of residential heating fuel consumption in Kazakhstan and the Kyrgyz Republic. Solid fuels used for residential space heating are a major source of indoor air pollution, which impose health risks. Using microdata from the national household surveys from Kazakhstan in 2018 and the Kyrgyz Republic in 2016, this study examines the factors affecting the choice of residential heating. We employ two models: logit and double-hurdle. The results show that access to cleaner and more modern energy infrastructure such as natural gas pipelines and district heating reduces solid fuel consumption, especially in rural areas. Regions with higher coal prices prefer cleaner heating, while regions with higher electricity prices are more likely to participate in the coal markets. Female-headed households are less likely to use coal. | Azhgaliyeva, D., Mishra, R., Karymshakov, K., Kerimray, A., Kapsalyamova, Z. What determines coal consumption for residential heating in Kazakhstan and the Kyrgyz Republic? // Australasian Journal of Environmental Management, 2021 DOI: 10.1080/14486563.2021.1989328 |
| 40. | An Empirical Model for Assessing the Impact of Air Quality on Urban Residents' Loyalty to Place of Residence | DOI: 10.1177/09754253211047202 | ABSTRACT : There has been a growing interest in the impact of environmental awareness on 'green' or 'environmentally friendly' consumption patterns, and this has been the subject of much research by environmental psychologists. However, the effect of environmental awareness on residents and their attachment to their homes and their environment has received little attention and is worthy of closer | Karaca, F., Turkyilmaz, A., Myrzagali, A., Kerimray, A., Bell, P. An Empirical Model for Assessing the Impact of Air Quality on Urban Residents' Loyalty to Place of Residence // Environment and Urbanization ASIA, 2021 DOI: 10.1177/09754253211047202 |

| | | | | |
|--|--|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| | | | <p>examination. Outdoor air quality can be considered one of the most critical environmental factors impacting the value of a residential location. This research investigates how air pollution-related environmental factors influence residents' attachment to the place of residence and their willingness to move. It defines the structural relationship between air pollution awareness parameters, which are later employed in the proposed structural equation model (SEM), to explain 'district loyalty'. A survey was carried out in Almaty, Kazakhstan, one of the most populated and polluted cities in Central Asia. A total of 550 respondents responded. Based on the overall model's test results, the factors relating to district loyalty explained the 17.5% variation in the samples, which suggests that the perception of residents to their district air quality has a low-level impact on loyalty to their place of residence. The power of perceived environmental risks appears to have little relation to district loyalty. The most influential factor on the model is environmental behaviour parameter, which is about adopting attitudes and behaviours aimed at minimizing negative impacts on the environment. When the perceived environmental risk increased, their place attachment levels only slightly decreased. However, the obtained results do not confirm that district loyalty significantly correlates with their readiness/unreadiness to move to another residence in order to enjoy improved</p> | |
|--|--|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|

| | | | | |
|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | air quality. To sum up, environmental awareness of local air quality seems not to directly affect residents' attachment to place. Nevertheless, indirect effects can be presented in research relating to urban residents' place attachment. Research, policy and sectoral implications of the findings are addressed and discussed in detail. | |
| 41. | New in situ solvothermally synthesized metal-organic framework MOF-199 coating for solid-phase microextraction of volatile organic compounds from air samples | DOI: 10.1016/j.micromeso.2021.111493 | <p>ABSTRACT :</p> <p>The development of new solid-phase microextraction coatings has attracted more attention due to a limited number of commercially available fibers and their inherent shortcomings, such as low effectiveness when extracting polar compounds, poor selectivity, and possible swelling upon exposure to certain solvents. In recent years, an increased interest has developed in the synthesis of SPME fiber coatings based on metal-organic frameworks, which are promising due to their permanent porosity, large surface area, and high mechanical and thermal stability. The in situ solvothermal method was employed in developing a new MOF-199-based coating on an etched stainless-steel core. Optimal MOF-199 deposition on the core was achieved after 16 h reaction time using 96.5% (v/v) ethanol as a solvent. The extraction effectiveness of 25 volatile organic compounds from the air (at 150 and 15 $\mu\text{g}/\text{m}^3$) was evaluated using the</p> | Omarova, A., Baizhan, A., Baimatova, N., Kenessov, B., Kazemian, H. New in situ solvothermally synthesized metal-organic framework MOF-199 coating for solid-phase microextraction of volatile organic compounds from air samples // Microporous and Mesoporous Materials this link is disabled, 2021, 328, 111493 DOI: 10.1016/j.micromeso.2021.111493 |

| | | | | |
|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>newly developed SPME fiber with 22 ± 3 μm thickness and compared with two commercially available fibers - 65 μm polydimethylsiloxane/divinylbenzene and 85 μm Carboxen/polydimethylsiloxane. In comparison with polydimethylsiloxane/divinylbenzene, the MOF-199-based fiber provided 1.3–82.3 times higher responses of 16 volatile organic compounds, as obtained using gas chromatography-mass spectrometry. The responses of five volatile organic compounds obtained using the MOF-199-based fiber were in the same range as those from Carboxen/polydimethylsiloxane fiber. The newly developed fiber exhibited a greater selectivity toward low molecular volatile organic compounds. The extraction effectiveness of the MOF-199-based fiber for nine volatile organic compounds ranged between 35 and 88%, with distribution constants in the range of 9.4×10^4 to 127×10^4.</p> | |
| 42. | Rapid quantification and screening of nitrogen-containing rocket fuel transformation products by vortex assisted liquid-liquid microextraction and gas chromatography | DOI: 10.1016/j.microc.2021.106821 | <p>ABSTRACT : Existing and newly developed technologies for clean-up of wastewaters and soils contaminated with rocket fuel unsymmetrical dimethylhydrazine (UDMH) are based on the oxidative treatment, as well as gasification in supercritical water.</p> | Ul'yanovskii, N.V., Kosyakov, D.S., Popov, M.S., ...Kenessov, B., Lebedev, A.T. Rapid quantification and screening of nitrogen-containing rocket fuel transformation products by vortex assisted liquid-liquid microextraction and gas |

| | | | | |
|--|-----------------------------------------------------|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | <p>– high-resolution Orbitrap mass spectrometry</p> | | <p>Being easily transformed by a radical mechanism, UDMH is capable of producing an extremely wide range of potentially hazardous nitrogen-containing products. Their identification and simultaneous quantification at low concentrations in water samples by gas chromatography is a challenging task requiring a matrix change. We proposed a combination of dispersive vortex-assisted liquid-liquid microextraction (VALLME) of analytes followed by gas chromatography – Orbitrap mass spectrometry allowing simultaneous target analysis and non-targeted screening. Dichloromethane and chloroform provided rapid (10 min) and effective extraction of most of UDMH transformation products. The maximum recoveries were achieved by alkalizing and saturating the aqueous samples with ammonium sulfate. The use of pyridine-d₅ as an internal standard allowed developing an approach to the simultaneous determination of 24 compounds of various classes with detection limits for the most analytes in the range 0.02–1.1 µg L⁻¹ and accuracy of 81–117% with low-cost, simple, and rapid sample preparation procedure. Extraction with a 100 µL of chloroform allowed further increasing sensitivity up to one order of magnitude</p> | <p>chromatography – high-resolution Orbitrap mass spectrometry // Microchemical Journal this link is disabled, 2021, 171, 106821 DOI: 10.1016/j.microc.2021.106821</p> |
|--|-----------------------------------------------------|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

| | | | | |
|-----|------------------------------------------------------------------------|----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | and attaining LOD values for 20 compounds in the range of 0.002–0.1 $\mu\text{g L}^{-1}$ comparable with that obtained by vacuum-assisted headspace solid-phase microextraction. The developed method was validated and tested for the analyses of real samples – degraded aqueous solution of rocket fuel, products of UDMH treatment in supercritical water and aqueous extract of soil from the place of carrier rocket accidental crash. Twenty-nine compounds that were not previously described as UDMH transformation products were tentatively identified. | |
| 43. | Development of electrochemical methods for production of pure thallium | DOI: 10.24193/subbchem.2021.1.01 | <p>ABSTRACT :</p> <p>In this work, the electrochemical studies were carried out to improve the purity of rough thallium. The results were obtained by the rough thallium refining through the anodic deposition of thallium oxide (Tl_2O_3), followed by its reduction to Tl^+ by hydroxylamine and repeated electrolysis. At the same time, platinum anode material was replaced with glassy carbon material to reduce economic costs in production. It was found that the addition of ammonium thiocyanate after the dissolution of thallium oxide(III) in nitric acid promotes the inhibition of re-formation of thallium oxide at the anode, as well as more complete oxidation of trivalent thallium to a monovalent state. The thallium obtained in this way is characterized by a purity of 99.96%. Based on the obtained experimental data the</p> | Ussipbekova, Y.Z., Seilkhanova, G.A., Berezovskiy, A.V., Kurbatov, A.P., Nauryzbaev, M.K. Development of electrochemical methods for production of pure thallium // Studia Universitatis Babeş-Bolyai Chemiathis link is disabled, 2021, 66(1), стр. 9–21 DOI: 10.24193/subbchem.2021.1.01 |

| | | | | |
|-----|-------------------------------------------------------------------------------------------------------------------------------|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | principal schemes for obtaining pure thallium are proposed. | |
| 44. | Determination of 1,3-Butadiene Migrated from Butadiene-Based Polymers to Air and Water Using Sorbent Tubes and Purge-and-Trap | DOI: 10.1007/s10337-021-04094-z | <p>ABSTRACT :</p> <p>Background and objective: 1,3-Butadiene has wide industrial application with main focus on production of butadiene-based polymers. The accurate determination of 1,3-butadiene is complicated by its high volatility. The aim of this study was to develop the method for determination of 1,3-butadiene migrated from butadiene-based polymers to air and water based on thermal desorption–gas chromatography–mass spectrometry. Methods: Purge-and-trap method was used for transferring analyte from water to gas phase followed by trapping on multi-bed sorbent tube (Carbopack B+X). Conclusions: The calibration plots for air and water with coefficients of determination $R^2 > 0.99$ were obtained in ranges 2–20, 10–200 and 50–1000 ng. The limits of detection and quantification of 1,3-butadiene were 0.02 ng and 0.06 ng, respectively. The accuracy of the developed method expressed in spike recoveries was in the range from 92 to 101% for air, and from 94 to 95% for water, with relative standard deviations below 10% for both matrices. The developed method was successfully applied for determination of 1,3-butadiene migration level from personal protective equipment (shoes) to air and water. The concentrations of 1,3-butadiene migrated to water and air were $0.044 \mu\text{g L}^{-1}$ and</p> | <p>Omarova, A., Ibragimova, O.P., Bukenov, B., ...Orazbayeva, D., Baimatova, N. Determination of 1,3-Butadiene Migrated from Butadiene-Based Polymers to Air and Water Using Sorbent Tubes and Purge-and-Trap // Chromatographiathis link is disabled, 2021 DOI: 10.1007/s10337-021-04094-z</p> |

| | | | | |
|-----|-----------------------------------------------------------------------------------------|-----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | 0.91 $\mu\text{g m}^{-3}$, respectively. Graphic Abstract: [Figure not available: see fulltext.] | |
| 45. | Surface modification of montmorillonite clay with organic molecules | DOI: 10.31788/RJC.2021.1416093 | ABSTRACT : In this paper, the organoclay was synthesized by the modification of the Na-montmorillonite from the deposit of Tagan (East Kazakhstan) with octadecylamine (ODA). Using X-ray phase analysis, the intercalation of ODA molecules in the interlayer spaces of the mineral was studied. The presence of ODA in the clay structure and the formation of hydrogen bonds in it after modification were confirmed by IR spectroscopy. According to the results of dynamic light scattering, a decrease in the particle size of montmorillonite after modification was shown. The TGA curves showed a decrease in the content of bound water in organoclay compared with the initial mineral. The determination of the contact angles made it possible to ascertain the substantial hydrophobization of montmorillonite and to create an optimal concentration of ODE causing this effect. | Musabekov, K.B., Artykova, D.M-K., Tazhibayeva, S.M., ...Sugurbekova, G.K., Kulichikhin, V. Surface modification of montmorillonite clay with organic molecules // <i>Rasayan Journal of Chemistry</i> , 2021, 14(1), стр. 635–640 DOI: 10.31788/RJC.2021.1416093 |
| 46. | Preparation of Dispersed Magnetite–Bentonite Composites and Kazcaine Adsorption on Them | DOI: 10.1134/S1061933X21030091 | ABSTRACT : Magnetite particles are prepared from a mixed aqueous solution of FeCl_2 and FeCl_3 , and magnetite–bentonite composite particles are obtained from a mixed dispersion of magnetite and bentonite by precipitation with ammonia. The | Kurmangazhi, G., Tazhibayeva, S.M., Musabekov, K.B., ...Ermakova, L.E., Yu, V.K. Preparation of Dispersed Magnetite–Bentonite Composites and Kazcaine Adsorption on Them // <i>Colloid Journal</i> , 2021, 83(3), стр. 343–351 |

| | | | | |
|--|--|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| | | | <p>dispersions are examined by the X-ray diffraction, transmission electron microscopy, IR spectroscopy, dynamic light scattering, and electrophoresis methods. In the presence of magnetite, the basal reflection at $2\theta = 6.06^\circ$ in the X-ray diffraction pattern of bentonite shifts to 7.14° due to the replacement of K^+, Na^+, and Mg^{2+} ions by Fe^{3+} ions. Moreover, peaks corresponding to iron compounds arise in the diffraction pattern, while an absorption band at 1405 cm^{-1} assigned to Fe–O bonds appears in the IR spectrum of the composite particles, thereby probably indicating the formation of small magnetite particles between bentonite layers. Along with the indicated changes, the passage from original bentonite to the magnetite–bentonite composite is accompanied by an increase in the ζ-potential of the particles from -35.1 to -25.7 mV and a decrease in their sizes from 300 to 220 nm. The latter phenomenon is explained by ion exchange, water removal from the interlayer space, and the contribution of smaller particles of magnetite. To test the functional potential of the obtained composite particles, the adsorption of a drug, kazcaine, on them is studied, and the maximum kazcaine adsorption value is found to be as large as</p> | DOI: 10.1134/S1061933X21030091 |
|--|--|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|

| | | | | |
|-----|------------------------------------------------------------|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | 74.65 mg/g. The analysis of kazcaine adsorption kinetics at different temperatures is carried out to determine the thermodynamic parameters of the process. The results obtained show that the process can be described by a pseudo-second-order kinetic equation. The Langmuir model appears to be most suitable for describing the adsorption mechanism. | |
| 47. | Biomimetic models of the human eye, and their applications | DOI: 10.1088/1361-6528/abf3ee | <p>ABSTRACT :</p> <p>Replicating the functionality of the human eye has been a challenge for more than a century, creating a great wealth of biomimetic and bioinspired devices, and providing ever improving models of the eye for myriad research purposes. As improvements in microelectronics have proceeded, individual components of the eye have been replicated, and models of the optical behaviour of the eye have improved. This review explores both work developed for improving medical components, with an ultimate aim of a fully functioning prosthetic eye, and work looking at improving existing devices through biomimetic means. It is hoped that this holistic approach to the subject will aid in the cross pollination of ideas between the two research foci. The review starts by summarising the reported measurements</p> | <p>Regal, S., Troughton, J., Djenizian, T., Ramuz, M. Biomimetic models of the human eye, and their applications // Nanotechnology, 2021, 32(30), 302001 DOI: 10.1088/1361-6528/abf3ee</p> |

| | | | | |
|-----|-----------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>of optical parameters of various components of the eye. It then charts the development of individual bionic components. Particular focus is put on the development of bionic and biomimetic forms of the two main adaptive components of the eye, namely the lens and the iris, and the challenges faced in modelling the light sensitive retina. Work on each of these components is thoroughly reviewed, including an overview of the principles behind the many different approaches used to mimic the functionality, and discussion of the pros and cons of each approach. This is concluded by an overview of several reported models of the complete or semi-complete eye, including details of the components used and a summary of the models' functionality. Finally, some consideration is given to the direction of travel of this field of research, and which existing approaches are likely to bring us closer to the long term goal of a fully functional analogue of the eye.</p> | |
| 48. | Plasticized I ₂ -free polysiloxane ionic conductors as electrolytes for stable and flexible solid-state dye-sensitized solar cells | DOI: 10.1016/j.apsadv.2021.100120 | <p>ABSTRACT : For practical applications, flexible solid-state dye-sensitized solar cells (ss-DSSCs) with high photovoltaic performance and stability are paramount. A novel iodine (I₂)-free polysiloxane based highly conductive</p> | Bharwal, A.K., Salian, G.D., Manceri, L., ...Simon, J.-J., Henrist, C. Plasticized I ₂ -free polysiloxane ionic conductors as electrolytes for stable and flexible solid-state dye-sensitized solar cells // Applied |

| | | | | |
|-----|---------------------------------------------------------------------------------------------------------|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>poly(ionic liquid), which acts as the lone charge transfer intermediate, is used for the first time as an electrolyte in flexible 1D TiO₂ nanotube photoanodes (TiO₂ NT) based ss-DSSCs. The I₂-free polymer electrolyte plasticized with ethylene carbonate (EC) leads to a higher power conversion efficiency in DSSCs involving TiO₂ NTs than the I₂-based polymer electrolyte, mainly due to improved V_{oc} and J_{sc}. Apart from overcoming the visible light absorption loss, this I₂-free polymer electrolyte also reduces the charge recombination and thus leads to higher electron lifetime in DSSCs. The I₂-free DSSCs also displayed long-term stability measured under ambient and accelerated stability testing. The improvement is also due to the effective pore infiltration into the large pores of TiO₂ NT structure in ss-DSSCs.</p> | <p>Surface Science Advances, 2021, 5, 100120 DOI: 10.1016/j.apsadv.2021.100120</p> |
| 49. | TiO ₂ nanotube layers decorated by titania nanoparticles as anodes for Li-ion microbatteries | DOI: 10.1016/j.matchemphys.2021.125337 | <p>ABSTRACT : In this work, the utilization of TiO₂ nanotube (TNT) layers decorated with TiO₂ nanoparticles (NPs) as anodes in Li-ion microbatteries is reported for the first time. Such TiO₂ NPs decorated TNT layers possess an increased amount of active material and a higher surface area compared with their non-decorated (blank) counterparts. TNT layers decorated with</p> | <p>Sopha, H., Ghigo, C., Ng, S., ...Djenizian, T., Macak, J.M. TiO₂ nanotube layers decorated by titania nanoparticles as anodes for Li-ion microbatteries // Materials Chemistry and Physics, 2022, 276, 125337 DOI: 10.1016/j.matchemphys.2021.125337</p> |

| | | | | |
|-----|----------------------------------------------------------------------|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>several different amounts of TiO₂ NPs were tested by galvanostatic cycling tests. The capacities of the TiO₂ NPs decorated TNT layer anodes increase with the amount of NPs decoration due to the enhancement of the capacitive effect. Indeed, an areal capacity of ~126 μAh cm⁻² (vs 88 μAh cm⁻² for the non-decorated TNT layer) at the 200th cycle has been obtained after optimizing the NPs loading. On the other hand, a too high NPs loading of the TNT layers leads to a reduced areal capacity due to clogging of the nanotube exteriors and a significant decrease in inner diameter of the nanotubes.</p> | |
| 50. | Dairy associations for the targeted control of opportunistic Candida | DOI: 10.1007/s11274-021-03096-1 | <p>ABSTRACT : Antifungal and antibacterial activities of twenty-six combinations of lactic acid bacteria, propionibacteria, acetic acid bacteria and dairy yeasts inoculated in whey and milk were investigated. Associations including acetic acid bacteria were shown to suppress growth of the opportunistic yeast <i>Candida albicans</i> in well-diffusion assays. The protective effect of milk fermented with the two most promising consortia was confirmed in Caco-2 cell culture infected with <i>C. albicans</i>. Indeed, these fermented milks, after heat-treatment or not, suppressed lactate dehydrogenase release after 48 h</p> | <p>Aitzhanova, A., Oleinikova, Y., Mounier, J., ...Ashimuly, K., Sadanov, A. Dairy associations for the targeted control of opportunistic <i>Candida</i> // World Journal of Microbiology and Biotechnology, 2021, 37(8), 143 DOI: 10.1007/s11274-021-03096-1</p> |

| | | | | |
|--|--|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| | | | <p>while significant increase in LDH release was observed in the positive control (<i>C. albicans</i> alone) and with fermented milk obtained using commercial yogurt starter cultures. The analysis of volatile compounds in the cell-free supernatant using solid phase microextraction (SPME) coupled to gas chromatography–mass spectrometry (GC–MS) showed accumulation of significant amount of acetic acid by the consortium composed of <i>Lactobacillus delbrueckii</i> 5, <i>Lactobacillus gallinarum</i> 1, <i>Lentilactobacillus parabuchneri</i> 3, <i>Lacticaseibacillus paracasei</i> 33-4, <i>Acetobacter syzygii</i> 2 and <i>Kluyveromyces marxianus</i> 19, which corresponded to the zone of partial inhibition of <i>C. albicans</i> growth during well-diffusion assays. Interestingly, another part of anti-<i>Candida</i> activity, yielding small and transparent inhibition zones, was linked with the consortium cell fraction. This study showed a correlation between anti-<i>Candida</i> activity and the presence of acetic acid bacteria in dairy associations as well as a significant effect of two dairy associations against <i>C. albicans</i> in a Caco-2 cell model. These two associations may be promising consortia for developing functional dairy products with antagonistic action against</p> | |
|--|--|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|

| | | | | |
|-----|-----------------------------------------------------------------------------------------------------|--------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | candidiasis agents. Graphic abstract: [Figure not available: see fulltext.] | |
| 51. | Influence of pesticides on the biological activity of light chestnut soils in South-East Kazakhstan | DOI: 10.24425/jwld.2021.136157 | <p>ABSTRACT :</p> <p>The paper discusses the impact of pesticides on the biological activity of soils, as well as an environmental assessment of the state of light chestnut soils by the Kazakh Research Institute of Agriculture and Crop Production with the aim to establish diagnostic indicators that reduce biological activity. The study covers physical, chemical and biological properties of soils under crops of winter wheat in the light chestnut soil in the South-East of the Republic of Kazakhstan. The content of pesticides in soil samples was determined using the gas chromatography mass-spectrometric method. The paper shows results of the chromatographic analysis of soil samples regarding the content of pesticides. The study of changes of light chestnut soil biological activity was conducted to determine their relative resistance to pesticide contamination. Data obtained revealed the degree of light chestnut soil resistance to pesticide contamination. The study also identified species of soil invertebrates, as well as soil enzymes that should be used as bioindicators for the monitoring of the contamination with</p> | <p>Tukenova, Z., Mustafayev, M., Alimzhanova, M., Akylbekova, T., Ashimuly, K. Influence of pesticides on the biological activity of light chestnut soils in South-East Kazakhstan // Journal of Water and Land Development, 2021, 48(1-3), стр. 141–147 DOI: 10.24425/jwld.2021.136157</p> |

| | | | | |
|-----|---------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | pesticides. Results obtained expand knowledge about changes in the biological activity of light chestnut soils due to pesticide contamination in the ecosystems of South-East Kazakhstan. In contrast to abundance indicators, the results suggest that the species composition of soil organisms can be used as a criterion for a qualitative assessment of the soil exposure to pesticides. | |
| 52. | Component Composition and Antimicrobial Activity of CO ₂ Extract of <i>Portulaca oleracea</i> , Growing in the Territory of Kazakhstan | DOI: 10.1155/2021/5434525 | <p>ABSTRACT :</p> <p>In the medicine of many countries, the use of herbal healing agents included a significant contribution to improving human health and well-being. Many antibiotics have been widely used to treat infectious diseases caused by various pathogenic bacteria. However, increased multidrug resistance has led to increased severity of diseases caused by bacterial pathogens. Bacteria remain the main causative agents of diseases that cause human death, even in the present day. This cause prompted scientists to investigate alternative new molecules against bacterial strains. The significant interest for the study is <i>Portulaca oleracea</i> L. (family <i>Portulacaceae</i>), a widespread annual plant used in folk medicine. Thus, the production and study of CO₂ extract of <i>Portulaca oleracea</i> is an actual problem. Methods.</p> | Tleubayeva, M.I., Datkhayev, U.M., Alimzhanova, M., ...Flisyuk, E.V., Gemejiyeva, N.G. Component Composition and Antimicrobial Activity of CO ₂ Extract of <i>Portulaca oleracea</i> , Growing in the Territory of Kazakhstan // <i>Scientific World Journal</i> , 2021, 2021, 5434525 DOI: 10.1155/2021/5434525 |

| | | | | |
|--|--|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| | | | <p>Raw materials were collected from Almaty and Zhambyl regions (Southeast and South Kazakhstan) in phase flowering. <i>Portulaca oleracea</i> herb's CO₂ extract was obtained by subcritical carbon dioxide extraction (installation of carbon dioxide flow-through extraction- 5L). The Wiley 7th edition and NIST'02 library were used to identify the mass spectra obtained. The antimicrobial activity study was conducted by the micromethod of serial dilution and disco-diffuse method. Standard test strains of microorganisms were used: <i>Bacillus subtilis</i> ATCC 6633, <i>Staphylococcus aureus</i> ATCC 6538-P, <i>Candida albicans</i> ATCC 10231, and <i>Escherichia coli</i> ATCC 8739. Results. The use of carbon dioxide extraction (further CO₂ extract) is a promising direction of obtaining total medicinal substances containing biologically active substances, from fractions of volatile esters of various composition and functional purpose until a fraction of fatty acids and fat-soluble vitamins. In the current study, we obtained CO₂ extract at subcritical conditions from aboveground organs of <i>Portulaca oleracea</i> and investigated the component composition for the first time. From 41 to 66 components were identified in the composition of <i>Portulaca oleracea</i>'s CO₂</p> | |
|--|--|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|

| | | | | |
|--|-----------------------------------------------------------------------|------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>extract. Studies of antimicrobial activity showed that CO₂ extract of Portulaca oleracea had the expressed effect against clinically significant microorganisms such as Escherichia coli, Staphylococcus aureus, Bacillus subtilis, and Candida albicans. Conclusions. This study showed that CO₂ extract of Portulaca oleracea's raw material contained biological active compounds exhibiting a significant antimicrobial effect.</p> | |
| | <p>P(DADMAAC-co-DMAA): Synthesis, thermal stability, and kinetics</p> | <p>DOI: 10.1002/pat.4999</p> | <p>ABSTRACT : The kinetics of copolymerization is one of the key factors for optimization the process in large scale of production. Copolymerization of N, N-dimethyl-N,N-diallylammonium chloride (DMDAAC) with N,N-dimethyl acrylamide (DMAA) was studied by a dilatometer technique using ammonium persulfate ([NH₄]₂S₂O₈) as an initiator. The effect of the parameters (including molar ratio of DMDAAC to DMAA, concentrations of monomers [M] and initiator [I], and the temperature) on the polymerization rate was analyzed. From these analyses it was found that the polymerization rate (R_p) with the above variables can be represented as the following relationship: $R_p \propto [M]^{2.63}$; $R_p \propto [I]^{0.40}$ and $R_p \propto [M_{DMDAAC}:M_{DMAA}]^{-0.86}$. The negative order found in the relationship of</p> | <p>Akhmetzhan Ayatzhan, Ayez Khan Tashenov, Abeu Nurgeldi, Ospanova Zhanar, Toktarbay Zhexenbek, Abdiyev Kaldibek, Nuxat Nuraje. P(DADMAAC-co-DMAA): Synthesis, thermal stability, and kinetics // Polymers for Advanced Technologies, 2021, 32(7), стр. 2669–2675 DOI: 10.1002/pat.4999</p> |

| | | | | |
|-----|--------------------------------------------------------------------------------------|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>the reaction rate and the monomer composition indicated that the DMDAAC concentration in the monomers composition conversely affected the polymerization rate. The overall activation energy for the polymerization rate was 39.56 kJ/mol in the temperature range between 40°C and 60°C. Based on the experimental results, the mechanism of polymerization is discussed in detail. Different thermal properties for DMDAAC and DMDAAC-DMAA were observed by differential scanning calorimetry (DSC), and thermogravimetry (TG) analysis. Addition of DMAA to DMDAAC lowered the thermal stability relative to the homopolymer of DMDAAC.</p> | |
| 53. | Synthesis and heavy-metal sorption studies of n,n-dimethylacrylamide-based hydrogels | DOI: 10.3390/polym13183084 | <p>ABSTRACT :</p> <p>In this work, a hydrogel system was produced via radical polymerization of N,N-dimethylacrylamide and 2-acrylamido-2-methylpropanesulfonic acid in the presence of N,N-methylenebis-acrylamide as a crosslinker and ammonium persulfate as an initiator. Parameters that impact the conversion of copolymerization (such as initial concentration of monomers, temperature, initiator dose, and time) were studied. The swelling degree of the hydrogel was investigated with the addition of a crosslinker and initiator at</p> | <p>Akhmetzhan, A., Abeu, N., Longinos, S.N., ...Ospanova, Z., Toktarbay, Z. Synthesis and heavy-metal sorption studies of n,n-dimethylacrylamide-based hydrogels // Polymers, 2021, 13(18), 3084 DOI: 10.3390/polym13183084</p> |

| | | | | |
|-----|---------------------------------------------------------------------------------------|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | different pH levels. A hydrogel with high conversion and high swelling degree was selected to investigate their ability for adsorption of Pb(II) ions from solutions. Adsorption behavior of Pb(II) ions in a hydrogel was examined as a function of reaction time and concentration of lead ions from a solution of Pb(II) ions. | |
| 54. | Titanium Carbide MXene Shows an Electrochemical Anomaly in Water-in-Salt Electrolytes | DOI: 10.1021/acsnano.1c06027 | <p>ABSTRACT :</p> <p>Identifying and understanding charge storage mechanisms is important for advancing energy storage. Well-separated peaks in cyclic voltammograms (CVs) are considered key indicators of diffusion-controlled electrochemical processes with distinct Faradaic charge transfer. Herein, we report on an electrochemical system with separated CV peaks, accompanied by surface-controlled partial charge transfer, in 2D Ti₃C₂T_x MXene in water-in-salt electrolytes. The process involves the insertion/desertion of desolvation-free cations, leading to an abrupt change of the interlayer spacing between MXene sheets. This unusual behavior increases charge storage at positive potentials, thereby increasing the amount of energy stored. This also demonstrates opportunities for the development of high-rate aqueous energy storage devices and</p> | Wang, X., Mathis, T.S., Sun, Y., ... Malchik, F., ...Simon, P., Gogotsi, Y. Titanium Carbide MXene Shows an Electrochemical Anomaly in Water-in-Salt Electrolytes // ACS Nano, 2021, 15(9), стр. 15274–15284 DOI: 10.1021/acsnano.1c06027 |

| | | | | |
|-----|------------------------------------|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | electrochemical actuators using safe and inexpensive aqueous electrolytes. | |
| 55. | Can Anions Be Inserted into MXene? | DOI: 10.1021/jacs.1c03840 | <p>ABSTRACT :</p> <p>Despite the continuous progress in the research and development of Ti₃C₂T_x (MXene) electrodes for high-power batteries and supercapacitor applications, the role of the anions in the electrochemical energy storage and their ability to intercalate between the MXene sheets upon application of positive voltage have not been clarified. A decade after the discovery of MXenes, the information about the possibility of anion insertion into the restacked MXene electrode is still being questioned. Since the positive potential stability range in diluted aqueous electrolytes is severely limited by anodic oxidation of the Ti, the possibility of anion insertion was evaluated in concentrated aqueous electrolyte solutions and aprotic electrolytes as well. To address this issue, we have conducted in situ gravimetric electrochemical quartz crystal microbalance with dissipation monitoring (EQCM-D) measurements in highly concentrated LiCl and LiBr electrolytes, which enable a significant extension of the operation range of the MXene electrodes toward positive potentials. Also, halogens are among the smallest anions and should</p> | <p>Shpigel, N., Chakraborty, A., Malchik, F., ...Major, D.T., Aurbach, D. Can Anions Be Inserted into MXene? // Journal of the American Chemical Society, 2021, 143(32), стр. 12552–12559 DOI: 10.1021/jacs.1c03840</p> |

| | | | | |
|-----|--------------------------------------------------------------------------------------------------------------------------|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>be easier to intercalate between MXene layers, in comparison to multiatomic anions. On the basis of mass change variations in the positive voltage range and complementary density functional theory calculations, it was demonstrated that insertion of anionic species into MXene, within the range of potentials of interest for capacitive energy storage, is not likely to occur. This can be explained by the strong negative charge on Ti₃C₂T_x sheets terminated by functional groups.</p> | |
| 56. | Influences of Cations' Solvation on Charge Storage Performance in Polyimide Anodes for Aqueous Multivalent Ion Batteries | DOI: 10.1021/acseenergylett.1c01007 | <p>ABSTRACT :</p> <p>Among the examined organic electrodes for aqueous mono and multivalent ions batteries, polyimide is considered a promising candidate because of its high capacity and good cyclability in different electrolyte solutions. While most of the studies so far were focused on the energetic performance of polyimide anodes, much less is known about their charge storage mechanism and particularly how such electrodes are affected by the solvation properties of the inserted cations. Using in situ EQCM-D, a direct assessment of the cationic fluxes and their hydration shells inserted/extracted to/from PI electrodes upon potential application was performed for a large variety of mono and multivalent cations.</p> | Nimkar, A., Malchick, F., Gavriel, B., ...Levi, M.D., Aurbach, D. Influences of Cations' Solvation on Charge Storage Performance in Polyimide Anodes for Aqueous Multivalent Ion Batteries // ACS Energy Letters, 2021, 6(7), стр. 2638–2644 DOI: 10.1021/acseenergylett.1c01007 |

| | | | | |
|------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | Our observations demonstrated a pronounced withdrawal of water molecules from the polymeric electrodes during insertion of chaotropic cations and significantly less water withdrawal upon insertion of kosmotropic cations. These findings are well correlated with the capacity and the rate capability of the polyimide electrodes in the examined systems and shed light on their charge storage mechanism. | |
| кафедра химии и технологии органических веществ, природных соединений и полимеров | | | | |
| 57. | Gellan gum and its methacrylated derivatives as in situ gelling mucoadhesive formulations of pilocarpine: In vitro and in vivo studies | DOI: 10.1016/j.ijpharm.2020.119093 (Q1 in Pharmaceutical Science) | Gellan gum was chemically modified by the reaction with methacrylic anhydride to produce derivatives with 6, 14 and 49% methacrylation. The structure and substitution degrees of these derivatives were confirmed by ¹ H NMR- and FTIR-spectroscopy. These derivatives are more hydrophobic compared to pristine gellan and form turbid solutions in water. In vitro study performed with formulations of sodium fluorescein containing gellan gum and its methacrylated derivatives indicated that methacrylation enhances their retention on bovine conjunctival mucosa. In vivo experiments with the formulations of pilocarpine hydrochloride containing gellan gum and methacrylated derivatives have demonstrated that all polymers enhance the drug effect significantly, but | Agibayeva, L.E., Kaldybekov, D.B., Porfiryeva, N.N., Garipova, V.R., Mangazbayeva, R.A., Moustafine, R.I., Semina, I.I., Mun, G.A., Kudaibergenov, S.E., Khutoryanskiy, V.V. Gellan gum and its methacrylated derivatives as in situ gelling mucoadhesive formulations of pilocarpine: In vitro and in vivo studies (2020) International Journal of Pharmaceutics, 577, статья № 119093, . DOI: 10.1016/j.ijpharm.2020.119093 |

| | | | | |
|-----|-------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | best performance is observed for the polysaccharide with 6% methacrylation. | |
| 58. | Fungal mediated biotransformation of melengestrol acetate, and T-cell proliferation inhibitory activity of biotransformed compounds | DOI: 10.1016/j.bioorg.2020.104313 (Q2 in Biochemistry) | <p>Glomerella fusarioide, and Rhizopus stolonifer were effectively able to transform the steroidal hormone melengestrol acetate (MGA) (1) into four (4) new metabolites, 17α-acetoxy-11α-hydroxy-6-methyl-16-methylenepregna-4,6-diene-3,20-dione (2), 17α-acetoxy-11α-hydroxy-6-methyl-16-methylenepregna-1,4,6-triene-3,20-dione (3), 17α-acetoxy-6,7α-epoxy-6β-methyl-16-methylenepregna-4,6-diene-3,20-dione (4), and 17α-acetoxy-11β,15β-dihydroxy-6-methyl-16-methylenepregna-4,6-diene-3,20-dione (5). All these compounds were structurally characterized by different spectroscopic techniques. The objective of the current study was to assess the anti-inflammatory potential of melengestrol acetate (1), and its metabolites 2–5. The metabolites and the substrate were assessed for their inhibitory effects on proliferation of T-cells in vitro. The substrate ($IC_{50} = 2.77 \pm 0.08 \mu M$) and its metabolites 2 ($IC_{50} = 2.78 \pm 0.07 \mu M$), 4 ($IC_{50} = 2.74 \pm 0.1 \mu M$), and 5 ($IC_{50} = < 2 \mu M$) exhibited potent T- cell proliferation inhibitory activities, while compound 3 ($IC_{50} = 29.9 \pm 0.09 \mu M$) showed a moderate activity in comparison to the standard prednisolone ($IC_{50} = 9.73 \pm 0.08 \mu M$). All the metabolites were found to be</p> | <p>Javed, S., Atia-tul-Wahab, Jabeen, A., Zhumagaliyeva, S., Abilov, Z.A., Atta-ur-Rahman, Choudhary, M.I. Fungal mediated biotransformation of melengestrol acetate, and T-cell proliferation inhibitory activity of biotransformed compounds (2020) Bioorganic Chemistry, 104, статья № 104313, . DOI: 10.1016/j.bioorg.2020.104313</p> |

| | | | | |
|-----|--------------------------------------------------------------------------------------------------------|-------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>non-toxic against 3T3 normal cell line. This study thus identifies some potent compounds active against T-cell proliferation. Their anti-inflammatory potential, therefore, deserves to be further investigated.</p> | |
| 59. | Phytochemical Study of <i>Bergenia crassifolia</i> | DOI: 10.1007/s10600-020-03184-y (Q3 in Plant Science) | Нет аннотации | <p>Akzhigitova, Z., Dyusebaeva, M.A., Tokay, T., Ydyrys, A., Lijiang, X., Jenis, J.</p> <p>Phytochemical Study of <i>Bergenia crassifolia</i> (2020) <i>Chemistry of Natural Compounds</i>, 56 (5), pp. 912-914. DOI: 10.1007/s10600-020-03184-y</p> |
| 60. | Pharmacological Activities of Psoralidin: A Comprehensive Review of the Molecular Mechanisms of Action | DOI: 10.3389/fphar.2020.571459 (Q1 in Pharmacology) | <p>Analysis of the most relevant studies on the pharmacological properties and molecular mechanisms of psoralidin, a bioactive compound from the seeds of <i>Cullen corylifolium</i> (L.) Medik. confirmed its complex therapeutic potential. In the last years, the interest of the scientific community regarding psoralidin increased, especially after the discovery of its benefits in estrogen-related diseases and as a chemopreventive agent. Growing preclinical pieces of evidence indicate that psoralidin has anticancer, antiosteoporotic, anti-inflammatory, anti-vitiligo, antibacterial, antiviral, and antidepressant-like effects. Here, we provide a comprehensive and critical review of psoralidin on its bioavailability, pharmacological activities with focus on</p> | <p>Sharifi-Rad, J., Kamiloglu, S., Yeskaliyeva, B., Beyatli, A., Alfred, M.A., Salehi, B., Calina, D., Docea, A.O., Imran, M., Anil Kumar, N.V., Romero-Román, M.E., Maroyi, A., Martorell, M.</p> <p>Pharmacological Activities of Psoralidin: A Comprehensive Review of the Molecular Mechanisms of Action (2020) <i>Frontiers in Pharmacology</i>, 11, статья № 571459, . DOI: 10.3389/fphar.2020.571459</p> |

| | | | | |
|-----|---------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>molecular mechanisms and cell signaling pathways. In this review, we conducted literature research on the PubMed database using the following keywords: “Psoralidin” or “therapeutic effects” or “biological activity” or “Cullen corylifolium” in order to identify relevant studies regarding PSO bioavailability and mechanisms of therapeutic effects in different diseases based on preclinical, experimental studies. In the light of psoralidin beneficial actions for human health, this paper gathers complete information on its pharmacotherapeutic effects and opens new natural therapeutic perspectives in chronic diseases.</p> | |
| 61. | <p>Myricetin bioactive effects: Moving from preclinical evidence to potential clinical applications</p> | <p>DOI: 10.1186/s12906-020-03033-z (Q1 in Complementary and Alternative Medicine)</p> | <p>Several flavonoids have been recognized as nutraceuticals, and myricetin is a good example. Myricetin is commonly found in plants and their antimicrobial and antioxidant activities is well demonstrated. One of its beneficial biological effects is the neuroprotective activity, showing preclinical activities on Alzheimer, Parkinson, and Huntington diseases, and even in amyotrophic lateral sclerosis. Also, myricetin has revealed other biological activities, among them as antidiabetic, anticancer, immunomodulatory, cardiovascular, analgesic and antihypertensive. However, few clinical trials have been performed using myricetin as nutraceutical. Thus, this review provides</p> | <p>Taheri, Y., Suleria, H.A.R., Martins, N., Sytar, O., Beyatli, A., Yeskaliyeva, B., Seitimova, G., Salehi, B., Semwal, P., Painuli, S., Kumar, A., Azzini, E., Martorell, M., Setzer, W.N., Maroyi, A., Sharifi-Rad, J. Myricetin bioactive effects: Moving from preclinical evidence to potential clinical applications (2020) BMC Complementary Medicine and Therapies, 20 (1), . статья № 241, . DOI: 10.1186/s12906-020-03033-z</p> |

| | | | | |
|-----|------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | new insights on myricetin preclinical pharmacological activities, and role in selected clinical trials. | |
| 62. | Foliar application of humic-stabilized nanoferrihydrate resulted in an increase in the content of iron in wheat leaves | DOI: 10.3390/agronomy10121891 (Q1 in Agronomy and Crop Science) | The objective of this study was to synthesize iron (hydr)oxide nanoparticles (IONPs) stabilized by humic substances, and to estimate the feasibility of their use for foliar application on iron deficient plants. The IONPs were synthesized by rapid hydrolysis of iron(III) nitrate in a solution of potassium humate. The iron speciation and nanoparticle morphologies were characterized using X-ray diffraction, transmission electron microscopy, and Mössbauer spectroscopy. The obtained sample of IONPs was applied at concentrations of 1-and 10-mM Fe, and 0.2% urea was used as an adjuvant. Wheat plants (<i>Triticum aestivum</i> L. cv. L15) were used for the iron uptake test. For both of the concentrations tested, spraying the nanoparticles resulted in a 70–75% higher iron content in wheat leaves compared to ferric ammonium salt of ethylenediaminetetraacetic acid (Fe-EDTA). The synergistic effect of humic substances acting as a surfactant seemed to promote an increase in the iron uptake of the ferrihydrite nanoparticles compared to the aqueous Fe-EDTA solution used in this study. We concluded that humic-stabilized IONPs are much better suited to foliar application as compared to soil amendment | Zimbovskaya, M.M., Polyakov, A.Yu., Volkov, D.S., Kulikova, N.A., Lebedev, V.A., Pankratov, D.A., Konstantinov, A.I., Parfenova, A.M., Zhilkibaev, O.T., Perminova, I.V. Foliar application of humic-stabilized nanoferrihydrate resulted in an increase in the content of iron in wheat leaves (2020) <i>Agronomy</i> , 10 (12), статья № 1891, . DOI: 10.3390/agronomy10121891 |

| | | | | |
|-----|------------------------------------------------------------------------------------------------------|----------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | when applied as a source of iron for plants. This is because humic substances act as a capping agent for nanoparticles and the surfactants enhance iron penetration into the leaf. | |
| 63. | Chitosan/poly(2-ethyl-2-oxazoline) films with ciprofloxacin for application in vaginal drug delivery | DOI: 10.3390/ma13071709 (Q2 in Condensed Matter Physics) | <p>Chitosan (CHI) and chitosan/poly(2-ethyl-2-oxazoline) (CHI/POZ)-based films were prepared by casting from aqueous solutions of polymer blends with different compositions. Ciprofloxacin was used as a model drug in these formulations. The weight, thickness, folding endurance and transparency of blend films were measured and characterised. All films had a uniform thickness (0.06 ± 0.01 mm) and exhibited sufficient flexibility. The surface pHs of films ranged from 3.76 ± 0.49 to 4.14 ± 0.32, which is within the pH range suitable for vaginal applications. The cumulative release of the drug from the films in experiments in vitro was found to be $42 \pm 2\%$ and $56 \pm 1\%$ for pure CHI and CHI/POZ (40:60) films, respectively.</p> <p>Drug-free chitosan/poly(2-ethyl-2-oxazoline) films showed weak antimicrobial activity against <i>Escherichia coli</i>. Drug-loaded CHI and CHI/POZ films showed good antimicrobial properties against both Gram-positive <i>Staphylococcus aureus</i> and Gram-negative bacteria <i>Escherichia coli</i>. Mucoadhesive properties of these films with respect to freshly excised sheep vaginal mucosa were</p> | <p>Abilova, G.K., Kaldybekov, D.B., Irmukhametova, G.S., Kazybayeva, D.S., Iskabayeva, Z.A., Kudaibergenov, S.E., Khutoryanskiy, V.V.</p> <p>Chitosan/poly(2-ethyl-2-oxazoline) films with ciprofloxacin for application in vaginal drug delivery (2020) <i>Materials</i>, 13 (7), статья № 1709, .</p> <p>DOI: 10.3390/ma13071709</p> |

| | | | | |
|-----|---------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>evaluated using a tensile method. It was established that all films were mucoadhesive, but an increase in POZ content in the blend resulted in a gradual reduction of their ability to stick to vaginal mucosa. These films could potentially find applications in vaginal drug delivery.</p> | |
| 64. | <p>Green synthesis and antimicrobial potential of silver Nanoparticles with <i>Boerhavia procumbens</i> extract</p> | <p>DOI: 10.22207/JPAM.14.2.42 (Q4 in Applied Microbiology and Biotechnology)</p> | <p>The goals of the present study were to use silver nitrate (AgNO_3) solution to synthesize plant-mediated silver nanoparticles (AgNPs) using <i>Boerhavia procumbens</i> extract, to evaluate the antimicrobial potential of crude <i>B. procumbens</i> extracts as well as the antimicrobial potential of synthesized AgNPs. The antimicrobial activity was tested against ten pathogenic bacterial strains including <i>Klebsiella pneumonia</i>, <i>Escherichia coli</i>, <i>Staphylococcus aureus</i>, <i>Pseudomonas aeruginosa</i>, <i>Citrobacter braakii</i>, <i>Providentia spp.</i>, <i>Salmonella typhi</i>, <i>Salmonella para typhi</i>, <i>Vibrio cholera</i>, and <i>Proteus vulgaris</i> and seven fungal species; <i>Rhizopus stolonifer</i>, <i>Candida albican</i>, <i>Alternaria alternata</i>, <i>Aspergillus flavus</i>, <i>Verticillium chlamydosporium</i>, <i>Penicillium chrysogenum</i>, and <i>Aspergillus oryzae</i>. The methanol extract was fractionated using several solvents and subjected to phytochemical analysis along with FTIR. Phytochemical analyses revealed flavonoids, tannins, saponins, steroids, quinones, and phenols in the</p> | <p>Rizwan, M., Amin, S., Kudaibergenova, B.M, Rauf, A., Siddique, M., Ullah, K., Bawazeer, S., Farooq, U., Mabkhot, Y.N., Ramadan, M.F. Green synthesis and antimicrobial potential of silver Nanoparticles with <i>Boerhavia procumbens</i> extract (2020) <i>Journal of Pure and Applied Microbiology</i>, 14 (2), pp. 1437-1451. DOI: 10.22207/JPAM.14.2.42</p> |

| | | | | |
|-----|------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>crude plant extract. AgNPs were synthesized using <i>B. percumbens</i> extract and characterized by UV-Vis, Fourier-transform infrared spectroscopy (FTIR), and Scanning Electron Microscopy (SEM). Synthesized AgNPs were spherical, with 20-80 nm diameter. The absorption peak of synthesized AgNPs was observed at 392 nm. AgNPs have significant antimicrobial potential against selected pathogenic bacterial and fungal species as compared to different fractions of crude <i>B. procumbens</i> extract. The current study suggests that green synthesis is a useful technique and can be used as an alternative to antimicrobial agents against pathogenic organisms.</p> | |
| 65. | <p><i>Trillium govanianum</i> Wall. Ex. Royle rhizomes extract-medicated silver nanoparticles and their antimicrobial activity</p> | <p>DOI: 10.1515/gps-2020-0054 (Q2 in Chemical Engineering (miscellaneous))</p> | <p>Synthesis of nanoparticles is a fast-growing area of interest in the current development in science and technology. Nanoparticles are also used in biomedical applications. Green synthesis of nanoparticles is an environmental friendly and cost-effective technique. <i>Trillium govanianum</i> Wall. Ex. Royle crude extract was used for the ecofriendly genesis of silver nanoparticles (AgNPs). Aromatic amines were the functional groups involved in the biofabrication and synthesis of the AgNPs. The production of AgNPs was established by the appearance of brown color. The manufactured AgNPs were characterized by UV-Vis</p> | <p>Uz-Zaman, K., Bakht, J., Malikovna, B.K., Elsharkawy, E.R., Khalil, A.A., Bawazeer, S., Rauf, A. <i>Trillium govanianum</i> Wall. Ex. Royle rhizomes extract-medicated silver nanoparticles and their antimicrobial activity (2020) <i>Green Processing and Synthesis</i>, 9 (1), pp. 503-514. DOI: 10.1515/gps-2020-0054</p> |

| | | | | |
|-----|--------------------------------------------------------------------------------|---------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>spectrophotometer, X-ray diffractometer, and FTIR spectrophotometer. AgNPs were face-centered cubic in nature with an average size of 9.99 nm. The produced AgNPs (18 μL disc-1) showed substantial antibacterial (53.74, 52.75, 51.61, 43.00, 36.84, and 36.84%) and antifungal (54.05, 42.11, 41.10, 40.85, 30.55, and 29.73%) potential against the tested bacterial (<i>X. campestris</i>, <i>P. aeruginosa</i>, <i>S. aureus</i>, <i>E. coli</i>, <i>B. subtilis</i>, and <i>K. pneumoniae</i>) and fungal (<i>A. alternaria</i>, <i>Paecilomyces</i>, <i>C. albicans</i>, <i>Curvularia</i>, <i>A. niger</i>, and <i>Rhizopus</i>) strains, respectively.</p> | |
| 66. | Effect of acrylic acid on the mechanical properties of pva/ starch blend films | DOI: 10.21608/ejchem.2019.16125.1983 (Q3 in Chemistry (miscellaneous)) | <p>Grafting polymers based on acrylic acid (AA) with blend copolymer were synthesized with different ratio of AA (0.125, 0.25 and 0.5% by mass of blend copolymer) using ammonium persulfate as an initiator. The blend copolymer (PVA/S) was prepared by blending poly(vinyl alcohol) (PVA) with starch (S) in ratio (1: 1 wt.%), in presence of glacial acetic acid as a catalyst. The obtained polymers (PVA/S/AA) were characterized by FT-IR, TGA, DTG, SEM and mechanical test. The results showed that the mechanical properties of blend films are strongly dependent on the AA. Moreover, an increase in the ratio of AA in grafted polymers, increase thermal stability, tensile strength and elongation at break.</p> | <p>Negim, E.-S., Bakytzhanuly, B., Urkimbayeva, P.I., Bekbayeva, L., Othman, M.B.H., Mohamad Ibrahim, M.N., Mun, G.A. Effect of acrylic acid on the mechanical properties of pva/ starch blend films (2020) Egyptian Journal of Chemistry, 63 (5), pp. 1911-1919. DOI: 10.21608/ejchem.2019.16125.1983</p> |

| | | | | |
|-----|----------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 67. | Hydrogels based on N-isopropylacrylamide and 2-hydroxyethylacrylate: synthesis, characterization and investigation of their antibacterial activity | DOI: 10.1002/pi.6065 (Q1 in Polymers and Plastics) | New thermosensitive hydrogels based on N-isopropyl acrylamide and 2-hydroxyethyl acrylate were prepared in the presence of ammonium persulfate as an initiator using a free-radical technique. The thermal stability as well as the physical and chemical properties of the obtained hydrogel were studied by thermogravimetric analysis, differential scanning calorimetry and scanning electron microscopy. The swelling of the hydrogels was investigated by the cathetometer method. In order to use thermosensitive hydrogels as a carrier of antibiotics (lincomycin and gentamicin), several biological tests were performed. All samples of thermosensitive poly(N-isopropyl acrylamide) and 2-hydroxyethyl acrylate hydrogels containing medical substances exhibited antibacterial activity. The antibacterial activity of temperature-sensitive hydrogels naturally increases with increasing concentration of antibiotics in the carrier. The results obtained indicate a large amount of drug was released from the hydrogels with full retention of antimicrobial properties. These copolymers can be used as an antibacterial material in the field of medicine. | Nakan, U., A Mun, G., M Shaikhutdinov, Y., Zh Yeligbayeva, G., Bierkehazhi, S., Negim, E.-S., S Selenova, B., Z Nauryzova, S. Hydrogels based on N-isopropylacrylamide and 2-hydroxyethylacrylate: synthesis, characterization and investigation of their antibacterial activity (2020) Polymer International, 69 (12), pp. 1220-1226. DOI: 10.1002/pi.6065 |
| 68. | Efficiency Problem of renewable energetics systems in the context of | DOI: 10.1051/e3sconf/202016413002 (нет квартiля) | Considering the question of efficiency of alternative energy systems, producing electricity from the position of interests of households it acquires an unexpected | Suleimenov, I., Egemberdieva, Z., Bakirov, A., Baipakbayeva, S., Kopishev, E., Mun, G. |

| | | | | |
|--|----------------------------------|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | <p>«smart house» concept</p> | | <p>sound. The efficiency can be low (about 7-10%) providing that the heat released in converting is targeted i.e also used on the needs of households. In such an approach low efficiency becomes acceptable since the most part of energy usage in households is spent on systems using the heat (hot water supply etc.) even in the summer period. It is shown that converting of energy providing targeted heat dissipation can be provided by the phenomenon of generation of electromotive force by flowing of the low-speed, low-molecular salt current trough the polymeric sewed net; relevant experimental results are presented. Basing on the analysis of low-molecular ions currents balance by flowing of solution through the gel, the theory of the phenomenon is proposed. It is shown that the described phenomenon and based on its energy converting systems can be considered as an example illustrating the perspectivity of the new paradigm of green energetics development. Given paradigm is based on principles of technical and humanitarian knowledge convergence and is completely consistent with the conclusion that the environment-friendly technologies development is a technical and social issue at one time.</p> | <p>Efficiency Problem of renewable energetics systems in the context of «smart house» concept (2020) E3S Web of Conferences, 164, статья № 13002, . DOI: 10.1051/e3sconf/202016413002</p> |
|--|----------------------------------|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

| | | | | |
|-----|--------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 69. | To the methodology of phase transition temperature determination in aqueous solutions of thermo-sensitive polymers | DOI: 10.18321/ectj960 (Q3 in Chemical Engineering (miscellaneous)) | An advanced methodology of phase transition determination in aqueous solutions of thermo-sensitive polymers by using the phase portraits method has been suggested. The methodology allows highly accurate determining the temperature when exactly half of the molecules lose solubility (from the maximum number that can go to another phase state under given conditions). It is shown that since phase transition passes usually in a wide enough temperature interval this indicator should be used as a quantitative parameter that characterizes phase transition process. Additionally, the suggested methodology allows introducing one more quantitative parameter that reflects a sharpness of phase transition. The methodology is verified by an example of phase transitions study in aqueous solutions of thermo-sensitive copolymers based on N-vinylpyrrolidone and vinyl propyl ether. | Mun, G.A., Moldakhan, I., Kabdushev, S.B., Yermukhambetova, B.B., Shaikhutdinov, R., Yeligbayeva, G.Z. To the methodology of phase transition temperature determination in aqueous solutions of thermo-sensitive polymers (2020) Eurasian Chemico-Technological Journal, 22 (2), pp. 129-133. DOI: 10.18321/ectj960 |
| 70. | Example of the Use of Artificial Neural Network in the Educational Process | DOI: 10.1007/978-3-030-39445-5_31 (Q3 in Computer Science (miscellaneous)) | An example of an artificial neural network intended for use in the educational process (in such disciplines as “The socio-political importance of artificial intelligence systems”, “History and philosophy of science”, etc.) is presented. The neural network provides automatic processing of critical reviews written by students for pseudoscientific works, presented in abundance in the current periodical press. This makes it possible to transfer such an | Ibragim, S., Akhat, B., Dinara, M., Anastasiya, G., Mariya, K., Grigoriy, M. (2020) Advances in Intelligent Systems and Computing, 1129 AISC, pp. 420-430. DOI: 10.1007/978-3-030-39445-5_31 |

| | | | | |
|-----|-------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | innovative form of study as the writing of critical reviews by students to the distance learning mode. An additional function of this neural network is testing of students in order to identify individuals with a psychological type that is appropriate to the scientist in the true meaning of the word. | |
| 71. | Microbial transformation of oral contraceptive ethisterone by <i>Aspergillus niger</i> and <i>Cunninghamella blakesleeana</i> | DOI: 10.1016/j.steroids.2019.108467 (Q3 in Biochemistry) | Ethisterone (17 α -ethynyl-17 β -hydroxyandrost-4-en-3-one) (1) is a synthetic steroidal estrogen. It is extensively used as an oral contraceptive. The current study involves the structural transformation of ethisterone (1) by <i>Aspergillus niger</i> , and <i>Cunninghamella blakesleeana</i> . Fermentation of 1 with <i>C. blakesleeana</i> afforded two new polar metabolites, 17 α -ethynyl-6 β ,15 β ,17 β -trihydroxyandrost-4-en-3-one, and 17 α -ethynyl-7 β ,15 β ,17 β -trihydroxyandrost-4-en-3-one, while transformation of ethisterone with <i>A. niger</i> yielded a new metabolite, 17 α -ethynyl-6 α ,17 β -dihydroxyandrost-4-en-3-one, along with a known metabolite, 17 α -ethynyl-11 α ,17 β -dihydroxyandrost-4-en-3-one. Modern spectroscopic techniques were used to characterize the structures of all transformed products. | Aziz, A., Bano, S., Atia-tul-Wahab, Choudhary, M.I. Microbial transformation of oral contraceptive ethisterone by <i>Aspergillus niger</i> and <i>Cunninghamella blakesleeana</i> (2020) <i>Steroids</i> , 154, статья № 108467, . DOI: 10.1016/j.steroids.2019.108467 |
| 72. | Effect of raw spirit in Borovička beverage on the quality of the product | DOI: 10.17660/ActaHortic.2020.1274.18 (Q4 in Horticulture) | “Borovička” is a distilled spirit made from juniper berries, produced by special fermentation of the <i>Juniperus communis</i> fruit. Distillate of juniper raw-material | Tarawneh, A.H., Salamon, I., Gadetskaya, A.V. |

| | | | | |
|--|--|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>occurs after special fermentation by using a neutral alcohol and drinking water. Species of <i>Juniperus communis</i> L. are considered a main raw material in the production of Borovička. The Slovak distillation industry declares a need of approximately 500 t of fresh fruits year⁻¹. Many companies do not have their own facility to collect juniper berries and to cultivate the shrubs and trees. Therefore they purchase plant raw material either from small local companies, which are organized in a juniper fruit collection in all Slovak territory, or import the berries from Albania, Macedonia, Serbia, and Bulgaria where different species of the genus <i>Juniper</i> are very common. This is the main reason for the difficulties in controlling the raw spirit industry at every stage. Low-quality raw spirit results in low-quality alcohol product. Usually, raw spirits contain by-products such as carbonyl compounds, esters, sulfur compounds, aldehydes, and organic acids. These types of compounds always appear in beverage produced by alcoholic fermentation. Their presence in the alcoholic beverage has a high influence on the quality. Results presented in the article show differences in the qualitative and quantitative characteristics of Borovička made from two different juniper species: raw materials harvested from Slovakia and Albania,</p> | <p>Effect of raw spirit in Borovička beverage on the quality of the product (2020) <i>Acta Horticulturae</i>, 1274, pp. 137-142. DOI: 10.17660/ActaHortic.2020.1274.18</p> |
|--|--|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

| | | | | |
|-----|------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | which mostly influence the taste of the Borovička alcoholic beverage. | |
| 73. | Sorption of heavy metal ions by composite materials based on polycarboxylic acids and bentonite clay | DOI: 10.18321/ectj1030 (Q3 in Chemical Engineering (miscellaneous)) | <p>The paper shows the study results of sorption capacities of composite gels based on polyacrylic and polymethacrylic acids with bentonite clay as the mineral filler concerning heavy metal ions (Pb^{+2}, Cu^{+2}, Ni^{+2}, Zn^{+2}, Fe^{+2}, Cd^{+2}). The binding of metal ions to gels occurs through the formation of electrostatic bonds between the charged surface of bentonite clay and ionogenic functional groups of polymers in the composition, as well as the coordination bonds between metal ions and unshared pairs of oxygen electrons in the functional groups of polymers. The gel swelling degree decreases in metal solutions with increasing metals concentration and the content of BC in the composite. The sorption and desorption of heavy metal ions from the polymer-clay composites from model solutions and samples of industrial wastewater from the Kazakhstani metallurgical plants were evaluated. The adjustment of the pH, the temperature of the medium and the clay content in the composite leads to increasing the degree of sorption and achieving regeneration of the used composite gels in certain media. The data obtained testify to the prospects of using these composites as effective sorbents of heavy metals from industrial wastewaters</p> | <p>Zhumagaliyeva, Sh.N., Iminova, R.S., Kairalapova, G.Zh., Kudaybergenova, B.M., Abilov, Zh.A.</p> <p>Sorption of heavy metal ions by composite materials based on polycarboxylic acids and bentonite clay (2021) Eurasian Chemico-Technological Journal, 23 (1), pp. 19-27. DOI: 10.18321/ectj1030</p> |

| | | | | |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | expanding the range of composite materials for wastewater treatment. | |
| 74. | A new metabolite from <i>Cunninghamella blakesleeana</i> -mediated biotransformation of an oral contraceptive drug, levonorgestrel | DOI: 10.1080/14786419.2019.1655018 (Q2 in Analytical Chemistry) | <i>Cunninghamella blakesleeana</i> -mediated biotransformation of an oral contraceptive drug, levonorgestrel (1), yielded a new metabolite, 13 β -ethyl-17 α -ethynyl-10,17 β -dihydroxy-4,6-dien-3-one (2), and two known metabolites 3 (13 β -ethyl-17 α -ethynyl-10 β ,17 β -dihydroxy-4-en-3-one), and 4 (13 β -ethyl-17 α -ethynyl-6 β ,17 β -dihydroxy-4-en-3-one) at an ambient temperature using aqueous media. Hydroxylation and dehydrogenation of compound 1 was observed during the biocatalytic transformation. The structure of a new metabolite 2 was determined by ^1H , ^{13}C , and 2DNMR and HR-EIMS spectroscopic techniques. | Kudaibergenova, B.M., Wahab, A.-T., Siddiqui, M., Abilov, Z.A., Choudhary, M.I. A new metabolite from <i>Cunninghamella blakesleeana</i> -mediated biotransformation of an oral contraceptive drug, levonorgestrel (2021) Natural Product Research, 35 (12), pp. 2095-2098. DOI: 10.1080/14786419.2019.1655018 |
| 75. | On the Question of the Method for Determining the Critical pH Value during the Formation of Complexes between Nonionic Polymers and Polyacid in Aqueous Solutions | DOI: 10.1134/S0965545X20060024 (Q3 in Materials Chemistry) | A new method is proposed for the quantitative determination of critical pH values during the formation of complexes between nonionic polymers and polyacids in aqueous solutions. As an indicator reflecting the pH value, where there is a transition from a solution containing noninteracting macromolecules to a solution in which the formation of an interpolymer complex occurs, the pH value should be taken with a yield of the complex formation reaction 1/2 of the maximum. The expediency of using just such an indicator is due to the fact that there is a fairly extended pH boundary | Ermukhambetova, B.B., Suleimenov, I.E., Alikulov, A.Z., Moldakhan, I., Baipakbaeva, S.T., Mun, G.A. On the Question of the Method for Determining the Critical pH Value during the Formation of Complexes between Nonionic Polymers and Polyacid in Aqueous Solutions (2021) Polymer Science - Series A, 63 (1), pp. 8-14. DOI: 10.1134/S0965545X20060024 |

| | | | | |
|-----|-------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>region with the coexistence of noninteracting macromolecules and the reaction product between them. It is shown that the indicator determined in this way can be conveniently to calculated using the phase portrait method. This technique was tested by analyzing families of experimentally obtained curves describing the effect of potassium chloride additives on the complexation process between a copolymer of 2-hydroxyethyl acrylate and butyl acrylate and poly(acrylic acid) in an aqueous solution. It was found that for this system, the nature of the dependence of the effect of ionic strength on the formation of the polycomplex significantly depends on the composition of the copolymer, while the increase of only 4.9 mol % in the content of hydrophobic butyl acrylate units in the copolymer is accompanied by the transition of this system from a weak complex to strong complex.</p> | |
| 76. | <p>Synthesis and Transformations of Novel Acetylene Glycols Derived from N-Substituted Piperidin-4-ones</p> | <p>DOI: 10.1134/S107042802102010X (Q4 in Organic Chemistry)</p> | <p>With the aim to prepare asymmetric acetylenic γ-glycols, the reactions of 1-(2-ethoxyethyl)piperidin-4-one with propargyl alcohol were studied and the reaction conditions were optimized to reach satisfactory yields of the target glycols. Some transformations of the γ-glycols were studied. It was found that the reaction of 1-(2-ethoxyethyl)-4-(3-hydroxyprop-1-yn-1-yl)piperidin-4-ol with ethyl bromide involves exclusively the OH</p> | <p>Bazhykova, K.B. Synthesis and Transformations of Novel Acetylene Glycols Derived from N-Substituted Piperidin-4-ones (2021) Russian Journal of Organic Chemistry, 57 (2), pp. 203-211. DOI: 10.1134/S107042802102010X</p> |

| | | | | |
|-----|----------------------------------------------------------------|-------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>group on the quaternary carbon atom to form a monoethyl ether, and the mercury-catalyzed hydration involves cyclization with the elimination of a water molecule from the keto glycol moiety, leading to a spiroketone. It was shown that the catalytic reduction of 1-(2-ethoxyethyl)-4-[2-(1-hydroxycyclohexyl)ethynyl]piperidin-4-ol at atmospheric pressure produces a mixture of a saturated and an unsaturated products in a 1 : 2 ratio. Quantum-chemical calculations of the stable conformers of the synthesized asymmetric acetylenic γ-glycols were performed by the RHF/STO-3G method with geometry optimization using Gaussian 09 software.</p> | |
| 77. | Phenolic Compounds from the Plant <i>Petrosimonia triandra</i> | DOI: 10.1007/s10600-021-03407-w (Q3 in Plant Science) | Нет аннотации | <p>Toktarbek, M., Seitimova, G.A., Yeskaliyeva, B.K., Burasheva, G.S., Choudhary, M.I., Atia-tul-Wahab Phenolic Compounds from the Plant <i>Petrosimonia triandra</i> (2021) Chemistry of Natural Compounds, 57 (3), pp. 536-538. DOI: 10.1007/s10600-021-03407-w</p> |
| 78. | Flavonoids from the Plant <i>Atraphaxis virgata</i> | DOI: 10.1007/s10600-021-03405-y (Q3 in Plant Science) | Нет аннотации | <p>Umbetova, A.K., Beyatli, A., Seitimova, G.A., Yeskaliyeva, B.K., Burasheva, G.S. Flavonoids from the Plant <i>Atraphaxis virgata</i> (2021) Chemistry of Natural Compounds, 57 (3), pp. 531-533. DOI: 10.1007/s10600-021-03405-y</p> |

| | | | | |
|-----|-----------------------------------------------------------------------|---------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 79. | Non-alkaloid cholinesterase inhibitory compounds from natural sources | DOI: 10.3390/molecules26185582 (Q1 in Chemistry (miscellaneous)) | Alzheimer's disease (AD) is a severe neurodegenerative disorder of different brain regions accompanied by distresses and affecting more than 25 million people in the world. This progressive brain deterioration affects the central nervous system and has negative impacts on a patient's daily activities such as memory impairment. The most important challenge concerning AD is the development of new drugs for long-term treatment or prevention, with lesser side effects and greater efficiency as cholinesterases inhibitors and the ability to remove amyloid-beta(A β) deposits and other related AD neuropathologies. Natural sources provide promising alternatives to synthetic cholinesterase inhibitors and many have been reported for alkaloids while neglecting other classes with potential cholinesterase inhibition. This review summarizes information about the therapeutic potential of small natural molecules from medicinal herbs, belonging to terpenoids, coumarins, and phenolic compounds, and others, which have gained special attention due to their specific modes of action and their advantages of low toxicity and high efficiency in the treatment of AD. Some show superior drug-like features in comparison to synthetic cholinesterase inhibitors. We expect that the listed phytoconstituents in | Tamfu, A.N., Kucukaydin, S., Yeskaliyeva, B., Ozturk, M., Dinica, R.M. Non-alkaloid cholinesterase inhibitory compounds from natural sources (2021) Molecules, 26 (18), статья № 5582, . DOI: 10.3390/molecules26185582 |
|-----|-----------------------------------------------------------------------|---------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

| | | | | |
|-----|--------------------------------------------------------------------------------------------------------|-------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>this review will serve as promising tools and chemical scaffolds for the discovery of new potent therapeutic leads for the amelioration and treatment of Alzheimer's disease.</p> | |
| 80. | <p>Natural Coumarins: Exploring the Pharmacological Complexity and Underlying Molecular Mechanisms</p> | <p>DOI: 10.1155/2021/6492346 (Q1 in Biochemistry)</p> | <p>Coumarins belong to the benzopyrone family commonly found in many medicinal plants. Natural coumarins demonstrated a wide spectrum of pharmacological activities, including anti-inflammatory, anticoagulant, anticancer, antibacterial, antimalarial, casein kinase-2 (CK2) inhibitory, antifungal, antiviral, Alzheimer's disease inhibition, neuroprotective, anticonvulsant, phytoalexins, ulcerogenic, and antihypertensive. There are very few studies on the bioavailability of coumarins; therefore, further investigations are necessitated to study the bioavailability of different coumarins which already showed good biological activities in previous studies. On the evidence of varied pharmacological properties, the present work presents an overall review of the derivation, availability, and biological capacities of coumarins with further consideration of the essential mode of their therapeutic actions. In conclusion, a wide variety of coumarins are available, and their pharmacological activities are of current interest thanks to their synthetic accessibility and riches in medicinal plants.</p> | <p>Sharifi-Rad, J., Cruz-Martins, N., López-Jornet, P., Lopez, E.P.-F., Harun, N., Yeskaliyeva, B., Beyatli, A., Sytar, O., Shaheen, S., Sharopov, F., Taheri, Y., Docea, A.O., Calina, D., Cho, W.C.</p> <p>Natural Coumarins: Exploring the Pharmacological Complexity and Underlying Molecular Mechanisms (2021) Oxidative Medicine and Cellular Longevity, 2021, статья № 6492346, . DOI: 10.1155/2021/6492346</p> |

| | | | | |
|-----|-------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | Coumarins perform the valuable function as therapeutic agents in a range of medical fields. | |
| 81. | Glycyrrhiza Genus: Enlightening Phytochemical Components for Pharmacological and Health-Promoting Abilities | DOI: 10.1155/2021/7571132 (Q1 in Biochemistry) | <p>The Glycyrrhiza genus, generally well-known as licorice, is broadly used for food and medicinal purposes around the globe. The genus encompasses a rich pool of bioactive molecules including triterpene saponins (e.g., glycyrrhizin) and flavonoids (e.g., liquiritigenin, liquiritin). This genus is being increasingly exploited for its biological effects such as antioxidant, antibacterial, antifungal, anti-inflammatory, antiproliferative, and cytotoxic activities. The species <i>Glycyrrhiza glabra</i> L. and the compound glycyrrhizin (glycyrrhizic acid) have been studied immensely for their effect on humans. The efficacy of the compound has been reported to be significantly higher on viral hepatitis and immune deficiency syndrome. This review provides up-to-date data on the most widely investigated <i>Glycyrrhiza</i> species for food and medicinal purposes, with special emphasis on secondary metabolites' composition and bioactive effects.</p> | Sharifi-Rad, J., Quispe, C., Herrera-Bravo, J., Belén, L.H., Kaur, R., Kregiel, D., Uprety, Y., Beyatli, A., Yeskaliyeva, B., Kirkin, C., Özçelik, B., Sen, S., Acharya, K., Sharopov, F., Cruz-Martins, N., Kumar, M., Razis, A.F.A., Sunusi, U., Kamal, R.M., Shaheen, S., Suleria, H.A.R. Glycyrrhiza Genus: Enlightening Phytochemical Components for Pharmacological and Health-Promoting Abilities (2021) Oxidative Medicine and Cellular Longevity, 2021, статья № 7571132, . DOI: 10.1155/2021/7571132 |
| 82. | Phytochemical analysis of aerial part of <i>Ikonnikovia kaufmanniana</i> and their protection of DNA damage | DOI: 10.1080/14786419.2019.1607858 (Q2 in Analytical Chemistry) | <i>Ikonnikovia kaufmanniana</i> is an endemic plant of Kazakhstan of which phytochemical analysis has not been reported. The present study found out that this species enriched with antioxidant chemicals. Isolation and structural | Baiseitova, A., Jenis, J., Kim, J.Y., Li, Z.P., Park, K.H. Phytochemical analysis of aerial part of <i>Ikonnikovia kaufmanniana</i> and their protection of DNA damage |

| | | | | |
|-----|-------------------------------------------------------------------------------------------------|---------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>identification processes reveal twelve phenolic compounds (1–12) having dihydroflavanonol, flavonol, isoflavone and flavanol skeletons. The annotation of individual components in the extract was carried out by LC-ESI-MS/MS to represent a chemotaxonomic marker of the target plant. The antioxidant activities of all compounds were screened using three different radical sources (DPPH, ORAC, and hydroxyl radicals). Most compounds (1–11) had significant antioxidant activity against three radical sources, and their efficacies were found to differ by their functionality and skeleton. The potential of the isolated compounds in preventing oxidative damage of DNA was evaluated with pBR322 plasmid DNA. Compounds (1, 5, 7, and 8) had protective effects on DNA damaged with 80% efficacy at 60 μM concentration.</p> | <p>(2021) Natural Product Research, 35 (5), pp. 880-883. DOI: 10.1080/14786419.2019.1607858</p> |
| 83. | Challenges and future directions of potential natural products leads against 2019-nCoV outbreak | DOI: 10.1016/j.cpb.2020.100180 (Q2 in Plant Science) | <p>Except for Remdesivir® no other drug or vaccine has yet been approved to treat the coronavirus disease (COVID-19) caused by the virus known as, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Remdesivir® an small molecule and nucleic acid analogue, it is used to treat adults and children with laboratory confirmed COVID-19, only administrated in hospital settings. Small molecules and particularly natural products count for almost fifty percent of the</p> | <p>Ospanov, M., León, F., Jenis, J., Khan, I.A., Ibrahim, M.A. Challenges and future directions of potential natural products leads against 2019-nCoV outbreak (2020) Current Plant Biology, 24, статья № 100180, . DOI: 10.1016/j.cpb.2020.100180</p> |

| | | | | |
|-----|-----------------------------------------------------------------------------|-----------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | commercially available drugs, several of them are marketed antiviral agents and those can be a potential agent to treat COVID-19 infections. This short review rationalized different key natural products with known activity against coronaviruses as potential leads against COVID-19. | |
| 84. | Modified humic substances as soil conditioners: Laboratory and field trials | DOI: 10.3390/agronomy11010150 (Q1 in Agronomy and Crop Science) | <p>The paper is devoted to the development and performance testing of a soil conditioner based on leonardite humic substances (LHS) modified with 3-aminopropyltriethoxysilane (APTES). The modified HS were obtained by adding APTES to LHS solution at different mass ratios of LHS and APTES, followed by the investigation of siloxane structures using ^{31}Si NMR spectroscopy. The Urbic Technosol was used as a model soil. The size and amount of water-stable soil aggregates were estimated using wet sieving and laser diffraction, respectively.</p> <p>Toxicity was evaluated by monitoring microbial substrate-induced respiration (SIR) and seedling bioassay. Laboratory column experiments demonstrated an increase in water-stability of the 3–5 mm soil aggregates after LHSAPTES application. Field tests showed an increase in the average weighted diameter of micro aggregates (from 59 to 73 μm) and water-stable macroaggregates (from 1.6 to 2.9 mm) due to the LHS-APTES amendment. A substantial increase in SIR from 5 to 9</p> | <p>Kulikova, N.A., Volikov, A.B., Filippova, O.I., Kholodov, V.A., Yaroslavtseva, N.V., Farkhodov, Y.R., Yudina, A.V., Roznyatovsky, V.A., Grishin, Y.K., Zhilkibayev, O.T., Perminova, I.V.</p> <p>Modified humic substances as soil conditioners: Laboratory and field trials (2021) Agronomy, 11 (1), статья № 150, . DOI: 10.3390/agronomy11010150</p> |

| | | | | |
|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>mg CO₂ (kg h)⁻¹ was detected. Better survival of seedlings was observed. The obtained beneficial results indicate that APTESmodified HS can be successfully used as a soil conditioner. The formation of extended siloxane networks was suggested as the main mechanism of the observed improvement in the structure of the amended soils.</p> | |
| 85. | <p>Synthesis of hydrolytically and oxidation-responsive networks using thiol-ene “click” chemistry with pentaerythritol tetrakis(3-mercaptopropionate) and tri/tetra-acrylates</p> | <p>DOI: 10.1002/pat.5147 (Q1 in Polymers and Plastics)</p> | <p>Thiol-ene click reactions of pentaerythritol tetrakis(3-mercaptopropionate) with pentaerythritol tetraacrylate and trimethylolpropane triacrylate were used to prepare polymeric degradable networks. The structure and properties of these networks were studied using Fourier-transform infrared and Raman spectroscopy, thermal gravimetric analysis and scanning electron microscopy. Degradation of these materials was evaluated in different media including phosphate buffer with and without esterase as well as in oxidative environment with hydrogen peroxide. Exposure of the samples to these media results in their degradation. Slow hydrolytic degradation was observed in phosphate buffer and it was not accelerated by the presence of an enzyme. Faster degradation is observed in solutions of hydrogen peroxide. The mechanisms of this degradation are discussed.</p> | <p>Kazybayeva, D.S., Irmukhametova, G.S., Khutoryanskiy, V.V. Synthesis of hydrolytically and oxidation-responsive networks using thiol-ene “click” chemistry with pentaerythritol tetrakis(3-mercaptopropionate) and tri/tetra-acrylates (2021) <i>Polymers for Advanced Technologies</i>, 32 (7), pp. 2682-2689. DOI: 10.1002/pat.5147</p> |

| | | | | |
|-----|-----------------------------------------------------------------------|---------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 86. | Test trials of a process to produce briquettes from coal mining waste | DOI: 10.17580/gzh.2021.02.12 (Q3 in Geotechnical Engineering and Engineering Geology) | <p>At the present time, coal production wastes up to 2 % of fine fraction, which has adverse impact on the environment. On the other hand, coal fines can be a feedstock to obtain different products of chemical processing—benzines, oils, briquettes, etc. For this reason, it is necessary to develop dedicated technologies to utilize fine waste in manufacture of products having high added value. The experimental results demonstrate usability of wheat bran as a binder in coal waste briquetting. It is found how the binder and the briquetting conditions influence the physical and mechanical properties and combustion characteristics of coal briquettes. The optimized coal briquetting conditions are: carbonization of feedstock, use of binder in quantity of 25–30 mass%, briquetting pressure of 4 MPa. Thus, the authors have analyzed the influence of the briquetting conditions on the properties of coal briquettes, and have tested the earlier developed approaches to transformation of Oi-Karagai coal fines into a target product of high added value. The authors appreciate participation of A. Karagulanov, fellow of the Al-Farabi Kazakh National University in this study.</p> | <p>Ketegenov, T.A., Yushina, T.I., Kalugin, S.N., Kamunur, K. Test trials of a process to produce briquettes from coal mining waste (2021) Gornyi Zhurnal, 2021 (2), pp. 93-96. DOI: 10.17580/gzh.2021.02.12</p> |
| 87. | Optimization of microbial assisted phytoremediation of soils | DOI: 10.1080/15226514.2020.1825330 (Q2 in Plant Science) | 580 microbial strains were isolated from the rhizosphere of the plants Cucurbita pepo L. and Xanthium strumarium grown on soil contaminated with | Nurzhanova, A., Mukasheva, T., Berzhanova, R., Kalugin, S., Omirbekova, A., Mikolasch, A. |

| | | | | |
|-----|------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | contaminated with pesticides | | <p>dichlorodiphenyltrichloroethane (DDT) and its metabolites. During the cultivation, two bacterial strains were selected because of their ability to grow on media containing 0.5–5.0 mg L⁻¹ of dichlorodiphenyldichloroethylene (DDE) as the sole carbon source. They were identified as <i>Bacillus vallismortis</i> and <i>Bacillus aryabhatai</i>. Both of these species were shown to have a high capacity for the utilization of DDE—more than 90% of which was consumed after 21 days of cultivation. Laboratory experiments were carried out then to assess the possibility of using these strains for the decontamination of organochlorine pesticides (OCPs) contaminated soils. Inoculation of <i>C. pepo</i> and <i>X. strumarium</i> with our isolates <i>B. vallismortis</i> and <i>B. aryabhatai</i> resulted in a reduction of the pollutant stress to the plants as shown by an increase both in aboveground and in root biomass. The microorganisms enhanced the uptake and phytostabilization potential of <i>C. pepo</i> and <i>X. strumarium</i> and can be applied for the treatment of DDE contaminated soils.</p> | <p>Optimization of microbial assisted phytoremediation of soils contaminated with pesticides (2021) <i>International Journal of Phytoremediation</i>, 23 (5), pp. 482-491. DOI: 10.1080/15226514.2020.1825330</p> |
| 88. | Development of a methodology for the study of polymer wound coatings for application characteristics | DOI: 10.21608/EJCHEM.2020.34370.2718 (Q3 in Chemistry (miscellaneous)) | <p>This paper reports a research methodology for characterizing wound dressings in order to assess the application properties of medical devices as a whole. Wound dressing was based on grafting polymerization of N-vinyl caprolactam and 2-hydroxyethyl acrylate on polyvinyl</p> | <p>Urkimbayeva, P.I., Koshkinbayev, Zh.B., Abilova, G.K., Kenessova, Z.A., Yessirkepova, A.N., Samenova, N.O., Bekbayeva, L. Development of a methodology for the study of polymer wound coatings for application characteristics</p> |

| | | | | |
|-----|-----------------------------------------------------------------------------------|--------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>alcohol. The obtained copolymer was characterized by FTIR. Cross-linked films of wound dressings were obtained by radiation treatment of the copolymers. The physico-mechanical properties of wound dressings were investigated. Testing included degree of swelling, elastic modulus, tensile strength and elongation at break. The radiation doses of the reaction affected physico-mechanical properties of wound dressings. As the dose of radiation increased, the yield of gel increased, degree of swelling and tensile strength decreased. Also, the results indicated that yield of the crosslinked fraction increases, and the swelling capacity of polymer mesh decreases with increasing 2-hydroxyethyl acrylate content in the graft copolymer.</p> | <p>(2021) Egyptian Journal of Chemistry, 64 (4), pp. 1957-1964. DOI: 10.21608/EJCHEM.2020.34370.2718</p> |
| 89. | Resveratrol-Based Nanoformulations as an Emerging Therapeutic Strategy for Cancer | DOI: 10.3389/fmolb.2021.649395 (Q1 in Biochemistry) | <p>Resveratrol is a polyphenolic stilbene derivative widely present in grapes and red wine. Broadly known for its antioxidant effects, numerous studies have also indicated that it exerts anti-inflammatory and antiaging abilities and a great potential in cancer therapy. Regrettably, the oral administration of resveratrol has pharmacokinetic and physicochemical limitations such as hampering its effects so that effective administration methods are demanding to ensure its efficiency. Thus, the present review explores the published data on the application of resveratrol nanoformulations in cancer therapy, with</p> | <p>Sharifi-Rad, J., Quispe, C., Mukazhanova, Z., Knut, E., Turgumbayeva, A., Kipchakbayeva, A., Seitimova, G., Mahomoodally, M.F., Lobine, D., Koay, A., Wang, J., Sheridan, H., Leyva-Gómez, G., Prado-Audelo, M.L.D., Cortes, H., Rescigno, A., Zucca, P., Sytar, O., Imran, M., Rodrigues, C.F., Cruz-Martins, N., Ekiert, H., Kumar, M., Abdull Razis, A.F., Sunusi, U., Kamal, R.M., Szopa, A. Resveratrol-Based Nanoformulations as an Emerging Therapeutic Strategy for Cancer</p> |

| | | | | |
|-----|--------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | the use of different types of nanodelivery systems. Mechanisms of action with a potential use in cancer therapy, negative effects, and the influence of resveratrol nanoformulations in different types of cancer are also highlighted. Finally, the toxicological features of nanoresveratrol are also discussed. | (2021) <i>Frontiers in Molecular Biosciences</i> , 8, статья № 649395, . DOI: 10.3389/fmolb.2021.649395 |
| 90. | Green synthesis, in vivo and in vitro pharmacological studies of <i>Tamarindus indica</i> based gold nanoparticles | DOI: 10.1007/s00449-020-02500-8 (Q2 in Bioengineering) | <p>The current investigation aims to synthesize gold nanoparticles (AuNPs) from aqueous extract of <i>Tamarindus indica</i> and to evaluate the in vitro anti-bacterial and in vivo sedative and anelgescic activities of crude extract as well as synthesized AuNPs. Several methods have been reported to synthesize AuNPs; however, most of them were not ecofriendly. In the present study, the green synthesis of AuNPs has been carried out. Using the green synthesis method, AuNPs of <i>T. indica</i> were synthesized at room temperature (25 °C) by mixing 5 mL of HAuCl₄ (1 mM) with 1 mL of <i>T. indica</i> seed extract solution. This extract solution was prepared by taking 5 gm dry seeds in 100 mL of double deionized water with continuous stirring for up to 24 h at 80 °C. The stability of AuNPs was confirmed with the help of relevant experimental techniques including ultraviolet–visible (UV/Vis) showing maximum absorbance at 535–540 nm, Fourier transform infrared showing a broad signal at 3464 cm⁻¹ which</p> | <p>Ullah, U., Rauf, A., El-Sharkawy, E., Khan, F.A., Khan, A., Bukhari, S.M., Bawazeer, S., Mabkhot, Y.N., Malikovna, B.K., Kazhybayeva, G., Shariati, M.A., Thiruvengadam, M. Green synthesis, in vivo and in vitro pharmacological studies of <i>Tamarindus indica</i> based gold nanoparticles (2021) <i>Bioprocess and Biosystems Engineering</i>, 44 (6), pp. 1185-1192. DOI: 10.1007/s00449-020-02500-8</p> |

| | | | | |
|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>can be attributed to either amide or hydroxyl functionalities and atomic force microscopy analysis showed that the biomaterial surrounding AuNPs was agglomerated which proves the formation of discrete nanostructures. These AuNPs have been evaluated for their antibacterial potential. The results revealed good antibacterial activity of the samples against <i>Klebsiella pneumonia</i>, <i>Bacillus subtilis</i> and <i>Staphylococcus epidermidis</i> with 10–12 mm zone of inhibition range. The AuNPs were also found stable at high temperature, over a range of pH and in 1 mM salt solution. Moreover, the crude extract and respective AuNPs also exhibited interesting sedative and analgesic activities. Hence, we focused on phytochemicals-mediated synthesis of AuNPs considered as greatest attention in the treatment of anti-bacterial, analgesic, and sedative.</p> | |
| 91. | <p>Green synthesis and biomedical applications of silver and gold nanoparticles functionalized with methanolic extract of <i>Mentha longifolia</i></p> | <p>DOI: 10.1080/21691401.2021.1890099 (Q1 in Biotechnology)</p> | <p>This study deals with facile and rapid synthesis of silver nanoparticles (AgNPs) and Gold nanoparticles (AuNPs) using <i>Mentha longifolia</i> leaves extracts (MLE). The synthesized AgNPs and AuNPs were characterized by UV-visible spectroscopy (UV-Vis), Fourier transformed infra-red spectroscopy (FT-IR), atomic force microscopy (AFM) and transmission electron microscopy (TEM) techniques. The phytochemical analysis showed the</p> | <p>Rauf, A., Ahmad, T., Khan, A., Maryam, Uddin, G., Ahmad, B., Mabkhot, Y.N., Bawazeer, S., Riaz, N., Malikovna, B.K., Almarhoon, Z.M., Al-Harrasi, A. Green synthesis and biomedical applications of silver and gold nanoparticles functionalized with methanolic extract of <i>Mentha longifolia</i></p> |

| | | | | |
|-----|-----------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>presence of bioactive secondary metabolites, which are involved in the synthesis of nanoparticles (NPs). The surface plasmon resonance (SPR) observed at 435 and 550 nm, confirmed the green synthesis of AgNPs and AuNPs, respectively. The TEM images showed poly dispersed and round oval shapes of Ag and Au NPs with an average particles size of 10.23 ± 2 nm and 13.45 ± 2 nm, respectively. TEM results are in close agreements with that of AFM analysis. The FT-IR spectroscopy revealed the presence of OH, $-\text{NH}_2$ and C = O groups, which involved in the synthesis of NPs. The MLE and their AgNPs and AuNP exhibited good in vitro antibacterial and anti-oxidant activities. Moreover, MLE and NPs also showed in vivo analgesic activities in mice, and excellent sedative properties in open field test paradigm.</p> | <p>(2021) Artificial Cells, Nanomedicine and Biotechnology, 49 (1), pp. 194-203. DOI: 10.1080/21691401.2021.1890099</p> |
| 92. | Thermosensitive N-isopropylacrylamide - CO-2-hydroxyethyl acrylate hydrogels interactions with poly(acrylic acid) and surfactants | DOI: 10.1002/pat.5070 (Q1 in Polymers and Plastics) | <p>Thermosensitive hydrogels based on N-isopropylacrylamide (NIPAAm) and 2-hydroxyl ethyl acrylate (2-HEA) were synthesized with different composition ratios at 50:50 and 70:30 mol% using ammonium persulfate as free radical initiation system. The hydrogel was characterized by Fourier transform infrared spectroscopy (FTIR). The interpolymer complex between hydrogels and linear with poly(acrylic acid) (PAA) with different molecular weight was studied.</p> | <p>Nakan, U., Mun, G.A., Rakhmetullayeva, R.K., Tolkin, B., Bieerkehazhi, S., Yeligbayeva, G.Z., Negim, E.-S. Thermosensitive N-isopropylacrylamide -CO-2-hydroxyethyl acrylate hydrogels interactions with poly(acrylic acid) and surfactants (2021) Polymers for Advanced Technologies, 32 (7), pp. 2676-2681. DOI: 10.1002/pat.5070</p> |

| | | | | |
|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>The effect of pH, molecular weights, inorganic salt (NaCl) as well as surfactants concentrations on the complexation was investigated. The swelling behavior of the thermosensitive hydrogels in PAA solutions went up with increasing pH and molecular weight of PAA. However, the decreasing the concentration of surfactants sodium dodecyl sulfate (SDS) and cetylpyridinium bromide (CPB) increased the swelling behavior of hydrogels.</p> | |
| 93. | <p>Some peculiarities of the kinetics of interaction of cationic hydrogels based on copolymers of vinyl esters of monoethanolamine and ethylene glycol with copper ions</p> | <p>DOI: 10.21533/pen.v9i4.2310 (Q2 in Architecture)</p> | <p>Over the past few decades, formation of polymer hydrogels complexes with metal ions, including transition ones, attracts the steady attention of researchers. The relevance of such study is due to the fact that the kinetics of swelling and contraction of hydrogels in various media has been studied in many works, however, this question remains insufficiently studied. Cationic hydrogels based on copolymer of vinyl ethers of monoethanolamine (VEMEA) and ethylene glycol (VEEG) as the study subject in the present work have been used. The kinetics of interaction cationic hydrogels based on copolymer of vinyl ethers of monoethanolamine and ethylene glycol with copper ions in aqueous solutions has been studied. It was shown that swelling behavior such hydrogel in this process is characterized two stages. At the initial stages of the interaction of the</p> | <p>Mun, G., Yeligbayeva, G., Nakan, U., Amitova, A., Suleimenov, I. Some peculiarities of the kinetics of interaction of cationic hydrogels based on copolymers of vinyl esters of monoethanolamine and ethylene glycol with copper ions (2021) Periodicals of Engineering and Natural Sciences, 9 (4), pp. 291-304. DOI: 10.21533/pen.v9i4.2310</p> |

| | | | | |
|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>gel with the copper salt solution, the interaction in question is determined mainly by the displacement of water from the swollen mesh, due to the difference in osmotic pressures inside and outside the sample. At this stage, the kinetics of the gel contraction is described by the same laws as for polyelectrolyte hydrogel in the alkali metal solution. At the second stage, the network charge density increases due to the formation of a complex, and the degree of the gel swelling begins to increase with time. On the basis of the results obtained, it can be assumed that in systems of this kind, metastable states with differences in character from truly equilibrium states, persisting for a long time, can be formed.</p> | |
| 94. | <p>Fluorine-Containing Block and Gradient Copoly(2-oxazoline)s Based on 2-(3,3,3-Trifluoropropyl)-2-oxazoline: A Quest for the Optimal Self-Assembled Structure for ¹⁹F Imaging</p> | <p>DOI: 10.1021/acs.biomac.1c00367 (Q1 in Bioengineering)</p> | <p>The use of fluorinated contrast agents in magnetic resonance imaging (MRI) facilitates improved image quality due to the negligible amount of endogenous fluorine atoms in the body. In this work, we present a comprehensive study of the influence of the amphiphilic polymer structure and composition on its applicability as contrast agents in ¹⁹F MRI. Three series of novel fluorine-containing poly(2-oxazoline) copolymers and terpolymers, hydrophilic-fluorophilic, hydrophilic-lipophilic-fluorophilic, and hydrophilic-thermoresponsive-fluorophilic, with block and gradient distributions of the</p> | <p>Kaberov, L.I., Kaberova, Z., Murmiliuk, A., Trousil, J., Sedláček, O., Konefal, R., Zhigunov, A., Pavlova, E., Vít, M., Jiráček, D., Hoogenboom, R., Filippov, S.K. Fluorine-Containing Block and Gradient Copoly(2-oxazoline)s Based on 2-(3,3,3-Trifluoropropyl)-2-oxazoline: A Quest for the Optimal Self-Assembled Structure for ¹⁹F Imaging (2021) Biomacromolecules, 22 (7), pp. 2963-2975. DOI: 10.1021/acs.biomac.1c00367</p> |

| | | | | |
|-----|------------------------------------------------------------------------|------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>fluorinated units, were synthesized. It was discovered that the CF₃ in the 2-(3,3,3-trifluoropropyl)-2-oxazoline (CF₃EtOx) group activated the cationic chain end, leading to faster copolymerization kinetics, whereby spontaneous monomer gradients were formed with accelerated incorporation of 2-methyl-2-oxazoline or 2-n-propyl-2-oxazoline with a gradual change to the less-nucleophilic CF₃EtOx monomer. The obtained amphiphilic copolymers and terpolymers form spherical or wormlike micelles in water, which was confirmed using transmission electron microscopy (TEM), while small-angle X-ray scattering (SAXS) revealed the core-shell or core-double-shell morphologies of these nanoparticles. The core and shell sizes obey the scaling laws for starlike micelles predicted by the scaling theory. Biocompatibility studies confirm that all copolymers obtained are noncytotoxic and, at the same time, exhibit high sensitivity during in vitro ¹⁹F MRI studies. The gradient copolymers provide the best ¹⁹F MRI signal-to-noise ratio in comparison with the analogue block copolymer structures, making them most promising as ¹⁹F MRI contrast agents.</p> | |
| 95. | Reversible multilayered vesicle-like structures with fluid hydrophobic | DOI: 10.1016/j.jcis.2021.04.050 (Q1 in Biomaterials) | Hydrophobic blocks of amphiphilic block copolymers often form glassy micellar cores at room temperature with a rigid structure that limits their applications as | Murmiliuk, A., Filippov, S.K., Rud, O., Košovan, P., Tošner, Z., Radulescu, A., Skandalis, A., Pispas, S., Šlouf, M., Štěpánek, M. |

| | | | | |
|--|----------------------------------------|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | <p>and interpolyelectrolyte layers</p> | | <p>nanocapsules for targeted delivery. Nevertheless, we prepared and analyzed core/shell micelles with a soft core, formed by a self-assembled block copolymer consisting of a hydrophobic block and a polycation block, poly(lauryl acrylate)-block-poly(trimethyl-aminoethyl acrylate) (PLA-QPDMAEA), in aqueous solution. By light and small-angle neutron scattering, by transmission electron microscopy and by fluorescence spectroscopy, we showed that these core/shell micelles are spherical and cylindrical with a fluid-like PLA core and a positively charged outer shell and that they can encapsulate and release hydrophobic solutes. Moreover, after mixing these PLA-QPDMAEA core/shell micelles with another diblock copolymer, consisting of a hydrophilic block and a polyanion block, namely poly(ethylene oxide)-block-poly(methacrylic acid) (PEO-PMAA), we observed the formation of novel vesicle-like multicompartiment structures containing both soft hydrophobic and interpolyelectrolyte (IPEC) layers. By combining small-angle neutron scattering with self-consistent field modeling, we confirmed the formation of these complex vesicle-like structures with a swollen PEO core, an IPEC inner layer, a PLA soft layer, an IPEC outer layer and a loose PEO corona. Thus, these</p> | <p>Reversible multilayered vesicle-like structures with fluid hydrophobic and interpolyelectrolyte layers (2021) Journal of Colloid and Interface Science, 599, pp. 313-325. DOI: 10.1016/j.jcis.2021.04.050</p> |
|--|----------------------------------------|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

| | | | | |
|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>multicompartment micelles with fluid and IPEC layers and a hydrophilic corona may be used as nanocapsules with several tunable properties, including the ability to control the thickness of each layer, the charge of the IPEC layers and the stability of the micelles, to deliver both hydrophobic and multivalent solutes.</p> | |
| 96. | <p>Understanding the temperature induced aggregation of silica nanoparticles decorated with temperature-responsive polymers: Can a small step in the chemical structure make a giant leap for a phase transition?</p> | <p>DOI: 10.1016/j.jcis.2021.01.044 (Q1 in Biomaterials)</p> | <p>Temperature-responsive nanomaterials have gained increasing interest over the past decade due their ability to undergo conformational changes in situ, in response to a change in temperature. One class of temperature-responsive polymers are those with lower critical solution temperature, which phase separate in aqueous solution above a critical temperature. When these temperature-responsive polymers are grafted to a solid nanoparticle, a change in their surface properties occurs above this critical temperature, from hydrophilic to more hydrophobic, giving them a propensity to aggregate. This study explores the temperature induced aggregation of silica nanoparticles functionalised with two isomeric temperature-responsive polymers with lower critical solution temperature (LCST) behavior, namely poly(N-isopropyl acrylamide) (PNIPAM), and poly(2-n-propyl-2-oxazoline) (PNPOZ) with similar molecular weights (5000 Da) and grafting density. These nanoparticles exhibited</p> | <p>Mansfield, E.D.H., Filippov, S.K., de la Rosa, V.R., Cook, M.T., Grillo, I., Hoogenboom, R., Williams, A.C., Khutoryanskiy, V.V. Understanding the temperature induced aggregation of silica nanoparticles decorated with temperature-responsive polymers: Can a small step in the chemical structure make a giant leap for a phase transition? (2021) Journal of Colloid and Interface Science, 590, pp. 249-259. DOI: 10.1016/j.jcis.2021.01.044</p> |

| | | | | |
|-----|-----------------------------------------------|-----------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>striking differences in the temperature of aggregation, which is consistent with LCST of each polymer. Using a combination of small-angle neutron scattering (SANS) and dynamic light scattering (DLS), we probed subtle differences in the aggregation mechanism for PNIPAM- and PNPOZ-decorated silica nanoparticles. The nanoparticles decorated with PNIPAM and PNPOZ show similar aggregation mechanism that was independent of polymer structure, whereby aggregation starts by the formation of small aggregates. A further increase in temperature leads to interaction between these aggregates and results in full-scale aggregation and subsequent phase separation.</p> | |
| 97. | Future and the past of polymeric antioxidants | DOI: 10.1002/pat.5203 (Q1 in Polymers and Plastics) | <p>Hybrid macromolecular antioxidants has evolved into a mature research field last three decades. The main concept of this area was to design polymer conjugates that combine in one structure the hydrophilic properties of a polymer backbone and biological efficiency of hydrophobic antioxidants. Over the years, the understanding of different aspects of such approach has grown. In general, meticulous selection of each component is essential to obtain the conjugate with required properties. This review overview a plethora of hybrid macromolecular antioxidants synthesized over the last 20</p> | <p>Filippov, S.K., Domnina, N., Vol'eva, V. Future and the past of polymeric antioxidants (2021) Polymers for Advanced Technologies, 32 (7), pp. 2655-2668. DOI: 10.1002/pat.5203</p> |

| | | | | |
|-----|-------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | years, together with the discussion their physicochemical properties and application for biomedical purposes. | |
| 98. | Happy 70th birthday, Professor Sarkyt E. Kudaibergenov | DOI: 10.1002/pat.5156 (Q1 in Polymers and Plastics) | In May 2021, the polymer science community of Kazakhstan, numerous former students and collaborators will celebrate the 70th anniversary of Prof Sarkyt E. Kudaibergenov. Prof S. E. Kudaibergenov is a prominent Kazakh polymer scientist, known for his research into water-soluble polymers, polyelectrolytes, polymer complexes, hydrogels, polymer-stabilised colloids, catalysis by polymers and stimuli-responsive materials for various applications. This essay aims to present some highlights of research career of Prof Kudaibergenov with a particular emphasis on his most significant original contributions to polymer science. | Khutoryanskiy, V.V. Happy 70th birthday, Professor Sarkyt E. Kudaibergenov (2021) Polymers for Advanced Technologies, 32 (7), pp. 2636-2638. DOI: 10.1002/pat.5156 |
| 99. | Synthesis and cytotoxicity of thieno[2,3-b]pyridine derivatives toward sensitive and multidrug-resistant leukemia cells | DOI: 10.17344/acsi.2020.6609 (Q3 in Chemistry (miscellaneous)) | A new series of substituted ethyl 7-cyclopropyl-2-(2-aryloxo)-3-nitro-4-oxo-4,7-dihydrothieno[2,3-b]pyridine-5-carboxylates 3a-e were prepared by utilizing ethyl 2-chloro-7-cyclopropyl-3-nitro-4-oxo-4,7-dihydrothieno[2,3-b]pyridine-5-carboxylate (1) and replacing of the 2-chlorine with anions obtained from phenol (2a), salicylaldehyde derivatives 2b-d or thiophenol (2e), leading to the respective ethyl 7-cyclopropyl-2-(2-aryloxo)-3-nitro-4-oxo-4,7-dihydrothieno[2,3-b]pyridine-5-carboxylates 3a-e. The new compounds | Al-Trawneh, S.A., Tarawneh, A.H., Gadetskaya, A.V., Seo, E.-J., Al-Ta'Ani, M.R., Al-Taweel, S.A., El-Abadelah, M.M. Synthesis and cytotoxicity of thieno[2,3-b]pyridine derivatives toward sensitive and multidrug-resistant leukemia cells (2021) Acta Chimica Slovenica, 68 (2), pp. 458-465. DOI: 10.17344/acsi.2020.6609 |

| | | | | |
|------|--------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>were evaluated for their in vitro cytotoxicity towards sensitive CCRF-CEM and multidrug-resistant CEM/ADR5000 leukemia cells. The screening revealed that compounds 3a, 3b, and 3e inhibited the growth of both cell lines. Compound 3b, with a phenol moiety, exhibited the highest growth inhibitory activity against CEM/ADR5000 and CCRF-CEM cells with IC₅₀ values 4.486 ± 0.286 and 2.580 ± 0.550 μM, respectively. Collectively, the presented results demonstrate that the synthesized thieno[2,3-b]pyridines warrant further exploration for potential use as anti-cancer agents.</p> | |
| 100. | <p>Assessment of lichens as biomonitors of heavy metal pollution in selected mining area, slovakia</p> | <p>DOI: 10.21743/pjaec/2021.06.07 (Q4 in Analytical Chemistry)</p> | <p>Lichens have widely been used as bioindicators to reflect the quality of the environment. The present study was conducted to investigate the lichens diversity that grows on the surface of waste heaps from an abandoned old copper mine in Mlynky, Slovakia. In spite of the heavy metal-contaminated environment, we documented twenty species of lichens in the selected site. Taxonomically the most numerous group were represented by Cladonia with seven species, as well other species; namely, <i>Acarospora fuscata</i>, <i>Cetraria islandica</i>, <i>Dermatocarpon miniatum</i>, <i>Hypogymnia physodes</i>, <i>Hypogymnia tubulosa</i>, <i>Lecanora subaurea</i>, <i>Lepraria incana</i>, <i>Physcia aipolia</i>, <i>Porpidia macrocarpa</i>, <i>Pseudevernia furfuracea</i>,</p> | <p>Tarawneh, A.H., Salamon, I., Altarawneh, R.M., Mitra, J., Gadetskaya, A. Assessment of lichens as biomonitors of heavy metal pollution in selected mining area, slovakia (2021) Pakistan Journal of Analytical and Environmental Chemistry, 22 (1), pp. 53-59. DOI: 10.21743/pjaec/2021.06.07</p> |

| | | | | |
|------|------------------------------------------------------------------------------------------------------------|---------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>Rhizocarpon geographicum and Xanthoria parietina. The content of selected heavy metals (Cu, Fe, and Zn) in the predominant lichens Cetraria islandica, Cladonia digitata, Cladonia pyxidata, Hypogymnia physodes and Pseudevernia furfuracea were analyzed. The highest content of Cu, Fe, and Zn was found in Cladonia pyxidata collected from mine-spoil heaps with concentration 46 ± 4.4, 82.5 ± 22.6, 4.8 ± 1.6 mg/kg, respectively. Interestingly, Cladonia pyxidata collected from the forest surrounding the location showed 15 times lower concentration for Cu. Additionally, similar results were found for Fe and Zn.</p> | |
| 101. | <p>Ficus plants: State of the art from a phytochemical, pharmacological, and toxicological perspective</p> | <p>DOI: 10.1002/ptr.6884 (Q2 in Pharmacology)</p> | <p>Ficus genus is typically tropical plants and is among the earliest fruit trees cultivated by humans. Ficus carica L. is the common fig, Ficus benjamina L. is the weeping fig, and Ficus pumila L. is the creeping fig. These species are commonly used in traditional medicine for a wide range of diseases and contain rich secondary metabolites that have shown diverse applications. This comprehensive review describes for Ficus genus the phytochemical compounds, traditional uses and contemporary pharmacological activities such as antioxidant, cytotoxic, antimicrobial, anti-inflammatory, antidiabetic, antiulcer, and anticonvulsant. An extended survey of the current literature (Science Direct, Scopus,</p> | <p>Salehi, B., Prakash Mishra, A., Nigam, M., Karazhan, N., Shukla, I., Kiełtyka-Dadasiewicz, A., Sawicka, B., Głowacka, A., Abu-Darwish, M.S., Hussein Tarawneh, A., Gadetskaya, A.V., Cabral, C., Salgueiro, L., Victoriano, M., Martorell, M., Docea, A.O., Abdolshahi, A., Calina, D., Sharifi-Rad, J.</p> <p>Ficus plants: State of the art from a phytochemical, pharmacological, and toxicological perspective (2021) Phytotherapy Research, 35 (3), pp. 1187-1217. DOI: 10.1002/ptr.6884</p> |

| | | | | |
|------|-------------------------------------------------------------|----------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>PubMed) has been carried out as part of the current work. The trends in the phytochemistry, pharmacological mechanisms and activities of Ficus genus are overviewed in this manuscript: antimicrobial, antidiabetic, anti-inflammatory and analgesic activity, antiseizure and anti-Parkinson's diseases, cytotoxic and antioxidant. Health-promoting effects, recent human clinical studies, safety and adverse effects of Ficus plants also are covered. The medical potential and long-term pharmacotherapeutic use of the genus Ficus along with no serious reported adverse events, suggests that it can be considered as being safe.</p> | |
| 102. | Recent updates on biodiesel production techniques: A review | DOI: 10.2174/2405520413999200807151306 (Q4 in Chemical Engineering (miscellaneous)) | <p>The present review presents the most commonplace vegetable-based feedstock for biodiesel production. It focuses on biodiesel production with an emphasis on the most recent studies and innovations. Transesterification of plant oil or animal fat is the most common process for the production of biodiesel. Several techniques are utilized for this transesterification reaction, such as batch processes, ultrasonic, microwave and other methods. Many conditions are usually studied, including temperature, pressure, solvent and catalysis. Furthermore, we aim to provide an investigation of the different processes and technologies applicable to</p> | <p>Gadetskaya, A.V., El-Araby, R., Al-Rawajfeh, A.E., Tarawneh, A.H., Al-Itawi, H. Recent updates on biodiesel production techniques: A review (2021) Recent Innovations in Chemical Engineering, 14 (1), pp. 80-102. DOI: 10.2174/2405520413999200807151306</p> |

| | | | | |
|---------------------------------------------|----------------------------------------------------------------|--------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | the production of second-generation biodiesel, with special attention paid to the development of innovative catalysts as well as new reactor concepts. | |
| Кафедры общей и неорганической химии | | | | |
| 103. | Study of the Purification of ¹⁷⁷ Lu-DOTAELA Complex | DOI 10.1007/s11094-020-02270-3 (IF=0.62, Q4) | Radiolabeled analog of the gonadotropin releasing hormone having a close molecular weight, namely ¹⁷⁷ Lu -1,4,7,10- tetraazacyclododecane -1,4,7,10- tetraacetic acid - 4-[[[(1R)-2-[5-(2-fluoro-3-methoxyphenyl)-3-[[2-fluoro-6-(trifluoromethyl)phenyl]methyl]-4-methyl-2,6-dioksopirimidin-1-yl]-1-phenylethyl]amino]butanoic acid (¹⁷⁷ Lu-DOTAELA) plays an important role in radionuclide receptor therapy for triple negative breast cancer. The preparation with a label was purified using C18 Sep-Pak cartridge and various types of cation exchangers. The reaction mixture was passed through the column after radiolabeling. The pure product of ¹⁷⁷ Lu-DOTAELA was eluted with ethanol and acetonitrile. The flushing was performed with distilled water and acetate buffer solution pH 5.0. The elution was performed using sterile vials. Ethanol was removed by heating at 80°C. The final product was diluted with physiological solution. According to the data obtained in experiments, ¹⁷⁷ Lu ³⁺ cations and the ¹⁷⁷ Lu-DOTAELA complex are retained on the cartridge with C18 and filled with | Gurin, A.N., Riss, P., Chakrova, E.T., Matveyeva, I.V., Kadyrbaev, E.A. Study of the Purification of ¹⁷⁷ Lu-DOTAELA Complex // Pharmaceutical Chemistry Journal, 2020, 54(1), стр. 64–68 DOI 10.1007/s11094-020-02270-3 |

| | | | | |
|------|------------------------------------------------------------------------------------------------------|-------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>various cation exchangers. Standard implementation of purification with C18, which is usually effective for eliminating non-included $^{177}\text{Lu}^{3+}$ ions, requires the use of a substances reducing the radiolysis effect (e.g., ascorbic acid) for maintaining radiochemical purity (RCP) of ^{177}Lu-DOTAELAs as well as the search for other eluents (e.g., trifluoroacetic acid) increasing the polarity of solvent.</p> | |
| 104. | <p>Optimization of reaction parameters for the synthesis of ^{177}Lu-DOTAELA</p> | <p>DOI 10.37358/RC.20.8.8278 (IF=0.66)</p> | <p>The article provides a comparison of the theoretically calculated and experimentally determined yield of the reaction $^{176}\text{Lu}(n, \gamma)^{177}\text{Lu}$. Also, it provides the results of the studies on lutetium-177 labeling of a non-peptide antagonist of gonadotropin-releasing hormone (GnRH) elagolix (ELA) associated with a chelating DOTA (DOTAELA). The synthesized DOTAELA complex was labeled with the ^{177}Lu isotope. ^{177}Lu was produced by the reaction (n, γ) using the enriched LuCl_3 target at the reactor WWR-K. Production of ^{177}Lu by the (n, γ) reaction from the enriched ^{176}Lu target achieved by irradiation for 17 days. All stages of the complex preparation were evaluated by paper chromatography. The optimal technological parameters for the synthesis of the complex ^{177}Lu-DOTAELA are: pH - 4.5, 90-100 °C and 40 min. The obtained optimal parameters made it possible to produce a labeled complex of</p> | <p>Gurin, A., Chakrova, Y., Matveyeva, I., Riss, P. Optimization of reaction parameters for the synthesis of ^{177}Lu-DOTAELA // Revista de Chimie, 2020, 71(8), стр. 55–62</p> <p>DOI 10.37358/RC.20.8.8278</p> |

| | | | | |
|------|--------------------------------------------------------------------------------|--------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | 177Lu-DOTAELA with a radiochemical yield of $\geq 95\%$. | |
| 105. | Synthesis of effective environmentally friendly additives for automotive fuels | DOI: 10.31788/RJC.2020.1345852 IF=1.23, Q3 | <p>One of the pressing problems when using internal combustion engines is the formation of harmful gas emissions. The synthesis of environmentally friendly additives to automotive fuels is one of the most important directions in the development of the oil refining and petrochemical industries. The greatest distribution among additives increasing the octane number, alkyl tert-butyl ethers (ATBE) received. This study aimed to develop a synthesis technology for several promising tertiary esters with the number of carbon atoms in a molecule of 6-8: ethyl tert-butyl (ETBE); isobutyl-tert-butyl (IBTBE) and iso-propyl-tert-amyl (IPTAE). To prepare ethers, the process of interaction of isobutylene (i-C₄H₈) with aliphatic alcohols on acid catalysts is carried out. The synthesis of additives was carried out according to 2 schemes. As catalysts, standard gel sulfocationites and catalysts prepared based on the systems heteropoly acid (HPA) - aluminum oxide and HPA – natural zeolite were tested. It was found that the selectivity of the synthesis of ATBE on catalysts with HPA increases with an increasing number of carbon atoms in alcohol. The</p> | <p>Sassykova, L. R., Kadirbekov, K. A., Zhakirova, N. K., Zhumakanova, A. S., Sendilvelan, S., Abildin, T. S., ... & Ryskaliyeva, R. G. SYNTHESIS OF EFFECTIVE ENVIRONMENTALLY FRIENDLY ADDITIVES FOR AUTOMOTIVE FUELS. // Rasayan journal of chemistry. - 2020. - Vol. 13. - No. 3. - P. 2085-2091 DOI: 10.31788/RJC.2020.1345852</p> |

| | | | | |
|------|---------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | amount of gasoline additives varied from 1 to 12%. It was shown that the additives synthesized allowed to increase the octane number by several points, in some cases up to 20. The results obtained show a good acceptance of the studied base gasoline to the components of the prepared composite additives. | |
| 106. | Catalytic cracking using catalysts based on hetero polyacids | http://dx.doi.org/10.31788/RJC.2020.1335822 (IF=1.23, Q2) | The paper discusses the issues of catalytic cracking processes and presents the experimental results of the authors with the use of the catalysts based on the natural Shankanai zeolite (Kazakhstan) and heteropoly acids (HPA). SEM analysis of the synthesized catalyst structure indicates the presence of its main elements prevailing on the surface of the zeolite. | Sassykova L. R. et al. Catalytic cracking using catalysts based on hetero polyacids //Rasayan Journal of Chemistry, 13 (3), 1444. – 2020. – T. 1450. http://dx.doi.org/10.31788/ |
| 107. | Influence of hydrothermal treatment conditions on the formation of lanthanum orthophosphate nanoparticles of monazite structure | DOI: 10.1134/S1070427220040084 | The influence of the heat treatment conditions and of the time of hydrothermal treatment at 210°C on the phase composition and size of crystallites and nanoparticles of lanthanum orthophosphate (LaPO ₄) was considered. The heating conditions in the course of hydrothermal synthesis of LaPO ₄ influence the structural transition of lanthanum orthophosphate of rhabdophane structure into the phase of monazite structure, and also the particle morphology and crystallite size. The phase of monazite structure with the | Enikeeva, M. O., Kenges, K. M., Proskurina, O. V., Danilovich, D. P., & Gusarov, V. V. (2020). Influence of hydrothermal treatment conditions on the formation of lanthanum orthophosphate nanoparticles of monazite structure. <i>Russian Journal of Applied Chemistry</i> , 93, 540-548. DOI: 10.1134/S1070427220040084 |

| | | | | |
|------|---------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | crystallite size of approximately 12 nm without rhabdophane impurity is formed after hydrothermal treatment at 210°C for 30 min in the case of microwave heating of the hydrothermal fluid. When using external heating of autoclaves, at the same temperature inside the autoclave, the mean size of the crystallites of the monazite phase formed is 17 nm. | |
| 108. | Morphology and Catalytic Properties of Cobalt-Containing Catalysts Synthesized by Different Means | DOI 10.1134/S0036024420040020 (Q4 in Physical and Theoretical Chemistry, процентиль 18) | Cobalt-containing catalysts are studied via BET, XRD, SEM, and TPR-H ₂ . Their activity in the reaction of carbon dioxide methane conversion and the process of Fischer–Tropsch synthesis is studied. It was shown that unlike impregnation, preparing Co/γ-Al ₂ O ₃ via solution combustion increases the dispersibility of the active phase of the catalyst and facilitates the reduction of cobalt oxide, which enhances the activity of the catalyst. | Dossumov, K.a, Yergaziyeva G., Ermagambet, B.T. Myltykbaeva, L.K. Telbaeva, M.M Mironenko, A.V. Mambetova, M.M. Kassenova, Z. Morphology and Catalytic Properties of Cobalt-Containing Catalysts Synthesized by Different Means //Russian Journal of Physical Chemistry A Volume 94, Issue 4, 1 April 2020, Pages 880-882 DOI 10.1134/S0036024420040020 |
| 109. | Role of ceria in several energy related catalytic transformations. Review | DOI 10.1007/s11696-019-00921-8 (Q2 in General Chemical Engineering, процентиль 54) | In this review, the focus is on the role of ceria in several reactions involving light hydrocarbons, namely total oxidation of methane, carbon monoxide hydrogenation and dehydration of ethanol to ethylene. These reactions were selected as they are relevant processes in energy chemistry, allowing obtaining valuable products. | K. Dossumov, Yergaziyeva G.,B.T. Ermagambet, M.M. Telbayeva. M.M. Mambetova, L.K.Myltykbaeva, Zh.M. Kassenova. Role of ceria in several energy related catalytic transformations. Review // Chemical Papers (2020) 74(2) 373-388 DOI 10.1007/s11696-019-00921-8 |

| | | | | |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 110. | Effect of cobalt oxide content on the activity of 3% NiO- Co ₂ O ₃ / γ -Al ₂ O ₃ catalyst in the reaction of dry reforming of methane to synthesis gas | DOI 10.18321/ectj978 (Q3 in General Chemistry, процентиль 34) | The effect of cobalt oxide content on the activity of NiO-Co ₂ O ₃ / γ -Al ₂ O ₃ catalyst was investigated in process of dry reforming of methane (DRM) to synthesis gas. It was found that among the studied catalysts the highest activity is shown by the NiO-Co ₂ O ₃ / γ -Al ₂ O ₃ , where methane conversion is 89%. It was determined by the scanning electron microscopy (SEM) and X-ray diffraction analysis (XRD) there are oxides of Ni and Co in the form of nanosized particles on active NiO-Co ₂ O ₃ / γ -Al ₂ O ₃ catalyst and Co-Ni alloys, formed after the reaction of DRM, the size of 17–23 nm. Thermogravimetric Analysis (TGA)/ Differential Thermal Analysis (DTA)/ Differential Scanning Calorimetry (DSC) of catalyst showed that the highest weight loss (2.7%) is observed at a degree from 30 to 260 °C after DRM. After heating above 300 °C there is a slight increase in weight, accompanied by an exothermic effect on the DSC curve due to the gas adsorption used to purge the unit. The data indicate the absence of coke formation on NiO-Co ₂ O ₃ / γ -Al ₂ O ₃ surface. According to TPR-H ₂ there are peaks at relatively low temperatures of T ¹ max = 205 °C and T ² max = 497 °C on thermally programmed reduction (TPR) TPR-H ₂ spectrum of NiO-Co ₂ O ₃ / γ -Al ₂ O ₃ , which are associated with the formation of easily reducible cobalt and nickel oxides, indicating the presence of | L.K. Myltykbayeva, Yergaziyeva G., M. M. Telbayeva, Z.R. Ismagilov, K. Dossumov, A.N. Papova, S.A. Sozynov, L.M. Hitsova. Effect of cobalt oxide content on the activity of 3% NiO- Co ₂ O ₃ / γ -Al ₂ O ₃ catalyst in the reaction of dry reforming of methane to synthesis gas // Eurasian Chemico-Technological Journal - 2020 -Vol. 22, No. 3. - P. 187-195. DOI 10.18321/ectj978 |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

| | | | | |
|------|------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | active and mobile oxygen in the catalyst. These results confirm that the activity of NiO-Co ₂ O ₃ /γ-Al ₂ O ₃ is due to the formation of nanophases, the presence of active oxygen, and the absence of coke on the catalyst surface. | |
| 111. | A reduction phenomenon on the anode surface: Selenate and copper (II) ions reduction to their elemental state on the anode surface | https://dl.uctm.edu/journal/node/j2020-5/23_19-117_p1105-1110.pdf IF = 0.81, Q3 | A selenite-ions reduction in the anode compartment of an electrolyzer is studied for the first time. It proceeds in aqueous solutions of hydrochloric acid and copper (II) chloride where that the monovalent copper, formed at the anode due to the difference of the redox potentials of the systems Se ⁰ -and Cu (I)-Cu(II), instantly reacts with selenium (VI) ions reducing them to their elementary state. It is shown that an abundant precipitation of an elemental selenium in a powder form occurs. The current output (CO) increases with an increase of the hydrochloric acid and copper (II) ions concentration and that of the temperature. The current density increase at the copper anode leads to a decrease of CO. It is found that the selenate ions reduction occurs practically on the anode surface, while an ultradispersed selenium powder is formed in the near-anode space. The electron microscopy photographs of the powder indicate that its particles have a round shape and a size not exceeding 1 μm. The phenomenon observed provides to develop a selective method of extracting selenium from multicomponent | Bayeshov A., Bayeshova A. A REDUCTION PHENOMENON ON THE ANODE SURFACE: SELENATE AND COPPER (II) IONS REDUCTION TO THEIR ELEMENTAL STATE ON THE ANODE SURFACE //Journal of Chemical Technology and Metallurgy. – 2020. – T. 55. – №. 5. – C. 1105-1110. https://dl.uctm.edu/journal/node/j2020-5/23_19-117_p1105-1110.pdf |

| | | | | |
|------|-------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>solutions. The investigation of the copper anodic behavior in a sulphate solution in presence of titanium (III) ions shows that an ultradispersed copper powder is formed on the copper anode surface, the particles of which are spherical in shape and of a size not exceeding 1 μm-1.5 μm. Thus, a new phenomenon is discovered-the phenomenon of selenite-ions and copper (II) ions reduction at the anode with the formation of ultradisperse selenium and copper powders</p> | |
| 112. | <p>Formation of selenium powder at reduction of seleniteions in hydrochloric acid solution on the surface of copper anode</p> | <p>DOI: 10.32014/2020.2518-170X.63</p> | <p>The article shows the possibility of reduction of selenite ions in the presence of copper (II) ions with the formation of dispersed selenium powders. The effect of the concentration of hydrochloric acid, copper (II) ions, the current density at the copper anode and the solution temperature on the current efficiency (CE) of the formation of selenium powder has been studied. The current efficiency of selenium powder was calculated by the weight of the powder formed. It was found that with increase in concentration of copper (II) ions and the solution temperature, the current efficiency of the formation of elemental selenium in the form of a powder increases. It was shown that at the current density below 75 A/m², the current efficiency of selenium powder exceeds 100%. Previous studies have shown that titanium (IV) ions cannot be used in the recovery of selenite</p> | <p>Bayeshov, A., Bayeshova, A. K., Abduvaliyeva, U. A., & Zaikov, Y. P. FORMATION OF SELENIUM POWDER AT REDUCTION OF SELENITEIONS IN HYDROCHLORIC ACID SOLUTION ON THE SURFACE OF COPPER ANODE //News of the National academy of sciences of the republic of Kazakhstan-Series of geology and technical sciences. – 2020. – №. 3. – C. 126-132. DOI: 10.32014/2020.2518-170X.63</p> |

| | | | | |
|------|--------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | ions. Using an electron microscope, micrographs of selenium powder were obtained. They indicate the formation of a finely dispersed selenium powder of spherical shape with an average particle size of 0.252 μm . | |
| 113. | Catalytic cracking using catalysts based on hetero polyacids | http://dx.doi.org/10.31788/RJC.2020.1335822 IF = 1.23, Q3 | The paper discusses the issues of catalytic cracking processes and presents the experimental results of the authors with the use of the catalysts based on the natural Shankanai zeolite (Kazakhstan) and heteropoly acids (HPA). SEM analysis of the synthesized catalyst structure indicates the presence of its main elements prevailing on the surface of the zeolite. Also, the intense spectra of the components of the HPA (tungsten and phosphorus) are revealed. Possibly, it is because of the high degrees of dispersion and distribution of PW12-HPA particles over the clinoptilolite surface. In this research an analysis of the final reaction product was carried out by NMR spectroscopy. NMR analysis allowed us to calculate the fraction of each component of the mixture. It was shown that the proton spectrum of the sample contains signals of paraffin compounds, which are the main components of the mixture. Aromatic components are absent. Chemical shifts of up to 1 ppm are characteristic mainly of protons of the methyl groups of saturated hydrocarbons and long alkyl substituents in aromatic | Sassykova L. R., Zhakirova N. K., Aubakirov Y. A., Sendilvelan S., Tashmukhambetova Z. K., Abildin T. S., Beisembaeva L. K. Catalytic cracking using catalysts based on hetero polyacids //Rasayan Journal of Chemistry. – 2020. – №3. –C.1444-1450. http://dx.doi.org/10.31788/RJC.2020.1335822 |

| | | | | |
|------|-----------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | systems. In this part of the spectrum, it is also assumed that some CH and CH ₂ groups of naphthenic fragments are resonated. | |
| 114. | Synthesis and Photocatalytic Properties of Silver Chloride/Silver Composite Colloidal Particles | https://doi.org/10.1134/S1061933X20010160 Q4 по Web of Science (Chemistry, Physical) | AgCl/Ag composite nanoparticles have been synthesized by mechanical activation of reaction $\text{NH}_4\text{Cl} + \text{AgNO}_3 + z\text{NH}_4\text{NO}_3 = (z + 1)\text{NH}_4\text{NO}_3 + \text{AgCl}$ using an untargeted reaction product (NH_4NO_3) as a diluent, where $z = 7.22$ is the dilution parameter, followed by partial photoreduction of AgCl to Ag (Ag^+ to Ag^0). Formation of Ag nanocrystals (about 7 nm in size) on the surface of 40-nm AgCl nanoparticles has been confirmed by X-ray diffraction analysis, transmission electron microscopy, and absorption spectrophotometry in a wavelength range of 200–1000 nm. Such AgCl/Ag composite particles exhibit high catalytic activity upon the photodegradation of methylene blue dye in aqueous solutions. | Urakaev F. K., Khan N. V., Shalabaev Z. S., Tatykaev B. B., Nadirov R. K., & Burkitbaev, M. M. Synthesis and Photocatalytic Properties of Silver Chloride/Silver Composite Colloidal Particles //Colloid Journal. – 2020. – T. 82. – №. 1. – C. 76-80. https://doi.org/10.1134/S1061933X20010160 |
| 115. | Ethylene-Vinyl Acetate Copolymer/Crude Gossypol Compositions as Pour Point Depressants for Waxy Oil | https://doi.org/10.1155/2020/4195382 Q3 по Web of Science (Engineering, Chemical) | Wax deposition from crude oil that blocks the pipeline and increases the viscosity of the fluid is considered as a serious challenge for petroleum transportation. Employment of chemical additives, the so-called pour point depressants (PPDs), is widely used to solve this problem. Among them are the ethylene-vinyl acetate (EVA) copolymers (EVAc), containing a polyethylene segment along the backbone with vinyl acetate. To improve the performance of EVAc as PPD, the compositions of this polymer with crude | Marenov B. T., Nadirov K. S., Zhantasov M. K., Nadirov R. K. Ethylene-Vinyl Acetate Copolymer/Crude Gossypol Compositions as Pour Point Depressants for Waxy Oil //International Journal of Chemical Engineering. – 2020. – T. 2020. - Article ID 4195382 https://doi.org/10.1155/2020/4195382 |

| | | | | |
|------|----------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>gossypol (CG), isolated from the refined cottonseed oil soapstock, were prepared by joint milling in a ball mill. Prepared compositions were characterized by Fourier transform infrared (FTIR), ultraviolet (UV), and nuclear magnetic resonance (NMR) spectroscopy. The pour point and viscosity of the crude oil from the Akshabulak oil field (Kazakhstan) were studied. The compositions with 10, 20, and 25 wt% of CG demonstrate better efficiency as PPD for crude oil than EVAc at the dosage of PPD of 50, 100, 250, and 500 ppm. The improved properties of the obtained PPD in comparison with the commercial EVAc is explained by the appearance of additional nonpolar and polar groups caused by the formation of the EVAc/CG composition.</p> | |
| 116. | <p>In Vivo Comparison of Chlorine-Based Antiseptics versus Alcohol Antiseptic for Surgical Hand Antisepsis</p> | <p>https://doi.org/10.1155/2020/3123084 70-й процентиль по Scopus (General Agricultural and Biological Sciences)</p> | <p>Despite being commonly used as effective preparation for surgical hand antisepsis, alcohol solutions have major drawbacks, such as drying effect, emergence of hand eczema, and other diseases. This study aimed to demonstrate the effectiveness of sodium hypochlorite (NaOCl) and hydrogen peroxide (H₂O₂) as antiseptic in comparison to single sodium hypochlorite and 70% ethanol. In 5-day tests, the effects of 3 antiseptics were established according to standard test methods. The antiseptics were applied to the hands of 82 volunteers, and samples of bacteria were collected on days 1 and 5, immediately after drying and</p> | <p>Mylytkbayeva Z., Kovaleva G., Mukhitdinov A., Omarova S., Nadirov, R. In Vivo Comparison of Chlorine-Based Antiseptics versus Alcohol Antiseptic for Surgical Hand Antisepsis //Scientifica. – 2020. – T. 2020. - Article ID 3123084 https://doi.org/10.1155/2020/3123084</p> |

| | | | | |
|------|-----------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>6 hours later after antiseptic application. Student's <i>t</i> test and ANOVA were applied in a statistical study. The NaOCl with H₂O₂ composition demonstrated noninferiority to both sodium hypochlorite only and alcohol products and superiority to these antiseptics on day 5 (at a significance level of 5% for each comparative trial in this day) at equivalence margin of 20%. The effectiveness of the NaOCl plus H₂O₂ composition as an antiseptic was explained by the formation of singlet oxygen in the system. Together, these data suggest that NaOCl and H₂O₂ may be an effective hand antiseptics that avoids the drawbacks seen with alcohol solutions.</p> | |
| 117. | Selective room-temperature leaching of copper from mechanically activated copper smelter slag | <p>https://doi.org/10.1016/j.jmrt.2021.03.090 Q1 on Web of Science (Metallurgy and Metallurgical Engineering)</p> | <p>Herein, the room-temperature sulfuric acid leaching of copper smelter slag powder in the presence of potassium dichromate was investigated, resulting in the selective extraction of copper with its separation from zinc and iron. To enhance the extraction of copper, mechanical activation in the planetary ball mill and attritor was used. The Taguchi method was applied to determine the optimal conditions for both mechanical activation and leaching. For mechanical activation in the attritor, a rotation speed of 1200 rpm, ball-to-powder ratio of 40 and milling time of 75 min were ideal. Under these conditions, the specific surface area (SBET) could be increased from 1.7 m²/g, for the starting slag, to 59.4</p> | <p>Mussapyrova L., Nadirov R., Baláž P., Rajňák M., Bureš R., Baláž M. Selective room-temperature leaching of copper from mechanically activated copper smelter slag //Journal of Materials Research and Technology. – 2021. – T. 12. – C. 2011-2025. https://doi.org/10.1016/j.jmrt.2021.03.090</p> |

| | | | | |
|------|----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>m²/g. According to ANOVA, the most important factor is the rotation speed. For comparison, the slag was subjected also to planetary ball milling using the same conditions and a specific surface area of 116 m²/g was obtained. Leaching conditions that maximize copper recovery and, independently, copper selectivity, were also found. The maximum copper recovery was 87.3%, while the maximum copper selectivity was 97.9%. The most influential parameters in leaching were the concentration of K₂Cr₂O₇ and the liquid-to-solid ratio. The copper selectivity is attributed to better solubility of chalcopyrite (CuFeS₂) in comparison with zinc ferrite (ZnFe₂O₄) and fayalite (FeSiO₄) containing the other metals. This study provides a statistical approach for planning the experiments of pretreatment and leaching to efficiently recover valuable metals from secondary raw resources in an environmentally interesting fashion by using low concentrations of leaching agents and mechanical pretreatment.</p> | |
| 118. | Dissolution of Chalcopyrite in Presence of Chelating Agent and Hydrogen Peroxide | <p>https://doi.org/10.1007/s12666-021-02426-z Q3 по Web of Science (Metallurgy and Metallurgical Engineering)</p> | <p>Chelating agents (e.g., EDTA, titriplex III, etc.) are very important salts as they can take a complex form with metal ions. This study investigated usage of titriplex III in presence of hydrogen peroxide for metal extraction from chalcopyrite concentrate under various conditions such as conventional leaching, mechanical</p> | <p>Turan M. D., Silva J. P., Sarı Z. A., Nadirov R., & Toro N. Dissolution of Chalcopyrite in Presence of Chelating Agent and Hydrogen Peroxide //Transactions of the Indian Institute of Metals. – 2021. – C. 1-8. https://doi.org/10.1007/s12666-021-02426-z</p> |

| | | | | |
|------|---------------------------------------------------------------------------------------------|--------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>activation and ultrasound leaching. The results show that both titriplex and hydrogen peroxide are required for metal extraction from chalcopyrite concentrate. However, mechanical activation is an important parameter for increasing metal extraction, so that copper extraction increases to 83% from 47% after 30 min of grinding chalcopyrite by a high-energy grinding system. Metal extraction efficiency is improved by application of ultrasound to the leaching process. It is possible to obtain copper and iron extraction as 93% and 65%, respectively, under the following leaching conditions: mechanical activation time of 30 min, titriplex concentration of 100 g L⁻¹, H₂O₂ concentration of 2 mol L⁻¹, ultrasound power of 10%, leaching time of 90 min, leaching temperature of 45 °C and liquid–solid ratio of 25 mL g⁻¹.</p> | |
| 119. | Hydrogenation of aromatic nitro compounds to amines on nickel and iron-containing catalysts | 10.31788/RJC.2021.1426124 IF = 1.23, Q3 | | <p>Sassykova, L. R., Sassykova, A. R., Kubekova, S. N., Batyrbayeva, A. A., Azhigulova, R. N., Zhaxibayeva, Z. M., Ponomarenko, O. I. Hydrogenation of aromatic nitro compounds to amines on nickel and iron-containing catalysts // <i>Rasayan Journal of Chemistry</i>. – 2021. - Vol. 14 (2). – P. 1223-1229. 10.31788/RJC.2021.1426124</p> |

| | | | | |
|------|----------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 120. | Growth and crystal structure of $\text{Li}_3\text{Ba}_4\text{Sc}_3\text{B}_8\text{O}_{22}$ borate and its Tb^{3+} doped green-emitting phosphor | https://doi.org/10.1016/j.jlumin.2019.116755 (IF=3,599; Q1 OPTICS) | A new lithium barium scandium borate ($\text{Li}_3\text{Ba}_4\text{Sc}_3\text{B}_8\text{O}_{22}$) was obtained by solid-state synthesis and grown by spontaneous crystallization. Single-crystal X-ray diffraction analysis showed that it crystallizes in the centrosymmetric space group P-1 with the cell dimensions $a = 5.2230(4) \text{ \AA}$, $b = 8.5609(6) \text{ \AA}$, $c = 11.4157(8) \text{ \AA}$, $\alpha = 73.3750(6)^\circ$, $\beta = 78.5020(6)^\circ$, $\gamma = 87.0520(6)^\circ$, and $V = 479.28(6) \text{ \AA}^3$ and a structure that consists of two layers formed by single $[\text{BO}_3]$ and double $[\text{B}_2\text{O}_5]$ triangles, $[\text{ScO}_6]$ octahedra, $[\text{BaO}_9]$ polyhedra, and disordered $[\text{LiO}_4]$ tetrahedra or squares. The diffuse optical reflection spectrum indicates that $\text{Li}_3\text{Ba}_4\text{Sc}_3\text{B}_8\text{O}_{22}$ is transparent in the range of 250–800 nm. Furthermore, an effective green emission centred at 545 nm was observed for the as-prepared Tb^{3+} -doped $\text{Li}_3\text{Ba}_4\text{Sc}_3\text{B}_8\text{O}_{22}$, making this borate compound a promising host material for engineering light-emitting phosphors. | Kuznetsov, A. B., Kokh, K. A., Kononova, N. G., Shevchenko, V. S., Rashchenko, S. V., Uralbekov, B., ... & Kokh, A. E. (2020). Growth and crystal structure of $\text{Li}_3\text{Ba}_4\text{Sc}_3\text{B}_8\text{O}_{22}$ borate and its Tb^{3+} doped green-emitting phosphor. <i>Journal of Luminescence</i> , 217, 116755. https://doi.org/10.1016/j.jlumin.2019.116755 |
| 121. | Synthesis and growth of new rare earth borates $\text{KCaR}(\text{BO}_3)_2$ (R= La, Pr and Nd) | https://doi.org/10.1016/j.jssc.2019.121091 (IF=3,498; Q2 CHEMISTRY, INORGANIC & NUCLEAR) | Novel $\text{KCaR}(\text{BO}_3)_2$ (R = La, Pr and Nd) compounds have been obtained by solid-state synthesis. Specifically, single crystals of $\text{KCaNd}(\text{BO}_3)_2$ and $\text{KCaPr}(\text{BO}_3)_2$ were grown by using a top seeded solution growth method from the KBO_2 flux. These crystal compounds belong to the orthorhombic system, Pbca space group. $\text{KCaLa}(\text{BO}_3)_2$ exhibits high transparency | Kuznetsov, A. B., Kokh, K. A., Kononova, N. G., Shevchenko, V. S., Kaneva, E. V., Uralbekov, B., ... & Kokh, A. E. (2020). Synthesis and growth of new rare earth borates $\text{KCaR}(\text{BO}_3)_2$ (R= La, Pr and Nd). <i>Journal of Solid State Chemistry</i> , 282, 121091. |

| | | | | |
|------|---------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | in the range of 200–900 nm. Pr and Nd compounds have a strong emission bands that are related to the well-known electron transition of Pr ³⁺ (3P ₀ → 3H ₆ at 630 nm, 3P ₀ → 3F ₂ at 670 nm) and Nd ³⁺ (4F _{3/2} → 4I _{9/2} at 875 nm, 4F _{3/2} → 4I _{11/2} at 1054 nm). | https://doi.org/10.1016/j.jssc.2019.121091 |
| 122. | New scandium borates RxLayScz(BO ₃) ₄ (x+y+z=4, R=Sm, Tb): Synthesis, growth, structure and optical properties | https://doi.org/10.1016/j.materresbull.2020.110850 (IF=4,641; Q2 MATERIALS SCIENCE, MULTIDISCIPLINARY) | Herein we report the growth of new RxLayScz(BO ₃) ₄ (x + y+z= 4, R= Sm, Tb) crystals with large second-harmonic generation (SHG) responses. The obtained compounds, grown from eutectic LiBO ₂ -LiF flux by the TSSG method, crystallize in the space group P321 with the cell parameters a = 9.800(15) Å and c = 7.9565(7) Å for Sm _{0.34} La _{0.68} Sc _{2.98} (BO ₃) ₄ and a = 9.7976(7) Å and c = 7.9567(12) Å for Tb _{0.23} La _{0.77} Sc ₃ (BO ₃) ₄ . These crystalline materials also exhibit luminescent properties related to the optical transitions of Tb ³⁺ and Sm ³⁺ ; specifically, Tb _{0.23} La _{0.77} Sc ₃ (BO ₃) ₄ shows a strong green emission that is dominated by the 5D ₄ to 7F ₅ transition. The studied crystals' SHG intensities were higher than those of KDP crystals, revealing their potential uses in various nonlinear optics applications. | Kuznetsov, A., Kokh, A., Kononova, N., Shevchenko, V., Uralbekov, B., Ezhov, D., ... & Kokh, K. (2020). New scandium borates RxLayScz (BO ₃) ₄ (x+ y+ z= 4, R= Sm, Tb): Synthesis, growth, structure and optical properties. Materials Research Bulletin, 126, 110850. https://doi.org/10.1016/j.materresbull.2020.110850 |
| 123. | Heterostructured g-cn/tio ₂ photocatalysts prepared by thermolysis of g-cn/mil-125(Ti) | https://doi.org/10.3390/nano10071387 (IF=5,076; Q2 CHEMISTRY, MULTIDISCIPLINARY) | Photocatalysts composed of graphitic carbon nitride (g-CN) and TiO ₂ were efficiently prepared by thermolysis of the MIL-125(Ti) metal organic framework | Tatykayev, B., Chouchene, B., Balan, L., Gries, T., Medjahdi, G., Girot, E., ... & Schneider, R. (2020). Heterostructured g-CN/TiO ₂ |

| | | | | |
|------|--------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | composites for efficient pollutant degradation and hydrogen production | | deposited on g-CN. The heterojunction between the 12 nm-sized TiO ₂ nanoparticles and g-CN was well established and the highest photocatalytic activity was observed for the g-CN/TiO ₂ (3:1) material. The g-CN/TiO ₂ (3:1) composite exhibits high visible light performances both for the degradation of pollutants like the Orange II dye or tetracycline but also for the production of hydrogen (hydrogen evolution rate (HER) up to 1330 μmolh ⁻¹ g ⁻¹ and apparent quantum yield of 0.22% using NiS as a cocatalyst). The improved visible light performances originate from the high specific surface area of the photocatalyst (86 m ² g ⁻¹) and from the efficient charge carriers separation as demonstrated by photoluminescence, photocurrent measurements, and electrochemical impedance spectroscopy. The synthetic process developed in this work is based on the thermal decomposition of metal organic framework deposited on a graphitic material and holds huge promise for the preparation of porous heterostructured photocatalysts. | Photocatalysts Prepared by Thermolysis of g-CN/MIL-125 (Ti) Composites for Efficient Pollutant Degradation and Hydrogen Production. <i>Nanomaterials</i> , 10(7), 1387. https://doi.org/10.3390/nano10071387 |
| 124. | Legacy and current pesticide residues in Syr Darya, Kazakhstan: Contamination status, seasonal variation and | https://doi.org/10.1016/j.watres.2020.116141 (IF=11,236; Q1 WATER RESOURCES) | The Syr Darya is one of two major rivers in Central Asia supplying critical fresh water to the Aral Sea. In spite of the river's importance and agriculturally-intensive history, few studies have provided a modern evaluation of and the occurrence | Snow, D. D., Chakraborty, P., Uralbekov, B., Satybaldiev, B., Sallach, J. B., Hampton, L. T., ... & Bartelt-Hunt, S. B. (2020). Legacy and current pesticide residues in Syr Darya, Kazakhstan: Contamination |

| | | | | |
|--|----------------------------------------|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | preliminary ecological risk assessment | | <p>of pesticide residues potential effects to aquatic life. The primary goal of this investigation was to determine seasonal variations in ambient concentrations of modern and legacy pesticides in bottom sediment and water of the Syr Darya in Kazakhstan (KZ) downstream from an agriculturally-intensive watershed in Uzbekistan. Grab samples and passive samplers were used at five remote sampling stations during June 2015 to provide a baseline for ecotoxicological evaluation. Results were compared with samples collected during and after the agricultural growing season. Polar organic chemical integrative samplers (POCIS) were used in June and calibrated for time-weighted average concentrations of current use pesticides. Among legacy chlorinated pesticides measured in grab samples from the river, lindane (γ-HCH) was detected most frequently with the highest concentrations occurring during June. For all the sampling events, residues of lindane (γ-HCH) ranged from 0.014 to 0.24 $\mu\text{g/L}$ detected in water samples, are among the highest concentrations reported for rivers globally. Concentrations of γ-HCH, p,p'-DDE and dieldrin were highest in October when dieldrin concentrations approached 0.4 $\mu\text{g/L}$. Sources of legacy pesticides may be either illicit upstream use or evidence of previous atmospheric contamination of</p> | <p>status, seasonal variation and preliminary ecological risk assessment. Water research, 184, 116141. https://doi.org/10.1016/j.watres.2020.116141</p> |
|--|----------------------------------------|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

| | | | | |
|------|-----------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | glacial meltwater. Chronic exposure to these residues may lead to ecological risk to lower order organisms in both the sediment and water column. | |
| 125. | Polymorphism in SmSc ₃ (BO ₃) ₄ : Crystal structure, luminescent and SHG properties | https://doi.org/10.1016/j.jallcom.2020.156825 (IF=5,316; Q1 METALLURGY & METALLURGICAL ENGINEERING) | Low temperature C2/c and high temperature P321 modifications of Sm _x Sc _{4-x} (BO ₃) ₄ solid solutions were grown from LiBO ₂ -LiF flux. These borates have typical luminescence for Sm ³⁺ containing crystals with the two strongest peaks at 602 and 645 nm, which correspond to 4G _{5/2} → 6H _{7/2} , 6H _{5/2} electron transitions. In addition, the compounds were characterized by IR and Raman spectroscopy. SHG intensity for trigonal modification was found to be three times higher than that of KDP revealing its high potential for various NLO applications. | Kuznetsov, A. B., Kokh, K. A., Kononova, N. G., Shevchenko, V. S., Rashchenko, S. V., Ezhov, D. M., ... & Kokh, A. E. (2021). Polymorphism in SmSc ₃ (BO ₃) ₄ : Crystal structure, luminescent and SHG properties. Journal of Alloys and Compounds, 851, 156825. https://doi.org/10.1016/j.jallcom.2020.156825 |
| 126. | Study of an SmBO ₃ -ScBO ₃ system and new SmSc(BO ₃) ₂ orthoborate | DOI https://doi.org/10.1039/D0CE01783C (IF=3,545; Q1 CHEMISTRY, MULTIDISCIPLINARY) | A new SmSc(BO ₃) ₂ compound was discovered from the study of SmBO ₃ -ScBO ₃ by solid-state synthesis. The obtained compound was grown from a stoichiometric melt by a spontaneous crystallization method, and crystallizes in the space group R[3 with combining macron] with the cell parameters of a = 4.8951(6) Å and c = 16.3012(2) Å. In addition, phase equilibria in this system in the 900–1300 °C temperature range were studied by X-ray diffraction and thermal analyses, as well as special diffusion experiments. | Kuznetsov, A. B., Kokh, K. A., Kononova, N. G., Shevchenko, V. S., Rashchenko, S. V., Lapin, I. N., ... & Kokh, A. E. (2021). Study of an SmBO ₃ -ScBO ₃ system and new SmSc(BO ₃) ₂ orthoborate. CrystEngComm, 23(6), 1482-1488. DOI https://doi.org/10.1039/D0CE01783C |

| | | | | |
|------|----------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 127. | Single-source precursor synthesis of quinary AgInGaZnS QDs with tunable photoluminescence emission | https://doi.org/10.1016/j.apsusc.2021.150143 (IF=6,707; Q1 PHYSICS, APPLIED) | A single source molecular precursor synthesis of new quinary Ag-In-Ga-Zn-S (AIGZS) QDs is presented. Dithiocarbamate complexes with varied Ag/In/Ga/Zn ratios were prepared from AgNO ₃ , In(NO ₃) ₃ , Ga(NO ₃) ₃ and Zn(diethyldithiocarbamate) ₂ . The thermal decomposition of these complexes at 220 °C in oleylamine produces AIGZS QDs emitting from the visible to the near-infrared region and with photoluminescence quantum yields (PL QYs) up to 48.3%. For AIGZS QDs prepared with a (Ag + In + Ga)/Zn molar ratio of 1, intragap states likely involving Ag ⁺ ions are responsible of the PL emission and the PL lifetime could reach 278 ns. A marked increase of the PL lifetime (up to 915 ns) was observed when decreasing the (Ag + In + Ga)/Zn molar ratio to 0.5. The optical properties of AIGZS QDs could be maintained after transfer in aqueous solution. AIGZS should be of high potential for various applications due to their PL emission tunability and high PL QYs. | Galiyeva, P., Rinnert, H., Balan, L., Alem, H., Medjahdi, G., Uralbekov, B., & Schneider, R. (2021). Single-source precursor synthesis of quinary AgInGaZnS QDs with tunable photoluminescence emission. Applied Surface Science, 150143. https://doi.org/10.1016/j.apsusc.2021.150143 |
| 128. | Cu ₂ ZnSnS ₄ crystal growth using an SnCl ₂ based flux | DOI https://doi.org/10.1039/D0CE01264E (IF=3,545; Q1 CHEMISTRY, MULTIDISCIPLINARY) | The stoichiometry and phase homogeneity of the kesterite type compound Cu ₂ ZnSnS ₄ play a key role in its efficiency in solar cells. In this work, CuCl ₂ , ZnCl ₂ and SnCl ₂ were applied as solvents in the Cu ₂ ZnSnS ₄ crystal growth | Kokh, K. A., Atuchin, V. V., Adichtchev, S. V., Gavrilova, T. A., Bakhadur, A. M., Klimov, A. O., ... & Surovtsev, N. V. (2021). Cu ₂ ZnSnS ₄ crystal growth using an SnCl ₂ based flux. CrystEngComm, |

| | | | | |
|------|--------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>for the first time. The multiphase ingot was obtained by direct fusion of the stoichiometric batch composed of constituent elements. Compared to that, the material recrystallized in SnCl₂ presented a single-phase Zn-rich kesterite with composition Cu_{1.94}Zn_{1.06}SnS₄ and unit cell parameters of a = 5.4324(3) and c = 10.8383(2) Å. The crystal structure of Cu_{1.94}Zn_{1.06}SnS₄ was determined by single crystal X-ray diffraction analysis. The integral phase purity of the crystals grown with the use of the SnCl₂ solvent was verified by powder X-ray diffraction analysis and Raman measurements. In the Raman spectrum, the FWHM value of the 337 cm⁻¹ line was as low as 9.6 cm⁻¹ that indicates the minimal lattice disorder.</p> | <p>23(4), 1025-1032. DOI https://doi.org/10.1039/D0CE01264E</p> |
| 129. | <p>Effect of preparation method on the activity of bimetallic Ni-Co/Al₂O₃ catalysts for dry reforming of methane</p> | <p>10.1007/s11696-021-01516-y IF = 2.097, Q 2</p> | <p>Ni-Co/γ-Al₂O₃ bimetallic catalysts were synthesized by capillary impregnation (CI) and solution combustion methods (SC). Catalysts tested in dry methane reforming (DRM), characterized by XRD, H₂-TPR, SEM, small-angle X-ray scattering. Preparation method plays an important role in regulating the textural and morphological properties of catalysts and provides a difference in indices of their activity. Synthesis of Ni-Co/γ-Al₂O₃ by SC in comparison with CI method leads to formation of solid solution of NiCo₂O₄ with a CSR size of 21 nm, increases the proportion of metal ions (Ni,</p> | <p>Ergazieva G.E., Telbayeva M.M., Popova A.N., Ismagilov Z.R., Dossumov K., Myltykbayeva L.K., Dodonov V.G., Sozinov S.A., Niyazbayeva A.I. Effect of preparation method on the activity of bimetallic Ni-Co/Al₂O₃ catalysts for dry reforming of methane // Chemical papers. - 2021</p> |

| | | | | |
|------|-----------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | Co) reduced at temperatures of 400–700 °C, uniform distribution of nanosized particles of active phase on carrier surface. At comparatively low reaction temperature (600 °C) on sample synthesized by SC, degree of methane conversion is higher compared to sample prepared by CI, X_{CH_4} -69%, X_{CH_4} -65%, respectively. SC provides an efficient way to develop an active catalyst for DRM at low temperatures (600–750 °C). | |
| 130. | Effect of sulfur-containing agrochemicals on growth, yield, and protein content of soybeans (<i>Glycine max</i> (L.) Merr) | 10.1016/j.sjbs.2020.11.033 IF=4.219, Q1 | In this study, effect of different forms of sulfur-containing agrochemicals on growth, yield, and protein content of soybean grains have been evaluated. Three forms were used, such as powdery, solute, and pasty, in which elemental sulfur is contained in a nanostructured state. Plants treated with powdered and solute sulfur-containing agrochemicals had the highest growth and grain yield values, and the effect of applying pasty sulfur-containing agrochemicals did not differ from the control, in which there was low yield on all variants. The use of powdered and solute sulfur-containing agrochemicals increased all protein fractions in soybeans. The results show that the use of powdered and solute sulfur-containing agrochemicals is necessary to boost the yield of soy and increase the supply of proteins in the grains. A key factor in the availability of sulfur for soybean plants is the conversion | Burkitbayev, M., Bachilova, N., Kurmanbayeva, M., Tolenova, K., Yerezhepova, N., Zhumagul, M., ... & Demeu, G. Effect of sulfur-containing agrochemicals on growth, yield, and protein content of soybeans (<i>Glycine max</i> (L.) Merr) //Saudi Journal of Biological Sciences. – 2021. – T. 28. – №. 1. – C. 891-900. |

| | | | | |
|------|-------------------------------------------------------------------------------------------|-----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | of sulfur to a nanodisperse state. This study provides relevant information about sulfur-containing agrochemicals, which can promote higher seed yields and increase the content of protein in soybeans. | |
| 131. | Conversion of limestone-limestone mining waste by impregnation with polysulfide solutions | DOI: 10.15828/2075-8545-2020-12-2-77-83 | he data of studies on the effectiveness of impregnating Aquastat waste generated as a result of the development of limestone-shell rock deposits are presented. As a result of sand impregnation, the water absorption coefficient as a result underwent a significant decrease from 7 to 17 times, while the water absorption coefficient decreases from 32.5% for the initial to 1.9% impregnated. Even treatment with low concentrated ($\rho = 1.17 \text{ g / cm}^3$) calcium polysulfide solution made the water absorption coefficient to decrease to a value of 4.5%. As a result of impregnation of crushed stone from limestone-limestone with a solution of calcium polysulfide, the water absorption coefficient decreases from 25.0% for untreated to 5.2% for treated, and the decrease in the coefficient of water absorption is greater for concentrated solutions. It was found that a solution density of 1.24 g/cm^3 is sufficient to reduce the water absorption coefficient to a value of 5.2%, the same as for a density value of 1.35 g/cm^3 . Comparison of the results of impregnation with «Aquastat» solution and sulfur melt showed that as a | Massalimov, I. A., Massalimov, B. I., Akhmetshin, B. S., Urakaev, F. K., & Burkitbaev, M. M. Conversion of limestone-limestone mining waste by impregnation with polysulfide solutions //Nanotekhnologii v Stroitel'stve. – 2020. – T. 12. – №. 2. – C. 77-83. DOI: 10.15828/2075-8545-2020-12-2-77-83 |

| | | | | |
|------|---------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>result of treatment with sulfur melt, the water absorption coefficient decreases by 13.3 and strength increases by 2 times, and as a result of impregnation with «Aquastat» solution decreases by 4.62%, strength increases by 1.35 times. Despite the high efficiency of sulfur melt processing, such treatment has drawbacks associated with the use of autoclave technology and high temperatures. The results of the modification of sand and crushed stone from shell rock by impregnating it with the «Aquastat» solution, a significant decrease in the water absorption parameter, an increase in compressive strength, revealed the possibility of using impregnated crushed stone as the layer material lying at the base of the road structures of local roads in the form of crushed stone and sand instead of the more expensive imported crushed stone.</p> | |
| 132. | <p>Temperature dependence of sulfur solubility in dimethyl sulfoxide and changes in concentration of supersaturated sulfur solutions at 25 °C</p> | <p>DOI: 10.1016/j.molliq.2020.113886 IF=6.165, Q1</p> | <p>This is the first systematic study on the isothermal dependence of the solubility of rhombic sulfur in dimethyl sulfoxide at a temperature range of 298–448 K (25–175 °C) using a gravity method. It was found that sulfur solubility is affected not only by the temperature of the solvent, but also by the phase transition of sulfur to monoclinic modification occurring during the dissolution process, as well as by the melting of the rhombic phase of sulfur. It</p> | <p>Burkitbayev M. M., Urakaev F. K. Temperature dependence of sulfur solubility in dimethyl sulfoxide and changes in concentration of supersaturated sulfur solutions at 25° C //Journal of Molecular Liquids. – 2020. – T. 316. – C. 113886. DOI: 10.1016/j.molliq.2020.113886</p> |

| | | | | |
|------|-------------------------------------------------------------------------------------|---------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>was shown that the concentration of a supersaturated sulfur solution in dimethyl sulfoxide under standard states, obtained by cooling isothermally heated solutions to 298 K (25 °C), increases significantly as the temperature of the isotherm rises, which contrasts with the findings available in the existing literature. Key aspects of sulfur solubility in DMSO are considered.</p> | |
| 133. | <p>Influence of new sulfur-containing fertilizers on performance of wheat yield</p> | <p>DOI: 10.1016/j.sjbs.2021.04.073 IF=4.219, Q1</p> | <p>Wheat is the main cereal crop in Kazakhstan and fertilizers play an important role in enhancing harvest growth. In this study, the impact of new sulfur-containing fertilizers on the growth and yield of wheat was evaluated, and the resistance of varieties to <i>Puccinia triticina</i> Erikss was also investigated. (also known as <i>Puccinia recondite</i> Rob. ex Desm.) for recommendations in agriculture. The study was conducted from 2017 to 2020 in a nursery and greenhouse. The sulfur-containing fertilizer contains nutrients that allow you to extend the duration of absorption by the plant, thereby extending the period of their availability to plants, compared to conventional preparations. By encapsulating molten elemental sulfur and impregnating with a solution of calcium polysulfide, a long-acting compound based on amorphous and monocalcium phosphate was developed. The sulfur is in a water-soluble sulfate form, which, in turn, is slowly oxidized by bacteria and retained in</p> | <p>Kurmanbayeva, M., Sekerova, T., Tileubayeva, Z., Kaiyrbekov, T., Kusmangazinov, A., Shapalov, S., Burkitbayev M., Bachilova, N. Influence of new sulfur-containing fertilizers on performance of wheat yield //Saudi Journal of Biological Sciences. – 2021. – Vol. 28 (8). – P. 4644-4655. DOI: 10.1016/j.sjbs.2021.04.073</p> |

| | | | | |
|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>the soil. Three different types of the developed sulfur-containing nano-particle have been used to test in greenhouses and nurseries: powdered, pasty sulfur-containing composition, and a solution of calcium polysulfide. The results showed that the use of powdered and dissolved sulfur-containing fertilizers contributed to the early ripeness and increased productivity of wheat. Wheat varieties were tested for the presence of key Lr genes that determine resistance to brown rust. The Omskaya 29 sample showed an immune response according to phytopathological assessment, and molecular screening revealed four resistance genes. The new sulfur-containing product is recommended for improving wheat productivity in agriculture, and the Omskaya 29 variety can also be used as a valuable breeding material resistant to brown rust.</p> | |
| 134. | <p>Heterostructured g-CN/TiO₂ Photocatalysts Prepared by Thermolysis of g-CN/MIL-125 (Ti) Composites for Efficient Pollutant Degradation and Hydrogen Production</p> | <p>https://doi.org/10.3390/nano10071387 IF=5.1, Q1 in nanomaterials</p> | <p>Photocatalysts composed of graphitic carbon nitride (g-CN) and TiO₂ were efficiently prepared by thermolysis of the MIL-125 (Ti) metal organic framework deposited on g-CN. The heterojunction between the 12 nm-sized TiO₂ nanoparticles and g-CN was well established and the highest photocatalytic activity was observed for the g-CN/TiO₂ (3: 1) material. The g-CN/TiO₂ (3: 1) composite exhibits high visible light</p> | <p>Tatykayev, Batukhan, Bilel Chouchene, Lavinia Balan, Thomas Gries, Ghouti Medjahdi, Emilien Girot, Bolat Uralbekov, and Raphaël Schneider. "Heterostructured g-CN/TiO₂ Photocatalysts Prepared by Thermolysis of g-CN/MIL-125 (Ti) Composites for Efficient Pollutant Degradation and Hydrogen Production." <i>Nanomaterials</i> 10, no. 7 (2020): 1387.</p> |

| | | | | |
|---------------------------------------------|----------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>performances both for the degradation of pollutants like the Orange II dye or tetracycline but also for the production of hydrogen (hydrogen evolution rate (HER) up to $1330 \mu\text{mol h}^{-1} \text{g}^{-1}$ and apparent quantum yield of 0.22% using NiS as a cocatalyst). The improved visible light performances originate from the high specific surface area of the photocatalyst ($86 \text{ m}^2 \text{ g}^{-1}$) and from the efficient charge carriers separation as demonstrated by photoluminescence, photocurrent measurements, and electrochemical impedance spectroscopy. The synthetic process developed in this work is based on the thermal decomposition of metal organic framework deposited on a graphitic material and holds huge promise for the preparation of porous heterostructured photocatalysts.</p> | <p>https://doi.org/10.3390/nano10071387</p> |
| Химической физики и материаловедения | | | | |
| 135. | A comprehensive kinetic modeling study of ethylene combustion with data uncertainty analysis | DOI:10.1016/j.fuel.2021.120833 (IF=5.578, Q1 in Chemical Engineering; Energy Engineering and Power Technology) | A revision and upgrade of the ethylene (C_2H_4) oxidation kinetic sub-mechanism were carried as a next step in the optimization of the $\text{C}_{<3}$ chemistry, which is a base for the upcoming PAH sub-model improvement. The main emphasis of the work was focused on the assessment of uncertainties of the thermo-kinetical and experimental data to involve that principally in the methodology of reaction model uncertainty. The principal targets of mechanism extension and update are: | Wang H., Slavinskaya N., Kanz A., Auyelkhanzy M., Gao Y., Haidn O. A comprehensive kinetic modeling study of ethylene combustion with data uncertainty analysis // Fuel. - 2021. -Vol.299. -No 120833. DOI:10.1016/j.fuel.2021.120833 |

| | | | | |
|------|-------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>inspection of the reaction rate coefficients with accounting recently published pressure-dependent reactions and analysis of reaction paths related to the C₂H₄ low-temperature oxidation and the formation of aromatic precursors. The experimental data (auto-ignition, premixed laminar flame speeds, and concentration profiles) with evaluated uncertainty and consistency were used for model optimization. The uncertainty bounds of the key reaction rate coefficients were evaluated from the statistical treatment of the published data, which provided constraints in the reaction rate parameters. The rate parameters of 57 reactions of C₂H₄ and key intermediates were optimized. The revised reaction mechanism demonstrates a good agreement with the majority of the existing experimental data. Results of the sensitivity and rate of production analyses performed for several kinetic mechanisms from the literature were compared to visualize the variations and ambiguity in the importance of reaction paths and highlight the uncertainty problems in mechanism optimization and integration.</p> | |
| 136. | Synthesis of graphene-like porous carbon from biomass for electrochemical energy storage applications | DOI:10.1016/j.diamond.2021.108560 (IF=3.315, Q1 in Electrical and Electronic Engineering; Materials Chemistry) | Graphene-like porous carbon (GLC) was synthesized from walnut shell (WSh) by carbonization and thermochemical activation process. The obtained samples of graphene-like porous carbon based on walnut shell (GLC-WSh) were | Yeleuov M., Daulbayev C., Taurbekov A., Abdisattar A., Ebrahim R., Kumekov S., Prikhodko N., Lesbayev B., Batyrzhan K. Synthesis of graphene-like porous carbon from biomass for |

| | | | | |
|------|-----------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>characterized by physicochemical analysis in order to optimize the synthesis process. The optimum condition of GLC-WSH synthesis was determined to meet the basic requirements for various applications such as an active material for supercapacitors, lithium-ion battery, as energy-intensive additives in order to increase the efficiency of high-energy rocket fuels, and as a membrane for desalination of seawater. The Raman spectra confirmed the presence of few-layer graphene in GLC-WSH with an average number of 5–7 graphene layers. The specific surface area (SSA) was determined using nitrogen adsorption/desorption analysis. The SSA is $2800 \text{ m}^2 \text{ g}^{-1}$ according to Brunauer-Emmett-Teller method. The mass yield of GLC-WSH from the initial mass of the WSH was 21%. The synthesized GLC-WSH powder was applied as an active material for an electrochemical double layer capacitor. Electrochemical characterization showed a high specific capacitance value of 263 F/g and coulombic efficiency of 99.4% at a gravimetric current density of 1000 mA/g.</p> | <p>electrochemical energy storage applications // <i>Diamond and Related Materials</i>. -2021. –Vol.119. - No108560. DOI:10.1016/j.diamond.2021.108560</p> |
| 137. | Bio-waste-derived few-layered graphene/SrTiO ₃ /PAN as efficient photocatalytic system for water splitting | DOI: 10.1016/j.apsusc.2021.149176 (IF=6.707; Q1 in Chemistry, Physical). | Bio-waste-derived few-layered graphene/SrTiO ₃ /PAN photocatalytic systems obtained via electrospinning technique have been investigated as promising, inexpensive and efficient photoelectrochemical materials for | Daulbayev C, Sultanov F, Korobeinyk A.V., Yeleuov M., Azat S., Bakbolat B., Umirzakov A., Mansurov Z. Bio-waste-derived few-layered graphene/SrTiO ₃ /PAN as efficient photocatalytic system for |

| | | | | |
|------|-------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>hydrogen production through the solar water-splitting. For the first time, a few-layered graphene synthesized from biologically waste materials such as a rice husk and walnut shell was used as a co-catalyst in a composite photocatalytic system. Results obtained in this work showed that the presence of the graphene is not only promoting the decrease of the band gap of the photocatalytic system, but also positively alter the effective separation of photoinduced charges. At the same time, those composite photocatalytic systems demonstrated a higher rate of the hydrogen release during the water splitting reaction when compared with the pure SrTiO₃. Performance of the bio-waste-derived few-layered graphene/SrTiO₃/PAN as a photocatalyst in the water-splitting reaction under the UV has been investigated. The developed photocatalytic systems based on few-layered graphene derived from bio-wastes, SrTiO₃ and PAN are perspective candidates for production of hydrogen under splitting water-alcohol mixtures.</p> | <p>water splitting // Applied Surface Science. -2021. –Vol.549. DOI: 10.1016/j.apsusc.2021.149176.</p> |
| 138. | <p>A carbonized cobalt catalyst supported by acid-activated clay for the selective hydrogenation of acetylene</p> | <p>DOI: 10.1007/s11144-021-01993-y (IF=1.52, Q3 in Catalysis; Physical and Theoretical Chemistry)</p> | <p>This study focused on the purification of ethylene from acetylene using a catalyst made of cobalt deposited on a carbon-containing material, such as clay. Cobalt catalysts with different mass fractions were carbonized at a temperature of 550 °C, activated with 5% and 10% nitric acid and tested for the hydrogenation of acetylene to</p> | <p>Aitugan A., Tanirbergenova S., Tileuberdi Y., Yucel O., Tugelbayeva D., Mansurov Z., Ongarbayev Y. A carbonized cobalt catalyst supported by acid-activated clay for the selective hydrogenation of acetylene // Reaction Kinetics, Mechanisms and Catalysis. -2021.</p> |

| | | | | |
|------|-----------------------------------------------------------------------------------------------------------------------|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | ethylene. The physicochemical properties were investigated by means of X-ray powder diffraction (XRD), scanning electron microscope (SEM) and TG/DSC. The reaction products were analyzed using a Chrom-3700 gas chromatograph and gas chromatography–mass spectrometry (Agilent 7890A/5975C). The conversion of a 7% Co/CL-10 catalyst, carbonized at 550 °C, was 82% at 100 °C, and reached 95% at 140 °C. Side reactions were activated when the temperature rose above 140 °C, which reduced the ethylene yield. The carbonized catalysts exhibited more activity than traditional impregnated catalysts that had not been subjected to carbonization. This paper outlines a simple method for preparing Co/CL-10 catalysts with high catalytic activities for the selective hydrogenation of acetylene, using the carbonization process on a chemically-activated carrier clay. | DOI: 10.1007/s11144-021-01993-y |
| 139. | Preparation of coal briquettes based on coal fines with the addition of vinyl chloride and polyethylene terephthalate | (IF=2.081; Q4 in Chemistry, Physical). | The object of the study is substandard coals of Kazakhstan and solid organic waste in the form of polymers. The effect of additives of chlorvinyl and polyethylene terephthalate on the energy properties of coal briquettes was researched. When coal fines and chlorvinyl are mixed, the phenomenon of adsorption occurs–spontaneous concentration of chlorvinyl on the surface of coal. According to SEM, gaseous chlorovinyl in the presence of coal | Tulepov M.I., Baiseitov D.A., Sassykova L.R., Zhapekova A.O., Abdrakova F.Y., Aknazarov S.K., Tureshova G.O., Spanova G.A. Preparation of coal briquettes based on coal fines with the addition of vinyl chloride and polyethylene terephthalate // ARPN Journal of Engineering and Applied Sciences. - 2020. –Vol.15. –No20. –P.2311-2317. |

| | | | | |
|------|------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>is characterized by coarsening of particles into a solid polymer phase with a slight increase in temperature due to adhesion and the formation of larger aggregates. When added to the composition of polyethylene terephthalate briquettes with different concentrations, the calorific value of briquettes increases linearly. Clay was used as a safe binder, preventing coal briquettes from falling apart. The optimization of the composition of coal briquette involved the addition of both clay and polyethylene terephthalate to the composition of briquettes. The presence of these two components will allow to obtain the optimal composition of durable briquettes with a constant calorific value in the range $Q = 20-25 \text{ kJ / kg}$.</p> | |
| 140. | <p>Determination of thermodynamic characteristics of phase-stabilized ammonium nitrate based high-energy solid combustible materials</p> | <p>DOI: 10.1080/00102202.2020.1786076 (IF=1.73, Q4 in Condensed Matter Physics; Physical and Theoretical Chemistry)</p> | <p>The thermodynamic and physical characteristics of the starting components and the synthesized high-energy solid combustible materials are determined. It was established that the reaction of the formation of aluminum nitride in the endothermic mode is possible at a temperature of about 3000 K. The adiabatic combustion temperatures of the synthesized fuel systems in the combustion chamber are calculated. The dependence of the values of the adiabatic temperature and specific impulse on the excess of the oxidizing agent, the nature of the binder and energy additives is established.</p> | <p>Aknazarov S.K., Seisenova A.B., Golovchenko O.Y., Golovchenko N.Y., Gonzalez-Leal J.M. Determination of thermodynamic characteristics of phase-stabilized ammonium nitrate based high-energy solid combustible materials // Combustion Science and Technology. -2020.</p> |

| | | | | |
|------|----------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 141. | Modified activated graphene-based carbon electrodes from rice husk for supercapacitor applications | DOI:10.3390/en13184943 (IF=3.343, Q2 in Control and Optimization; Electrical and Electronic Engineering) | The renewable biomass material obtained from rice husk, a low-cost agricultural waste, was used as a precursor to synthesize a highly porous graphene-based carbon as electrode material for supercapacitors. Activated graphene-based carbon (AGC) was obtained by a two-step chemical procedure and exhibited a very high specific surface area (SSA) of 3292 m ² g ⁻¹ . The surface morphology of the synthesized materials was studied using scanning and transmission electron microscopy (SEM, TEM). Furthermore, the AGC was modified with nickel hydroxide Ni(OH) ₂ through a simple chemical precipitation method. It was found that the most significant increase in capacitance could be reached with Ni(OH) ₂ loadings of around 9 wt.%. The measured specific capacitance of the pure AGC supercapacitor electrodes was 236 F g ⁻¹ , whereas electrodes from the material modified with 9 wt.% Ni(OH) ₂ showed a specific capacitance of up to 300 F g ⁻¹ at a current density of 50 mA g ⁻¹ . The increase in specific capacitance achieved due to chemical modification was, therefore 27%. | Yeleuov M., Seidl C., Temirgaliyeva T., Taurbekov A., Prikhodko N., Lesbayev B., Sultanov F., Daulbayev C., Kumekov S. Modified activated graphene-based carbon electrodes from rice husk for supercapacitor applications // Energies. -2020. – Vol.13. -No18. DOI:10.3390/en13184943 |
| 142. | The recent progress in pitch derived carbon fibers applications. A Review | DOI: 10.1016/j.sajce.2021.07.001 (IF=2.081; Q1 in Chemistry, Physical) | Interest in carbon fibers (CFs) is due to their chemical properties, high electrical conductivity and mechanical strength, which makes them promising candidates for various kinds of practical applications. The need to develop low-cost technologies for producing CFs is a major factor in research | Daulbayev C., Kaidar B., Sultanov F., Bakbolat B., Smagulova G., Mansurov Z. The recent progress in pitch derived carbon fibers applications. A Review // South African Journal of Chemical |

| | | | | |
|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>in this area. Currently, the widespread commercial use of CFs is limited by their high cost, which primarily depends on the type of carbon feedstock. Conventional methods for producing CFs use expensive raw materials such as hydrocarbons and graphite. A possible solution to this problem is the use of coal, petroleum and coal tar as an effective precursor to produce CFs. The review examines recent progress in the synthesis of CFs using petroleum and coal tar and details the prospects for their application in the energy sector and as a structural material for the adsorption of volatile organic compounds. In addition, methods for improving the chemical and structural properties of these CFs have been reviewed and described.</p> | <p>Engineering. -2021. –Vol.38. -No9. – P.20. DOI: 10.1016/j.sajce.2021.07.001</p> |
| 143. | <p>Energetic Compositions by Mechanochemical Treatment of Metal Powders: 3. Influence of Activated and Modified Aluminum Particles on Combustion of Thermite SiO₂–Al Mixtures</p> | <p>DOI:10.3103/S106138622103002X (SJR=0.34; Q3 in Materials Science)</p> | <p>The influence of mechanochemical treatment (MCT) and modification of Al particles on the process of technological combustion in aluminothermic SiO₂–Al mixtures was studied by XRD, SEM/EDS, and pyrometrically. Graphite, polyvinyl alcohol, and stearic acid were used as modifiers. Combined use of modifiers and MCT was found to markedly increase combustion temperature and burning velocity of thermite SiO₂–Al compositions.</p> | <p>Bakkara A.E., Sadykov B.S., Sultanova Z.L., Khairullina A.S., Mofa N.N., Mansurov Z.A. Energetic Compositions by Mechanochemical Treatment of Metal Powders: 3. Influence of Activated and Modified Aluminum Particles on Combustion of Thermite SiO₂–Al Mixtures // International Journal of Self-Propagating High-Temperature Synthesis. -2021. –Vol.30. –No3. – P.165-169. DOI:10.3103/S106138622103002X</p> |
| 144. | <p>Experimental Determination of</p> | <p>DOI:10.3103/S1067821221030111</p> | <p>For the Republic of Kazakhstan, like for any country with a developed mining and</p> | <p>Mansurov Z.A., Supiyeva Z.A., Yeleuov M.A., Taurbekov A.T.,</p> |

| | | | | |
|--|-------------------------------------------------------------------------|---------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | <p>Electrochemical Sorption/Desorption Properties of Gold(III) Ions</p> | <p>(IF= 0.605; Q3 in Mechanics of Materials; Metals and Alloys)</p> | <p>processing sector, it is important to develop knowledge to improve methods and technologies for the complex processing of raw materials, including those for the more complete extraction of precious metals. This is needed due to the high loss of precious metals during their processing and separation and the need to improve the process of their concentration. Advances in the field of carbon nanomaterials offer great prospects for improving existing technologies for the extraction of precious metals from waste solutions and pulps. The goal of the work is to conduct comprehensive studies on the influence of the flow rate of solutions, pH, and the presence of ions of other metals on the extraction of gold on a carbon nanostructured material from rice husk (with its further regeneration and reuse). The effect of the pH of the solution on the degree of extraction of gold(III) ions is studied, it is found that the highest recovery for gold ions is observed at pH ~ 2. The selectivity of gold extraction is established in the combined presence of copper, nickel, and silver. The dependence of the electrochemical reduction sorption of gold on the flow rate of solutions is investigated. It is found that the optimal flow rate of solutions is 10 mL/min. The sorption capacity of the sorbent based on carbonized rice husk is calculated. The investigation</p> | <p>Pavlenko V.V., Smagulova G.T. Experimental Determination of Electrochemical Sorption/Desorption Properties of Gold(III) Ions // Russian Journal of Non-Ferrous Metals. - 2021. –Vol.62. -No3. –P.257-264. DOI:10.3103/S1067821221030111</p> |
|--|-------------------------------------------------------------------------|---------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

| | | | | |
|------|----------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | into the electrochemical sorption/desorption of gold(III) ions showed that the desorption process proceeds better in an acetone/water/NaOH mixture; the degree of desorption is 96%, which demonstrates the possibility of regeneration of the carbon material of the electrode for reuse. The results can be applied to optimize the processes of extraction of precious metals from their solutions. | |
| 145. | Energetic Metal–Organic Frameworks: Thermal Behaviors and Combustion of Nickel Oxide (II) Based on Activated Carbon Compositions | DOI:10.1007/s10891-021-02357-y (IF=1.402; Q2 in Engineering) | Ammonium nitrate (AN) extensively used as an oxidizer in energetic compositions is a promising compound as a propellant and gas generator. It is well known that metal oxides help to address some of the disadvantages of AN, such as the low stability and low burning rate. To investigate the effect of nickel oxide (II) (NiO) on thermal decomposition of AN mixtures, the thermal characteristics of AN, activated carbon C, and NiO mixtures as of metal–organic frameworks (MOFs) were measured using simultaneous differential scanning calorimetry. The compositions were burnt at the pressures 1, 2, 3, and 3.5 MPa in a combustion chamber, and the burning rates were determined. On addition of a metal oxide, the burning rate was shown to increase three–four times. Besides, the activation energy of the systems was calculated. | Yelemessova Z.K., Imangazy A.M., Tulepov M.I., Mansurov Z.A. Energetic Metal–Organic Frameworks: Thermal Behaviors and Combustion of Nickel Oxide (II) Based on Activated Carbon Compositions // Journal of Engineering Physics and Thermophysics. -2021. –Vol.94. - No3. –P.804-811. DOI:10.1007/s10891-021-02357-y |

| | | | | |
|------|-------------------------------------------------------------------------------|-----------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 146. | Recycling of Low-Density Polyethylene Waste for Synthesis of Carbon Nanotubes | DOI:10.1007/s10891-021-02313-w (IF=1.402; Q2 in Engineering) | <p>The authors have presented results of synthesis of carbon nanotubes from low-density polyethylene. The synthesis was carried by thermal destruction of the polyethylene in a chemical-vapor-deposition unit. The process of decomposition of the polyethylene and the synthesis of carbon nanotubes were implemented in one stage in a triple-fired furnace for chemical vapor deposition. Consideration has been given to the influence of temperature on the decomposition products of polyethylene in the range of temperatures 450–550oC. The gas- and vaporphase decomposition products of polyethylene, obtained at different temperatures, were investigated by the infrared spectroscopy method. It has been established that the necessary and sufficient temperature of decomposition of polyethylene is 450oC. Carbon nanotubes were grown on a catalyst that represented cenospheres impregnated with a ferrous nitrate solution. On exposure to high temperatures, ferrous nitrate decomposes to form pure iron particles on the cenospheric surface, which are active sites of growth of carbon nanotubes. The formation of iron particles on the cenospheric surface upon the impregnation with ferrous nitrate and thermal treatment is confirmed by the results of x-ray phase analysis. A semiquantitative analysis shows that the</p> | <p>Smagulova G.T., Vassilyeva N., Kaidar B.B., Yesbolov N., Prikhod'ko N.G., Supiyeva Z., Artykbaeva M.T., Mansurov Z.A. Recycling of Low-Density Polyethylene Waste for Synthesis of Carbon Nanotubes // Journal of Engineering Physics and Thermophysics. -2021. –Vol.94. - No2. –P.431-436. DOI:10.1007/s10891-021-02313-w</p> |
|------|-------------------------------------------------------------------------------|-----------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

| | | | | |
|------|-------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | content of iron in the total catalysts mass amounts to about 2.3%. The synthesis gives rise to carbon nanotubes with diameters of 50–60 nm on the cenospheric surface. Thus, it has been shown that carbon nanotubes can be synthesized from low-density polyethylene waste. | |
| 147. | Compositional fibers based on coal tar mesophase pitch obtained by electrospinning method | DOI:10.23939/chcht15.03.403 (IF=0.608, Q3 in Chemical Engineering; Chemistry) | This research examines the use of coal-processing wastes of Shubarkol deposit (Kazakhstan) in obtaining useful materials such as carbon fibers. For our experiments, mesophase pitch was obtained by coal tar heat treatment at 773 K. Spinnable solution was prepared by crushing mesophase pitch into the pieces with adding poly(methylmethacrylate) as a fiber-forming material and 1,2-dichloroethane as a solvent. Elemental analysis revealed that the chemical composition of mesophase pitch (C – 91.48 %; O – 8.52 %; S – 0.00 %) showed that heat treatment up to 773 K leads to the complete removal of sulfur-containing components which affect the mesophase formation. Raman data of the obtained pitch revealed the appearance of D (1366 cm ⁻¹) and G (1605 cm ⁻¹) peaks, which are responsible for carbon materials; another peak at 2900 cm ⁻¹ shows the presence of C–H bonds. Carbon fibers with the diameter of 0.8–1.75 μm were obtained by electrospinning method in laboratory settings. | Imangazy A., Smagulova G., Kaidar B., Mansurov Z., Kerimkulova A., Umbetkaliev K., Zakhidov A., Vorobyev P., Jumadilov T. Compositional fibers based on coal tar mesophase pitch obtained by electrospinning method // Chemistry and Chemical Technology. -2021. – Vol.15. –No3. –P.403-407. DOI:10.23939/chcht15.03.403 |

| | | | | |
|------|---------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 148. | Nanofibrous biologically soluble scaffolds as an effective drug delivery system | DOI:10.5802/crchim.58 (IF=2.22, Q2 in Chemical Engineering; Chemistry) | In this article, the synthesis of biocompatible fibrous scaffolds with antimicrobial properties based on polycaprolactone/hydroxyapatite/amoxicillin and study of their surface morphology, antimicrobial effect, and drug release are discussed. Hydroxyapatite (1-2_m, 97%) synthesized from biologically waste material (eggshell) was added to the composite scaffolds as a bone-replacement material. The scaffolds' antimicrobial properties were evaluated against <i>S. aureus</i> and <i>E. faecalis</i> . The scaffolds possessed a sustained drug release from the scaffolds amounted to about 94% of the antibiotic's total weight over a 4-week observation period. Agar diffusion confirmed the antimicrobial properties of the scaffolds against specific bacteria. | Daulbayev C., Sultanov F., Aldasheva M., Abdybekova A., Bakbolat B., Shams M., Chekiyeva A., Mansurov Z. Nanofibrous biologically soluble scaffolds as an effective drug delivery system // Comptes Rendus Chimie. -2021. – Vol.24. -No1. –P.1-9. DOI:10.5802/crchim.58 |
| 149. | Fabrication of 3D porous CoTiO ₃ photocatalysts for hydrogen evolution application: Preparation and properties study | DOI:10.1016/j.mssp.2020.105360 (IF= 3.085, Q1 in Mechanical Engineering) | Cobalt titanate (CoTiO ₃) is one of the promising candidates for visible-light-driven photocatalytic water oxidation. In this research, the formation of multilayered 3D porous structures was performed by mixing Co ₃ O ₄ and TiO ₂ nanopowders with adding pore-forming agents and further calcination. Different crystallite sizes of porous CoTiO ₃ were produced by varying the calcination temperature. The fabricated 3D porous CoTiO ₃ were characterized using XRD, SEM, BET, optical measuring technique. The crystallite size increases with increasing the calcination temperature | Beissenov R.E., Mereke A.L., Umirzakov A.G., Mansurov Z.A., Rakhmetov B.A., Beisenova Y.Y., Shaikenova A.A., Muratov D.A. Fabrication of 3D porous CoTiO ₃ photocatalysts for hydrogen evolution application: Preparation and properties study // Materials Science in Semiconductor Processing. -2021. –Vol.121. -No105360. DOI:10.1016/j.mssp.2020.105360 |

| | | | | |
|------|------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>within the range of 600–800 °C. The photocatalytic activity of 3D porous CoTiO₃ was studied by measuring the rate of H₂ evolution during the splitting in 0.5 M KOH aqueous solution electrolyte under 300 mW/cm² xenon lamp irradiation. The SEM images and BET analysis show that an increase in the calcination temperature leads to a decrease of porosity CoTiO₃ due to the agglomeration of particles. The change in values of potential and current of CoTiO₃ depending on the dark and light conditions showed a certain extent under the light, which is mainly reflected in the drop of the initial voltage, and the hydrogen evolution reaction occurs under the 0.2 V bias voltage. The measured rate of hydrogen production of 3D porous CoTiO₃ showed for UV irradiation of 0.3 mmol/g-h and for visible light 0.024 mmol/g-h, respectively. Gas chromatography analysis shows a 13% higher amount of hydrogen production for 3D porous CoTiO₃ sample calcined at 800 °C, than at 600 °C. The results of current work not only report but also put forward a strategy of applied advantages the 3D CoTiO₃ porous material for efficient visible-light photocatalytic reduction of hydrogen.</p> | |
| 150. | Influence of metal oxide particles on bandgap of 1d photocatalysts based on srtio ₃ /pan fibers | DOI:10.3390/nano10091734 (IF= 2.986, Q2 in Materials Science) | This paper deals with the study of the optical properties of one-dimensional SrTiO ₃ /PAN-based photocatalysts with the addition of metal oxide particles and the | Sultanov F., Daulbayev C., Azat S., Kuterbekov K., Bekmyrza K., Bakbolat B., Bigaj M., Mansurov Z. Influence of metal oxide particles on |

| | | | | |
|--|--|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>determination of their bandgaps. One-dimensional photocatalysts were obtained by the electrospinning method. Particles of metals such as iron, chromium, and copper were used as additives that are capable of improving the fibers' photocatalytic properties based on SrTiO₃/PAN. The optimal ratios of the solutions for the electrospinning of fibers based on SrTiO₃/PAN with the addition of metal oxide particles were determined. The transmission and reflection of composite photocatalysts with metal oxide particles were measured in a wide range of spectra, from the ultraviolet region (185 nm) to near-infrared radiation (3600 nm), to determine the values of their bandgaps. Thus, the introduction of metal oxide particles resulted in a decrease in the bandgaps of the obtained composite photocatalysts compared to the initial SrTiO₃/PAN (3.57 eV), with the following values: -3.11 eV for SrTiO₃/PAN/Fe₂O₃, -2.84 eV for SrTiO₃/PAN/CuO, and -2.89 eV for SrTiO₃/PAN/Cr₂O₃. The obtained composite photocatalysts were tested for the production of hydrogen by the splitting of water-methanol mixtures under UV irradiation, and the following rates of hydrogen evolution were determined: 344.67 μmol h⁻¹g⁻¹ for SrTiO₃/PAN/Fe₂O₃, 398.93 μmol h⁻¹g⁻¹ for SrTiO₃/PAN/Cr₂O₃,</p> | <p>bandgap of 1d photocatalysts based on srtio3/pan fibers // Nanomaterials. -2020. -Vol.10. -No9. -P.1-9. DOI:10.3390/nano10091734</p> |
|--|--|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|

| | | | | |
|------|--------------------------------------------------------------------------------------------|-----------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | and 420.82 $\mu\text{mol h}^{-1}\text{g}^{-1}$ for SrTiO ₃ /PAN/CuO. | |
| 151. | High-Efficiency Selective Solar Absorber from Nanostructured Carbonized Plant Raw Material | DOI:10.1007/s10891-020-02203-7 (IF=1.402; Q2 in Engineering) | The results of investigation into the absorptivity of carbonized rice-husk plant material with regard to solar radiation have been given. It has been shown that an absorber based on leached carbonized rice husk has higher solar absorptivity than an absorber based on carbonized apricot pits with an Apricus coating and an absorber based on a commercial Chinese-made coating. The results of investigation into the physical and chemical properties of carbonized rice husk have been presented. It has been shown that the carbon content in the initial unleached rice husk powder is 82.3%, and after leaching, the percentage of carbon rises up to 93.3%. Based on the results of a BET (Brunauer–Emmet–Teller) analysis, it has been established that leached rice husk has a more developed specific surface (447–641 m ² /g) and a higher specific volume of pores (0.27–0.392 cm ³ /g) than unleached rice husk (127–160 m ² /g and 0.054–0.127 cm ³ /g respectively). The advantage of the considered plant-based carbon materials compared to the exiting coatings lies in their porous structure. Cavities are known to be a model of a blackbody, which is a decisive factor in using a material as an absorber, and, simultaneously, a porous structure has a heat-insulating property. | Prikhod'ko N.G., Smagulova G.T., Nazhipkyzy M., Rakhymzhan N.B., Temirgalieva T.S., Lesbaev B.T., Zakhidov A.A., Mansurov Z.A. High-Efficiency Selective Solar Absorber from Nanostructured Carbonized Plant Raw Material // Journal of Engineering Physics and Thermophysics. -2020. –Vol.93. - No4. –P.1020-1029. DOI:10.1007/s10891-020-02203-7 |

| | | | | |
|------|--------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 152. | Combustion Study of Gas-Generating Compositions with Carbon Powder Additives | DOI:10.1134/S1990793120030112 (IF= 0.544, Q4 in Physical and Theoretical Chemistry) | Abstract: In blasting in dense urban areas and piece stone mining, the issue of organizing gentle destruction modes arises, which requires the use of pyrotechnic compositions operating in the deflagration mode. In such compositions, ammonium perchlorate, ammonium nitrate, and other nitrates are used as oxidizing agents. Magnesium is often used as fuel. In this paper, the combustion of a three-component mixture of sodium nitrate, magnesium, and carbon was studied. The latter was obtained by carbonizing a walnut shell or grinding gas mask adsorbents. The thermodynamic calculations of combustion were performed, and the combustion characteristics of the NaNO ₃ /Mg/C mixture with a component ratio of 60/20/20 were measured. | Tursynbek S., Zarko V.E., Glotov O.G., Kiskin A.B., Korchagin M.A., Mansurov Z.A., Surodin G.S., Umbetkaliev K.A. Combustion Study of Gas-Generating Compositions with Carbon Powder Additives // Russian Journal of Physical Chemistry B. -2020. –Vol.14. -No3. – P.407-412. DOI:10.1134/S1990793120030112 |
| 153. | Microwave-enhanced chemical vapor deposition graphene nanoplatelets-derived 3D porous materials for oil/water separation | DOI:10.1007/s42823-019-00073-5 (IF= 1.917, Q3 in Ceramics and Composites; Energy Engineering and Power Technology; | The study presented in the article is focused on use of graphene obtained by novel microwave-enhanced chemical vapor deposition (MECVD) method as a construction material for 3D porous structures—aerogels and sponges. MECVD graphene nanoplatelets-based aerogels were obtained by mixing MECVD graphene nanoplatelets and chitosan, dissolved in 3% acetic acid followed by its freeze drying and carbonization at 800° in inert medium. Surface morphology of aerogels was characterized by SEM. MECVD graphene nanoplatelets-based aerogels are characterized by a porous structure; they are | Sultanov F.R., Daulbayev C., Bakbolat B., Mansurov Z.A., Urazgaliyeva A.A., Ebrahim R., Pei S.S., Huang K.-P. Microwave-enhanced chemical vapor deposition graphene nanoplatelets-derived 3D porous materials for oil/water separation // Carbon Letters. -2020. – Vol.30. -No1. –P.81-92. DOI:10.1007/s42823-019-00073-5 |

| | | | | |
|------|-----------------------------------------------------------------------------|------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>superhydrophobic and possess high sorption capacity with regard to organic liquids of different densities. Polyurethane sponges coated with MECVD graphene can serve as an alternative to aerogels. The process of their obtaining is cheaper and less complicated. They were obtained by facile “dip-coating” method, modifying its surface to increase its hydrophobicity. The resulting sponges are superhydrophobic and superoleophilic, and demonstrate high rate of sorption of organic liquids and can be easily regenerated by squeezing. In addition, they can be used as a separating material in conjunction with vacuum system for continuous and selective collection of organic liquids from the surface of water.</p> | |
| 154. | Recent achievements and future challenges in nanoscience and nanotechnology | DOI:10.18321/ectj994 (IF=0.593, Q3 in Chemical Engineering; Chemistry) | <p>The article presents the investigation results of the formation and synthesis of nanosized materials that were obtained at the Institute of Combustion Problems (ICP), many works have been brought to practical use. Investigations of low-temperature soot formation become the basis of nanomaterial synthesis methods, developed at the ICP since 1985. Below is a list of works on nanomaterials synthesis carried out at the Institute: a complete scheme of soot formation; a developed method for synthesis of nanocarbon, containing few layer graphenes from rice husk and walnut shell; the addition of 1.0% of activated</p> | <p>Mansurov Z.A. Recent achievements and future challenges in nanoscience and nanotechnology // Eurasian Chemico-Technological Journal. - 2020. –Vol.22. -No4. –P.241-253. DOI:10.18321/ectj994</p> |

| | | | | |
|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | carbon accelerates the burning rate of hydroxyl ammonium nitrate three times; also this activated nanocarbon is used as membranes for desalination of water up to 95%; perovskite photocatalysts based on SrTiO ₃ and CoTiO ₃ /PAN fibers are used for hydrogen evolution reaction for sunlight illumination; obtaining carbon fibers by the method of electrospinning from coal tar pitches; obtaining of biologically soluble membranes based on polymeric nanofibres and hydroxyapatite of calcium. | |
| 155. | Comparative analysis of physicochemical properties of rutile tio ₂ with hierarchical 3d architecture prepared by liquid hydrolysis of ticl ₄ and hydrothermal method | DOI:10.18321/ectj976 (IF=0.593, Q3 in Chemical Engineering; Chemistry) | TiO ₂ (rutile) samples with a hierarchical 3D nanostructure of the particles were synthesized by two methods: liquid hydrolysis of TiCl ₄ at 90 °C and atmospheric pressure; hydrothermal synthesis from TiCl ₄ at 160 °C and different [H ₂ O]/[Ti] ratios. The effect exerted by conditions of the synthesis and post-treatments on the crystallite size, morphology, electronic properties and pore structure of the rutile samples was investigated. It was shown that severe hydrothermal conditions with the ratio [H ₂ O]/[Ti] = 20 provide the formation of a more perfect crystal structure of rutile with a smaller band gap energy (3.00 eV against 3.06 eV for the rutile obtained by liquid hydrolysis at atmospheric pressure). The study revealed the stabilizing effect of cerium cations on the pore structure of | Shikina N.V., Yashnik S.A., Toktarev A.V., Ishchenko A.V., Ushakov V.A., Mel'gunov M.S., Mansurov Z.A., Ismagilov Z.R. Comparative analysis of physicochemical properties of rutile tio ₂ with hierarchical 3d architecture prepared by liquid hydrolysis of ticl ₄ and hydrothermal method // Eurasian Chemico-Technological Journal. -2020. – Vol.22. -No3. –P.165-175. DOI:10.18321/ectj976 |

| | | | | |
|------|---------------------------------------------------------------------------------|---------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | rutile, which changes upon thermal treatment. | |
| 156. | A numerical study of fluid flow in the porous structure of biological scaffolds | DOI:10.18321/ectj974 (IF=0.593, Q3 in Chemical Engineering; Chemistry) | Tissue engineering (TE) is one of the promising areas that aims to address the global problem of organ and tissue shortages. The successful development of TE, particularly in bone tissue engineering, consists of the use of modern methods that allow the creation of scaffolds, the physicochemical, mechanical, and structural parameters of which will allow achieving the desired clinical results. The vast possibilities of the rapidly developing technology of three-dimensional (3D) printing, which allows the creation of individual scaffolds with high precision, has led to various developments in bone tissue TE. In this work, for the successful use of three-dimensional printing in TE to ensure the diffusion of nutrients during cell cultivation throughout the entire structure of the scaffold, a model of a rotating scaffold is proposed, and the movement of the diffusion flow of nutrient fluid is calculated based on Darcy's law, which regulates the flow of fluids through porous media. The conducted studies of the rate of diffusion flow of nutrients based on glucose in the porous structure of scaffolds with a 10% content of calcium hydroxyapatite demonstrated the promise of using a model of a rotating composite scaffold in TE of bone tissue. The results show that at a | Daulbayev C., Mansurov Z., Sultanov F., Shams M., Umirzakov A., Serovajsky S. A numerical study of fluid flow in the porous structure of biological scaffolds // Eurasian Chemico-Technological Journal. - 2020. -Vol.22. -No3. -P.149-156. DOI:10.18321/ectj974 |

| | | | | |
|------------------------------------------------|---------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | scaffold rotation speed of 12 rpm, the diffusion flow rate of nutrients in the composite scaffolds porous structure is practically not affected by their geometric shape. | |
| 157. | Synthesis of Multiwall Carbon Nanotubes by the Cvd Method and their Functionalization | DOI:10.1007/s10891-020-02094-8 (IF=1.402; Q2 in Engineering) | Results of the functionalization of multiwall carbon nanotubes by an aqueous solution of nitric acid and a mixture of nitric and sulfuric acids with subsequent treatment of them by ultrasound are presented. The presence of functional groups on the surface of multiwall carbon nanotubes was determined with the use of IR spectroscopy. | Temirgaliyeva T.S., Nazhipkyzy M., Nurgain A., Turganbay A., Dinistanova B., Mansurov Z.A. Synthesis of Multiwall Carbon Nanotubes by the Cvd Method and their Functionalization // Journal of Engineering Physics and Thermophysics. -2020. –Vol.93. - No1. –P.91-94. DOI:10.1007/s10891-020-02094-8 |
| Физической химии, катализа и нефтехимии | | | | |
| 158. | Catalytic cracking using catalysts based on hetero polyacids | DOI 10.31788/RJC.2020.1335822 (IF = 1.23, Q2 in Energy: General Energy, Pharmacology, Toxicology and Pharmaceutics: General Pharmacology, Toxicology and Pharmaceutics, Chemistry: General Chemistry, Chemical Engineering: General Chemical Engineering, Biochemistry, Genetics and Molecular Biology: Biochemistry) | The paper discusses the issues of catalytic cracking processes and presents the experimental results of the authors with the use of the catalysts based on the natural Shankanai zeolite (Kazakhstan) and heteropoly acids (HPA). SEM analysis of the synthesized catalyst structure indicates the presence of its main elements prevailing on the surface of the zeolite. Also, the intense spectra of the components of the HPA (tungsten and phosphorus) are revealed. Possibly, it is because of the high degrees of dispersion and distribution of PW12-HPA particles over the clinoptilolite surface. In this research an analysis of the final reaction product was carried out by NMR spectroscopy. NMR analysis allowed | Sassykova, L.R., Zhakirova, N.K., Aubakirov, Y.A., Sarybayev, M.A., Beisembaeva, L.K. Catalytic cracking using catalysts based on hetero polyacids// Rasayan Journal of Chemistry. – 2020. – Vol. 13, issue 3) - P. 1444–1450 DOI 10.31788/RJC.2020.1335822 |

| | | | | |
|------|------------------------------------------------------------------------------------------|------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>us to calculate the fraction of each component of the mixture. It was shown that the proton spectrum of the sample contains signals of paraffin compounds, which are the main components of the mixture. Aromatic components are absent. Chemical shifts of up to 1 ppm are characteristic mainly of protons of the methyl groups of saturated hydrocarbons and long alkyl substituents in aromatic systems. In this part of the spectrum, it is also assumed that some CH and CH₂ groups of naphthenic fragments are resonated</p> | |
| 159. | Heavy metals accumulation in plants of the dry-steppe zone of the East Kazakhstan region | - In Materials Science: General Materials Science | <p>In this article data of a long-term research of the main regularities of distribution of heavy metals (Cu, Zn, Mn, Co, Pb, Cd) in plants of dry-steppe zone of the East Kazakhstan region are described. The field under study is of considerable scientific significance, as it includes the former nuclear plant of Semipalatinsk, as well as the protected area of the Abai Museum-Reserve. Zone typical plants of a steppe and desert-steppe zone were investigated; all 100 tests of plants, 18 views from 6 families were studied. It is shown that the wild vegetation of the study region contains much higher amounts of lead than cobalt. A significant scatter in the content of heavy metals in wild plants is characteristic. The maximum change in heavy metals is observed in cadmium (72%) and</p> | <p>Sassykova L.R.,Aubakirov Y.A.,Akhmetkaliyeva M.Sh.,Sassykova A.R.,Sendilvelan S.,Prabhakar M.,Prakash S.,Tashmukhambetova Zh.Kh.,Abildin T.S.,Zhussupova A.K.Heavy metals accumulation in plants of the dry-steppe zone of the East Kazakhstan region//Materials Today: Proceedings. – 2020. Vol. 33. – P. 1187–1191</p> |

| | | | | |
|------|--------------------------------------------------------------------|------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>manganese (62%), the minimum change in zinc (25%). For the researched region by the level of biological absorption by plants, copper, manganese, cobalt, lead belong to the group of elements of average absorption; zinc, cadmium - to a group of elements of intense absorption. For zinc and cadmium, biogenic migration, apparently, can act as the main factor in the migration of these elements in the landscape. For zinc a basipetal distribution in various parts of plants is shown, and for copper and manganese an acropetal distribution in various parts of plants is revealed. Cobalt, lead and cadmium are characterized by the greatest accumulation in the roots of plants, while the content of these heavy metals in plant stems is minimal.</p> | |
| 160. | Catalytic reforming of methane into synthesis-gas | - In Materials Science: General Materials Science | <p>Using h-Al₂O₃ as a carrier and Ni and Co as active materials, a series of catalysts were prepared by traditional method of air impregnation on moisture capacity. Test the catalyst with XRD and other characterization methods. The performance of the methane dry reforming reaction was investigated on a fixed reactor. The optimal process conditions were: T = 700 and 900 °C, GHSV = 6000 h⁻¹ and CH₄: CO₂: Ar = 1: 1: 1, 5%Ni-5%Co/h-Al₂O₃ has the best activity and the smallest particle size.</p> | Zhang, X., Maki-Arvela, P., Palonen, H., Tungatarova, S.A., Baizhumanova, T.S. Catalytic reforming of methane into synthesis-gas// Materials Today: Proceedings. – 2020. – Vol. 31. - P. 595–597 |
| 161. | New catalysts for toluene oxidation technology in the liquid phase | - In Materials Science: General Materials Science | <p>The purpose of this study was to study the kinetics of the toluene oxidation process and establish the mechanism of the process.</p> | Tashmukhambetova, Zh.Kh., Sassykova, L.R., Aubakirov, Y.A., Kanatbayeva, M.A., Rustem, |

| | | | | |
|------|---------------------------------------------------------------------------------------------|----------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>For the first time, catalytic systems based on platinum complexes immobilized on a polyimide film (PIP) in the toluene oxidation reaction (ArCH_3) were studied. The general formula of the studied catalytic system can be represented as: $\text{ArCH}_3 - \text{CH}_3\text{CN} - \text{O}_2 - \text{ML}_x/\text{PIP}$, where M - Pt+4; L - Cl-; $x = 2, 3$. Metallization of polymer films was carried out by chemical reduction from a solution of platinum salt (0.01 M H_2PtCl_6). The metal concentration in the catalyst ranged from $0.1 \cdot 10^{-2}$ mol/L to $1 \cdot 10^{-1}$ mol/L, while all other values of the catalytic system remained unchanged. Using the method of thermogravimetric analysis (TGA), it was found that in the temperature range 65-75 °C the catalyst samples are stable, since they do not undergo mass loss due to thermal decomposition. The presence of benzaldehyde was detected in the catalyst.</p> | <p>A.E. New catalysts for toluene oxidation technology in the liquid phase //Materials Today: Proceedings. – 2020. – Vol. 31. - P. 529–531</p> |
| 162. | <p>Composite materials based on Co-Al-Mg-Mn in catalytic oxidative reforming of methane</p> | <p>- In Materials Science: General Materials Science</p> | <p>Study of the activity of Al - Co - Mg - Mn catalysts prepared at 300-600 °C by solution combustion synthesis method was carried out in partial oxidation of methane to synthesis-gas. The developed catalysts make it possible to achieve 98% conversion of CH_4, high yields of H_2 - 98-99% and CO - 40-43% at 900 °C and GHSV = 2500 h-1. The presence of simple and mixed oxides, metal aluminates and spinel-type structures in catalysts, the presence of which contributes to the active work of the</p> | <p>Kaumenova, G.N., Xanthopoulou, G., Aubakirov, Y.A., Tungatarova, S.A., Baizhumanova, T.S. Composite materials based on Co-Al-Mg-Mn in catalytic oxidative reforming of methane // Materials Today: Proceedings. – 2020. - Vol. 31. - P. 603–606</p> |

| | | | | |
|------|---------------------------------------------------------------------------------------------------------|---------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | methane oxidative conversion catalysts, has been established. | |
| 163. | Investigation of obtaining low-sulfur coke from heavy oil residues in the presence of a recycling agent | - In Materials Science: General Materials Science | The current state of the oil refining industry requires obtaining high-quality products that meet environmental requirements. An important issue is the deep processing of oil, as well as the use of oil waste as a raw material. The paper is devoted to study of the influence of various technological parameters during delayed coking of tar on the yield and physicochemical properties of hydrocarbon fuel components and solid-phase product - petroleum coke. As raw materials tar obtained from the Kumkol deposit (Kazakhstan) was applied. Heavy oil residues were coked at a temperature of 510 °C and an overpressure of 0.5 MPa in a laboratory coking unit. It was found that the group hydrocarbon composition of gasoline fraction is consisting mainly from isoparaffin (22.04%) and naphtenic compounds (22.15%), kerosene fraction from paraffin (19.42%) and isoparaffin (25.79%) and diesel fraction composition comprise paraffin (26.04). Raman scattering at 1165 cm ⁻¹ belong to CC aromatic and C = C region and indicates a high crystallinity of the coke structure. Coke is obtained with more developed specific surface 6.76 m ² /g. The volume of the liquid product is 12.06 g (60.3%) and gas evolution amounted 5%. | Aubakirov, Y.A., Sassykova, L.R., Buzayev, N.A., ...Bold, A., Akhmetova, F.Zh. Investigation of obtaining low-sulfur coke from heavy oil residues in the presence of a recycling agent //Materials Today: Proceedings. – 2020. - Vol. 31. - P.514–517 |

| | | | | |
|------|----------------------------------------------|------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 164. | Petroleum resources management systems(Prms) | doi.org/10.32014/2021.2518-170X.66 | <p>Hydrocarbon resources are those quantities of hydrocarbons that exist naturally on the earth surface or in the subsurface. When considering resources, quantities of hydrocarbons both in known and undiscovered accumulations are estimated. Resource estimates are aimed at those quantities that can potentially be extracted and sold in the market during the implementation of commercial projects. The petroleum resource management system provides systematic approach to estimating quantities of hydrocarbons, evaluating projects and presenting results under the scope of universal classification. During exploration, uncertainties and risks inevitably arise. Forecast estimates of hydrocarbon reserves are also performed under conditions of uncertainty. At present oil companies strive to minimize risks and remove some uncertainties before starting exploration work. In order to increase the efficiency of exploration, it is proposed to use several methods of forecast reserves estimation for exploration wells. The most widespread in modern oil and gas industry is classification of the Society of Petroleum Engineers (SPE)-Petroleum Resources Management System (PRMS)-liquid, gaseous and solid hydrocarbons reserves and resources management system. Technology for prospecting and exploration, development, production and</p> | <p>Kosmbaeva, G.T., Aubakirov, Y.A., Tastanova, L.K., Orynassar, R.O., Urazakov, K.R. Petroleum resources management systems(Prms) // News of the National Academy of Sciences of the Republic of Kazakhstan, Series of Geology and Technical Sciences. - 2021. – Vol.3, issue 447.- P. 80–86</p> <p>doi.org/10.32014/2021.2518-170X.66</p> |
|------|----------------------------------------------|------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

| | | | | |
|------|-----------------------------------------------------------------------|----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | treatment of hydrocarbons is constantly evolving and improving. The SPE Oil and Gas Reserves Committee (OGRC) is in constant contact with stakeholder organizations to keep existing definitions and guidelines up to date with evolving technology and industry requirements. | |
| 165. | Hydrogenation of polyaromatic compounds over NiCo/chrysotile catalyst | - doi.org/10.31489/2021Ch3/74-82 | The activity and selectivity of the bimetallic NiCo/chrysotile catalyst during the hydrogenation of model objects (anthracene and phenanthrene) for 1 hour at an initial hydrogen pressure of 3 MPa and a temperature of 400 °C were studied. The chrysotile mineral used as a substrate for active centers of nickel and cobalt is a waste product of asbestos production at Kostanay Minerals JSC (the Republic of Kazakhstan). The catalyst was characterized by a complex of methods of physical and chemical analysis. The chrysotile mineral consists of nanotubes with an inner diameter of about 10 nm and an outer diameter of about 60 nm. The amount of hydrogenation products is 61.91 %, destruction - 15.08 % and isomerization - 8.37 % during the hydrogenation of anthracene. The amount of hydrogenation products is 26.09 %, and that of destruction is 2.51 % during the hydrogenation of phenanthrene. It was found that the catalyst selectively accelerates the hydrogenation reaction and allows increasing the yields of hydrogenation products. The schemes of the | Baikenov, M.I., Aitbekova, D.E., Balpanova, N.Zh., ...Ma, F., Makenov, D.K. Hydrogenation of polyaromatic compounds over NiCo/chrysotile catalyst // Bulletin of the Karaganda University Chemistry Series. – 2021. – Vol. 103, issue 3. – P. 74–82 doi.org/10.31489/2021Ch3/74-82 |

| | | | | |
|------|------------------------------------------------------------------|----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | hydrogenation reaction of model objects were drawn up according to the results of gas chromatography-mass spectrometric analysis of hydrogenates. | |
| 166. | Mono- and Bimetallic Ni-Co Catalysts in Dry Reforming of Methane | DOI 10.1002/slct.202100686 (IF =2.109 Q2 in Chemistry: General Chemistry) | Several bimetallic Ni-Co catalysts supported on θ -Al ₂ O ₃ together with 10 wt % Ni and 10 wt % Co on θ -Al ₂ O ₃ were prepared via the incipient wetness method, characterized by X-ray diffraction (XRD), nitrogen adsorption, transmission electron microscopy, temperature programmed reduction, temperature programmed CO ₂ desorption, Fourier Transformed Infrared Spectroscopy (FTIR) with pyridine adsorption-desorption and tested in dry methane reforming at 700 °C in a fixed bed reactor. According to XRD the metal oxide crystallite sizes decreased from 20 nm for 10 wt % Co/ θ -Al ₂ O ₃ to 13 nm for 5 wt % Ni-5 wt % Co/ θ -Al ₂ O ₃ , which also showed formation of a mixed oxide alloy. The unit cell parameters for spinel in the fresh catalyst and fcc metal formed during the reaction followed the Vegard's rule. Although monometallic 10 wt % Co/ θ -Al ₂ O ₃ exhibited high hydrogen consumption, desorption temperature was also high resulting in a rather low activity of 10 wt % Co/ θ -Al ₂ O ₃ in comparison to bimetallic 5 wt % Ni-5 wt % Co/ θ -Al ₂ O ₃ . The latter exhibited the highest initial activity for hydrogen formation due to its relatively small metal particle size. This | Zhang X.,Vajglova Z.,Mäki-Arvela P.,Peurla M.,Palonen H.,Murzin D.Y. Tungatarova S.A.,Baizhumanova T.S., Aubakirov Y.A. Mono- and Bimetallic Ni-Co Catalysts in Dry Reforming of Methane // Chemistry Select. – 2021. – Vol. 6, issue 14. – P.3424–3434 DOI 10.1002/slct.202100686 |

| | | | | |
|------|----------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | catalyst suffered, however, from extensive coking. The most stable catalyst was 10 wt % Ni/ θ -Al ₂ O ₃ for which the hydrogen yield decreased from 56 % to 45 % during 100 h time-on-stream. For this catalyst no sintering occurred, opposite to 10 wt % Co/ θ -Al ₂ O ₃ . | |
| 167. | Action of Ozone in the Low-Temperature Ozonization of Coal Tar | DOI 10.3103/S1068364X20110034 (IF = 0.477, Q3 in Energy: Fuel Technology, Chemical Engineering: Process Chemistry and Technology, Environmental Science: Environmental Chemistry) | The action of ozone in the low-temperature ozonization of coal tar from the semicoking of Shubarkol coal (Kazakhstan) is analyzed. Two mechanisms are possible: the electrophilic addition of ozone by π bonds to the molecules of unsaturated compounds; or radical-chain reactions with the formation of a broad spectrum of oxygen-bearing products (carboxylic acids, alcohols, aldehydes, etc.). The presence of each mechanism in tar ozonization is approximately the same. Ozone plays a positive role, by doubling the content of β fraction in the tar; and decreasing the content of the unreactive α 1 fraction. The β fraction determines the binding and clinkering properties of pitch, while the α 1 fraction prevents the appearance of anisometric needle-coke structures in pitch coking. | Maloletnev, A.S., Smagulova, N.T., Kairbekov, Z.K. Action of Ozone in the Low-Temperature Ozonization of Coal Tar// Coke and Chemistry. – 2020- Vol. 63, issue 11. - P. 543–547 DOI 10.3103/S1068364X20110034 |
| 168. | Application of Nanoheterogeneous Molybdenum Sulfide Catalysts to the Hydrofining of the Semicoking Tar of Coal | DOI 10.3103/S0361521920040060 (IF = 0.937, Q3 in Chemical Engineering: General Chemical Engineering, Chemistry: General | The hydrofining of semicoking coal tar from the Shubarkul deposit (Republic of Kazakhstan) in the presence of nanoheterogeneous molybdenum sulfide catalyst systems (Mo content, 0.025–0.12%) was studied in order to intensify | Smagulova, N.T., Kairbekov, Z.K., Maloletnev, A.S., Kudreeva, L.K., Sabitova, A.N. Application of Nanoheterogeneous Molybdenum Sulfide Catalysts to the Hydrofining of the Semicoking Tar of Coal from |

| | | | | |
|------|----------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | from the Shubarkul Deposit | Chemistry, Energy: Fuel Technology) | processing technology. The catalysts were in situ prepared in the coal tar with the addition of a sulfidizing agent—elemental sulfur in an amount of 0.03–0.09 wt % on a raw material basis. It was found that the effective Mo content of the catalyst was 0.025%, and the amount of sulfur was 0.03%, which made it possible to obtain a maximum yield of total liquid products (76.8%), which mainly contained diesel fuel fractions, at 5 MPa and 400°C. | the Shubarkul Deposit// Solid Fuel Chemistry. – 2020. – Vol.54, issue 4. - P. 214–218 DOI 10.3103/S0361521920040060 |
| 169. | Refining of Coal Tar by Hydrogenation in the Presence of Nanoheterogeneous Nickel Sulfide Catalyst | DOI 10.3103/S1068364X20050038 (IF = 0.477, Q3 in Energy: Fuel Technology, Chemical Engineering: Process Chemistry and Technology, Environmental Science: Environmental Chemistry) | The refining of coal tar by hydrogenation is considered. In this process, nanoheterogeneous Ni-based catalysts may expediently be produced in situ from precursors in the reaction medium. The yield of needle coke in complete coal processing with recirculation of the residue at the coking stage is found to be 50–55%. That is 1.5 times the industrial yield in the coking of pitch. | Maloletnev, A.S., Kairbekov, Z.K., Smagulova, N.T. Refining of Coal Tar by Hydrogenation in the Presence of Nanoheterogeneous Nickel Sulfide Catalyst// Coke and Chemistry. – 2020. – Vol. 63, issue 5. - P. 253–256 DOI 10.3103/S1068364X20050038 |
| 170. | Group composition analysis of the Shubarkol deposit coal-tar resin fraction | DOI 10.1088/1757-899X/770/1/012002 | Coke-chemical resin is used for the production of sulfur-free naphthalene, benzene, and tetralin. In this study, physico-chemical characteristics of the coke-chemical resin and the tar fraction were examined using gas chromatography and mass spectrometry. Three fractions of initial resin were analyzed with boiling point up to 180, 180-230, and 230-280°C. The results showed that the chemical composition of | Smagulova N.T., Kairbekov Zh.K., Maloletnev A.C., Kairbekov A.Zh., Zhanabaev D., Kanatkyzy A. Group composition analysis of the Shubarkol deposit coal-tar resin fraction// OP Conference Series: Materials Science and Engineering. – 2020. – Vol.770, issue 1, 012002 |

| | | | | |
|------|-----------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | distillate fractions of resin consists of alkyl derivatives and aromatic hydrocarbons with the number of aromatic rings of 1-4. | DOI 10.1088/1757-899X/770/1/012002 |
| 171. | Hydrofining of ozonized coal tar in the presence of molybdenum-sulphide catalysts | DOI 10.1016/j.matpr.2020.06.299 In Materials Science: General Materials Science | Hydrofining in the presence of nanoheterogeneous molybdenum-sulphide catalysts and low-temperature ozonation of the non-dehydrated semi-coking coal tar from the Shubarkol Deposit was conducted. As a result of ozonation of coal tar (CT), the conversion of its component composition with the increased yield of aromatic hydrocarbons and significant reduction of sulfur compounds, toxic heterocyclic and carcinogenic polycyclic arenes was achieved, which contributes to the treatment and improvement of the quality of tar products | Kairbekov Zh.K., Smagulova N.T., Maloletnev A.S., Abik N.A., Otyunshiyev Y.B. Hydrofining of ozonized coal tar in the presence of molybdenum-sulphide catalysts// OP Materials Today: Proceedings. – 2020. – Vol.31, issue 562–565 DOI 10.1016/j.matpr.2020.06.299 |
| 172. | Synthesis and antibacterial activity of (AgCl, Ag)NPs/diatomite hybrid composite | DOI 10.3390/ma13153409 (IF = 3.623, Q2 in Physics and Astronomy: Condensed Matter Physics, Materials Science: General Materials Science) | In the present research, hybrid (AgCl, Ag)NPs/diatomite composites were synthesized by direct impregnation with aqueous silver nitrate solutions. The silver chloride nanoparticles (AgCl-NPs) were formed as an effect of the exchange reaction when silver interacted with the diatomite mineral impurity halite. Nanoparticles of metallic silver (AgNPs) were created by the reduction of silver ions under the influence of hydrogen peroxide. The content of silver chloride nanoparticles in the (AgCl, Ag)NPs/diatomite composite was limited | Kubasheva Z., Sprynskyy M., Railean-Plugaru V., Pomastowski P., Ospanova A., Buszewski B. Synthesis and antibacterial activity of (AgCl, Ag)NPs/diatomite hybrid composite// Materials. – 2020. – Vol. 13, issue 15. - P.1–12, 3409 DOI 10.3390/ma13153409 |

| | | | | |
|------|--------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>by the content of the halite in the used diatomite. Samples of natural diatomite and synthesized (AgCl, Ag)NPs/diatomite composites were examined by using scanning electron microscopy, transmission electron microscopy, X-ray powder diffraction, infrared spectroscopy and thermogravimetric analysis. Moreover, the antibacterial potential of synthesized composites was also studied using the MIC (minimal inhibitory concentration) method against the most common drug-resistant microorganisms in the medical field: Gram-positive Staphylococcus aureus and Gram-negative Klebsiella pneumoniae. The obtained hybrid (AgCl, AgNPs)/diatomite composites were shown to have antimicrobial potential. However, widespread use requires further study by using various microorganisms and additional cytotoxic studies on eukaryotic systems, e.g., cell lines and animal models.</p> | |
| 173. | Several features of producing polyelectrolyte-based nanolayers by the multi-layer assembly | DOI 10.1016/j.matpr.2020.07.070 In Materials Science: General Materials Science | <p>NaCMC/chitosan and PAA/Chitosan nanofilms were prepared by the LbL method. Silicon plates, medical orthopedic titanium and steel implants were chosen as substrates. The surfaces of the solid carriers were pre-treated depending on nature. Surface preparation is one of the essential and major steps in producing an active surface to produce uniform nanolayers in the form of multilayers. Samples of the obtained nanofilms were examined by</p> | <p>Ospanova, A., Savdenbekova, B., Kubasheva, Z., Baltabayeva, B., Uvarov, N., Baltabayeva, B., Uvarov, N. Several features of producing polyelectrolyte-based nanolayers by the multi-layer assembly// Materials Today: Proceedings. – 2020. – Vol.31. - P. 584–587</p> <p>DOI 10.1016/j.matpr.2020.07.070</p> |

| | | | | |
|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | atomic-force microscope (AFM), spectral ellipsometer, scanning electron microscopy (SEM) and contact angle determined. The effect of concentration on film quality and thickness has been studied. | |
| 174. | Physicochemical evaluation of the effect of natural zeolite modification with didodecyldimethylammonium bromide on the adsorption of Bisphenol-A and Propranolol Hydrochloride | DOI 10.1016/j.micromeso.2021.111020 (IF = 5.455, Q1 in Engineering: Mechanics of Materials, Physics and Astronomy; Condensed Matter Physics, Chemistry: General Chemistry, Materials Science: General Materials Science) | Wastewater pollution by organic anions is of great interest. Surfactant-modified zeolites exhibit high adsorption of both organic and inorganic toxicants. Here, bisphenol-A and propranolol hydrochloride were adsorbed on natural zeolite modified with the cationic surfactant didodecyldimethylammonium bromide with and without pretreatment of the zeolite with NaCl and HCl. Detailed physicochemical analysis shows chemisorption, electrostatic and hydrophobic interactions with the surfactant and bisphenol-A, and in the case of propranolol, also physisorption. | Rakhym, A.B., Seilkhanova, G.A., Mastai, Y. Physicochemical evaluation of the effect of natural zeolite modification with didodecyldimethylammonium bromide on the adsorption of Bisphenol-A and Propranolol Hydrochloride//Microporous and Mesoporous Materials. – 2021. – Vol. 318. – P.111020 DOI 10.1016/j.micromeso.2021.111020 |
| 175. | Development of electrochemical methods for production of pure thallium | DOI 10.24193/subbchem.2021.1.01 IF = 0.447, Q4 in Chemistry: General Chemistry | In this work, the electrochemical studies were carried out to improve the purity of rough thallium. The results were obtained by the rough thallium refining through the anodic deposition of thallium oxide (Tl ₂ O ₃), followed by its reduction to Tl ⁺ by hydroxylamine and repeated electrolysis. At the same time, platinum anode material was replaced with glassy carbon material to reduce economic costs in production. It was found that the addition of ammonium thiocyanate after the dissolution of thallium oxide(III) in nitric acid promotes the | Ussipbekova, Y.Z., Seilkhanova, G.A., Berezovskiy, A.V., Kurbatov, A.P., Nauryzbaev, M.K. Development of electrochemical methods for production of pure thallium// Studia Universitatis Babeş-Bolyai Chemia. – 2021. Vol. 66, issue 1. – P. 9–21 DOI 10.24193/subbchem.2021.1.01 |

| | | | | |
|------|------------------------------------------------------------------------------------------|------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | inhibition of re-formation of thallium oxide at the anode, as well as more complete oxidation of trivalent thallium to a monovalent state. The thallium obtained in this way is characterized by a purity of 99.96%. Based on the obtained experimental data the principal schemes for obtaining pure thallium are proposed. | |
| 176. | Solid polymer electrolytes for energy storage systems | DOI 10.1016/j.matpr.2020.07.106 | In this work, nine composite polymer electrolytes (CPE) based on polyvinylidene fluoride (PVdF) with different fillers PVdF-PEG (PVP)-X (where X = Li ₂ SO ₄ , NaCl, LiCl, LiF) were synthesized at the room temperature. The composition of composite polymer electrolytes providing the highest ionic conductivity was determined. The effect of the polyvinylpyrrolidone (PVP) on the ionic conductivity of the film was established. The ionic conductivities of the obtained polymer electrolytes were calculated. Solid polymer electrolyte with the composition PVDF + NMP + LiCl shows the highest ionic conductivity which is equal to 6.0710 ⁻¹ Ohm ¹ cm ¹ | Kenessova, A.K., Seilkhanova, G.A., Kurmanbayeva, T.S., Ussipbekova, E.Zh., Kurbatov, A.P. Solid polymer electrolytes for energy storage systems//Materials Today: Proceedings. – 2020. – Vol. 31. – P. 588–591 DOI 10.1016/j.matpr.2020.07.106 |
| 177. | Adsorption of lead (II) ions from water solutions with natural zeolite and chamotte clay | DOI 10.1016/j.matpr.2020.05.672 | Natural zeolites and clays are known as effective and low-cost materials to use as adsorbents of different pollutants. The adsorption behavior of the Pb ²⁺ ions adsorption on Kazakhstani natural zeolite and Ukrainian Chamotte clay has been studied in this work. The samples are characterized by SEM, EDAX, and XRD methods. The maximum uptake of lead ions | Rakhym, A.B., Seilkhanova, G.A., Kurmanbayeva, T.S. Adsorption of lead (II) ions from water solutions with natural zeolite and chamotte clay// Materials Today: Proceedings. – 2020. Vol.31. - P 482–485 DOI 10.1016/j.matpr.2020.05.672 |

| | | | | |
|------|----------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | (q _{max}) was determined as 14 mg/g for zeolite and 11 mg/g for clay. Langmuir and Freundlich isotherm models were used to describe the adsorption mechanism. It was observed that Langmuir isotherm model best describes the adsorption of Pb ²⁺ on natural zeolite and clay. The separation factors (K _R) were calculated from the Langmuir isotherm. | |
| 178. | Supported palladium catalysts for selective liquid-phase hydrogenation of aromatic nitro compounds | DOI 10.31788/RJC.2021.1436284 (IF = 1.23, Q2 in Energy: General Energy, Pharmacology, Toxicology and Pharmaceutics: General Pharmacology, Toxicology and Pharmaceutics, Chemistry: General Chemistry, Chemical Engineering: General Chemical Engineering, Biochemistry, Genetics and Molecular Biology: Biochemistry) | This article is devoted to the issues of aromatic hydrogenation reactions on supported palladium catalysts: adsorption on palladium catalysts, models of the Pd surface and the location of adsorption centers, features of hydrogenation of aromatic nitro compounds over palladium catalysts with additives of rare-earth elements. Palladium catalysts for hydrogenation of nitro groups in nitro compounds with different functional groups are described. The article discussed theoretical and experimental aspects of data from literature and patent sources. The experimental results of the authors of this article concerning selective hydrogenation of 4,4'-dinitrostilbene-2,2'-disulfonic acid to 4,4'-diaminostilbene-2,2'-disulfonic acid are also shown. Pd-Cu/sibunite was used for selective obtaining 4,4'-diaminostilbene-2,2'-disulfonic acid in water. The formation on the surface of mixed active centers of the type of solid solutions of the Cu ₃ Pd composition with a particle size of 5 nm and | Sassykova L.R., Sassykova A.R., Dossumova B.T., Ilmuratova M.S., Maximov N.E., Yerzhanov A.Y., Batyrbayeva A.A., Raiyssov A.T., Kubekova S.N., Bazilbayev S.M., Abildin T.S. Supported palladium catalysts for selective liquid-phase hydrogenation of aromatic nitro compounds// Rasayan Journal of Chemistry. – 2021.- Vol.14, issue 3). –P. 1795–1802 DOI 10.31788/RJC.2021.1436284 |

| | | | | |
|------|--------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>massive Pd clusters of 100 nm is established, which cause sufficient uniformity of both the surface and the adsorbed hydrogen. This is probably the reason for the high selectivity of the Pd-Cu/sibunite catalyst in the hydrogenation of 4,4'-dinitrostilbene-2,2'-disulfonic acid. A highly selective Pd-Cu / sibunite catalyst has been developed, the optimal conditions for the process (temperature and pressure of hydrogen, solvent) have been determined, which make it possible to obtain the target amine, 4,4'-diaminostilbene-2,2'-disulfonic acid, up to 91-92%. The optimal composition of the catalyst is stable when hydrogenating 7-8-fold portions of 4,4'-dinitrostilbene-2,2'-disulfonic acid.</p> | |
| 179. | Preparation of coal briquettes based on non-standard Kazakhstan coal with various additives and determination of their quality | IF = 0.806 , Q3 in Engineering: Industrial and Manufacturing Engineering, Chemical Engineering: General Chemical Engineering | <p>Briquetting of coal fines is one of the best solutions for the disposal of substandard coal and coal fines. The coals of the Central region of Kazakhstan were selected as the object of this study. When stored for a long time, the coals of this region dry out and turn into coal fines that are not suitable for consumption. It is established that mechanical properties of composite briquettes depend on the charge composition and some technological parameters of briquetting, including: the material composition of the briquetted mixture, moisture mixture, compacting pressure, mode of heat treatment of the briquettes, the type and flow rate of the</p> | <p>Tulepov M., Sassykova L., Kerimkulova A., Tureshova G., Zhapekova A., Sultanova Z., Tursynbek S., Gabdrashova S., Baiseitov D. Preparation of coal briquettes based on non-standard Kazakhstan coal with various additives and determination of their quality // Journal of Chemical Technology and Metallurgy. – 2021. – Vol.56, issue 1. – P.123–132</p> |

| | | | | |
|------|------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>binder component. To optimize the combustion of the coal mass, the pyrotechnic component or polymer additives were added to mixture with the initial coal. The pyrotechnic component produces an incendiary layer, which contains as a combustible component (coal sludge, cardboard), a magnesium igniter and oxidizing agents in the form of ammonium nitrate and barium chromate. The greatest influence on the duration of burning of brown coal is exerted by oxygen-containing compounds (90 %). It was found in the laboratory research to obtain high-quality fuel briquettes, the following characteristics are necessary: coal size 0 - 2.5 mm; coal humidity 10 - 11 %; pressing pressure 150.0 MPa; processing temperature 230° C; heat treatment time of 180 min. The introduction of incendiary composition in the briquette does not lead to a significant reduction in the size and destruction of aggregates, while a significant part of the pyrotechnic composition is located on the surface of the coal in the form of particles with sizes from 145.8 to 368.6 nm, mainly in the form of “coagulants”.</p> | |
| 180. | Synthesis and testing catalysts based on fly ash from thermal power plants and natural zeolite for gas emissions | DOI 10.31788/RJC.2021.1446511 (IF = 1.23, Q2 in Energy: General Energy, Pharmacology, Toxicology and Pharmaceutics: | In this study, hollow microspheres based on fly ash from the Ekibastuz coal field (Kazakhstan) and natural zeolite from the Taizhuzgen field (Kazakhstan) were used for the synthesis of catalysts. The catalysts | Shakiyeva T.V., Sassykova L.R., Khamlenko A.A., Sassykova A.R., Batyrbayeva A.A., Zhaxibayeva Z.M., Kozhaisakova M.A., Muratova A., Dossumova B.T., Abildin |

| | | | | |
|------|---------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | purification and catalytic processing of heavy oil | General Pharmacology, Toxicology and Pharmaceutics, Chemistry: General Chemistry, Chemical Engineering: General Chemical Engineering, Biochemistry, Genetics and Molecular Biology: Biochemistry) | were tested in the process of sulfur dioxide oxidation with different SO ₂ content in the SO ₂ -Ar gas mixture at a flow vortex plant of the “Emulsifier” type with a capacity of 2 m ³ / h. Technology for the oxidation of SO ₂ with oxygen in an aqueous solution has been developed and the best technological parameters for the selective oxidation of SO ₂ with the production of sulfuric acid as a product have been determined. The degree of SO ₂ sorption is reached up to 95%. Also, the prepared catalysts were tested in the process of redox-catalytic cracking of fuel oil (with preliminary electromagnetic excitation of hydrocarbon molecules) to obtain light carbon fractions. The fuel oil of the Amangeldy Gas Processing Plant (AGPP, Kazakhstan) of the M-100 brand was studied as a feedstock. On the optimal catalyst in the products of oxidative cracking of fuel oil, the fraction of light gas oil makes up the main part. The resulting light gas oil contains a significant amount of alpha-olefins, which are scarce raw materials for the production of synthetic additives and oils. | T.S.,Zhumagali M. Synthesis and testing catalysts based on fly ash from thermal power plants and natural zeolite for gas emissions purification and catalytic processing of heavy oil// Rasayan Journal of Chemistry. – 2021. – Vol.14, issue 4. – P. 2216–2223 DOI 10.31788/RJC.2021.1446511 |
| 181. | Hydrogenation of aromatic nitro compounds to amines on nickel and iron-containing catalysts | DOI 10.31788/RJC.2021.1426124 (IF = 1.23, Q2 in Energy: General Energy, Pharmacology, Toxicology and Pharmaceutics: General Pharmacology, Toxicology and Pharmaceutics, | A special place among the chemical transformations of nitro compounds is the reduction reaction allowing the production of valuable amines. In this review, the focus is on the discussion of nickel and iron-containing catalysts. Nickel is the most common catalyst for the reduction of | Sassykova L.R., Sassykova A.R.,Kubekova S.N.,Batyrbayeva A.A.,Azhibigulova R.N.,Zhaxibayeva Z.M.,Kozhaisakova M.A.,Zhusupova L.A.,Sendilvelan S.,Ponomarenko O.I. Hydrogenation of aromatic nitro |

| | | | | |
|------|--------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | Chemistry: General Chemistry, Chemical Engineering: General Chemical Engineering, Biochemistry, Genetics and Molecular Biology: Biochemistry) | various substances, including nitro compounds. Along with Raney nickel different nickel-based catalysts are used: nickel black, Ni/Al ₂ O ₃ , Ni/C, Ni/kieselguhr, Ni/SiO ₂ , Ni/ZnO, Ni/MgO, Ni-Cr ₂ O ₃ /C. Today iron-containing catalysts are successfully used in various processes (Fischer-Tropsch synthesis, Gaber-Bosch, dehydrogenation, dechlorination of organochlorine compounds) and during last years the papers devoted to the application of Fe-containing catalysts for selective catalytic reduction of nitro compounds have been published. The application of catalytic systems based on Fe and Fe _x O _y nanoparticles for implementation of the selective hydrogenation of nitro groups is a promising decision for replacing expensive catalysts prepared of Pt-group metals. | compounds to amines on nickel and iron-containing catalysts// Rasayan Journal of Chemistry. – 2021. – Vol.14, issue 2. – P. 1223–1229 DOI 10.31788/RJC.2021.1426124 |
| 182. | Optimization of the oxidative cracking of fuel oil on catalysts obtained from Kazakhstan raw materials | DOI 10.31788/RJC.2021.1426152 (IF = 1.23, Q2 in Energy: General Energy, Pharmacology, Toxicology and Pharmaceutics: General Pharmacology, Toxicology and Pharmaceutics, Chemistry: General Chemistry, Chemical Engineering: General Chemical Engineering, Biochemistry, Genetics and Molecular Biology: Biochemistry) | This study aimed to prepare catalysts on the base of Kazakhstan raw materials and test them in the oxidative catalytic cracking of fuel oils. It was determined the influence of air on the route of cracking reactions and establish the relationship between the parameters of oxidative catalytic cracking and the degree of conversion of high molecular weight hydrocarbons to light products. It was found that the air additives contribute to a deeper degradation of hydrocarbons of the starting material. According to the IR spectra, the oxidative | Shakiyeva T.V., Sassykova L.R., Dzhatkambayeva U.N., Khamlenko A.A., Zhakirova N.K., Batyrbayeva A.A., Azhigulova R.N., Kubekova S.N., Zhaxibayeva Z.M., Kozhaisakova M.A., Zhusupova L.A., Sendilvelan S. Optimization of the oxidative cracking of fuel oil on catalysts obtained from Kazakhstan raw materials// Rasayan Journal of Chemistry. – 2021. – Vol.14, issue 2. – P. 1065–1071 |

| | | | | |
|------|----------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>cracking gasoline carried out without a catalyst contains sulfur compounds bound to the oxygen atom (927-1,007 cm⁻¹) and carbon (747 cm⁻¹). With an increase in the volumetric flow rate of air and processed feedstock, in the presence of a catalyst, sulfur-containing hydrocarbons are likely to be oxidized. The introduction of air additives into the reactor increases the fraction of the dehydrogenation reaction for lighter-boiling hydrocarbons (fraction 185-340°C) and does not affect the degree of dehydrogenation of the heavier fraction. The addition of air oxygen to the reactor when carrying out catalytic cracking on the developed catalysts makes it possible to deepen the processing of fuel oil and significantly reduce the content of sulfur-containing compounds. The presence of a catalyst promotes their destruction and removal from the gasoline fraction.</p> | DOI 10.31788/RJC.2021.1426152 |
| 183. | <p>Oxides of nitrogen and soot trade-off characteristics of methyl esters in a hybrid mode compression ignition engine</p> | <p>http://dx.doi.org/10.31788/RJC.2021.1426152 In Materials Science: General Materials Science</p> | <p>Partially pre-blended compression ignition engine reduces the discharge of oxides of nitrogen and soot. The aim of this research is to study the combustion and emission parameters of hybrid mode compression ignition (HBMCI) at different hybrid ratios. In this system, the percentage of fuel is introduced in the intake manifold is varied according to hybrid ratios. The remaining part of the fuel is injected straight into combustion chamber prior to the end of the compression stroke to trigger the</p> | <p>Shakiyeva T.V., Sassykova L.R., Dzhatkambayeva U. N., Khamlenko A.A., Zhakirova N.K., Batyrbayeva A.A., Azhigulova R. N., Kubekova Sh. N., Zhaxibayeva Zh. M., Kozhaisakova M. A., Zhusupova L. A., Sendilvelan S., Bhaskar K. Oxides of nitrogen and soot trade-off characteristics of methyl esters in a hybrid mode compression ignition engine// Materials Today:</p> |

| | | | | |
|------|---------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>combustion event. The pre-blended charge is burnt in the cylinder along with the fuel directly injected into the cylinder by a conventional injection system. The brake thermal efficiency at rated power output in Hybrid Mode Diesel-JOME (HBMDJ Mode) is observed from 26.8% to 21.6% and in Hybrid Mode Diesel-FOME (HBMDJ Mode) is observed from 26.4% to 21.4%, when the hybrid ratio changed from 0.25 to 0.75, compared to 28.4% in diesel mode. The hybrid ratio of 0.25 is observed to be optimum in both HBMDJ and HBMDJ. At this hybrid ratio, decrease in brake thermal efficiency is marginal compared to diesel mode. Significant reduction in soot emission is also found than that of diesel mode. From the above investigation, it can be seen that HBMDJ mode was better than HBMDJ mode by comparing the performance, combustion and emission characteristics.</p> | <p>Proceedings. - 2021. - Vol. 45., - P. 5847-5852</p> <p>http://dx.doi.org/10.31788/RJC.2021.1426152</p> |
| 184. | Analysis of Cymbopogon Citratus, Pinus sylvestris and Syzygium cumini biodiesel feedstocks for its fatty acid composition | In Materials Science: General Materials Science | <p>Rapid depletion of fossil fuel and increased demand for petroleum products in energy and transportation sector motivated the researchers to find a substitution for petroleum diesel. Biodiesel is one among the alternate to this crisis. Biodiesel is a combined mixture of fatty acid alkyl esters obtained by the reaction of triglycerides of vegetable or animal origin with alcohol in the presence of a catalyst. The fatty acid profile influences the overall properties of</p> | <p>Bhaskar K.^a Sassykova^b L.R., Prabhakar^c M., Shebha E., Percis^d A., Nalini^d T., Jenish^d J., Jayarajan^d S., Sendilvelan^e S. Analysis of Cymbopogon Citratus, Pinus sylvestris and Syzygium cumini biodiesel feedstocks for its fatty acid composition//Materials Today: Proceedings. - 2021. - Vol.45. - P. 5970-5977</p> |

| | | | | |
|------|---------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>the biodiesel. The properties of individual fatty acid depend on the occurrence of double bonds, fatty acid chain length and branching. Better understanding of the fatty acid composition and correlating the fuel properties is of utmost importance in improving the optimal performance. In the present study, feedstocks of Cymbopogon citratus, Pinus sylvestris and Syzygium cumini is analysed for its fatty acid composition study using Gas Chromatography assisted with mass spectrometry. Based on GC-MS Analysis, fifteen types of fatty acids in Cymbopogon citratus, Pinus sylvestris and Syzygium cumini oil methyl esters were analysed and defined; all these esters are amalgamations of saturated and unsaturated fatty acids. The variation in fatty acid compositions affects the properties of the esters. GC-MS synthesis showed that methyl, ethyl esters free from dirt for the three feedstocks. Few impurities like mainly mono-, di- and triglycerides were found.</p> | |
| 185. | Analysis of Cymbopogon Citratus, Pinus sylvestris and Syzygium cumini biodiesel feedstocks for its fatty acid composition | DOI 10.1016/j.matpr.2020.09.254 In Materials Science: General Materials Science | Rapid depletion of fossil fuel and increased demand for petroleum products in energy and transportation sector motivated the researchers to find a substitution for petroleum diesel. Biodiesel is one among the alternate to this crisis. Biodiesel is a combined mixture of fatty acid alkyl esters obtained by the reaction of triglycerides of vegetable or animal origin with alcohol in | Bhaskar K., Sassykova L.R., Prabhakar M., Percis E.S., Nalini A., Jenish T., Jayarajan J., Sendilvelan S. Analysis of Cymbopogon Citratus, Pinus sylvestris and Syzygium cumini biodiesel feedstocks for its fatty acid composition//Materials Today: |

| | | | | |
|------|---------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>the presence of a catalyst. The fatty acid profile influences the overall properties of the biodiesel. The properties of individual fatty acid depend on the occurrence of double bonds, fatty acid chain length and branching. Better understanding of the fatty acid composition and correlating the fuel properties is of utmost importance in improving the optimal performance. In the present study, feedstocks of Cymbopogon citratus, Pinus sylvestris and Syzygium cumini is analysed for its fatty acid composition study using Gas Chromatography assisted with mass spectrometry. Based on GC–MS Analysis, fifteen types of fatty acids in Cymbopogon citratus, Pinus sylvestris and Syzygium cumini oil methyl esters were analysed and defined; all these esters are amalgamations of saturated and unsaturated fatty acids. The variation in fatty acid compositions affects the properties of the esters. GC–MS synthesis showed that methyl, ethyl esters free from dirt for the three feedstocks. Few impurities like mainly mono-, di- and triglycerides were found.</p> | <p>Proceedings. – 2021. – Vol.45. - P. 5970–5977</p> <p>DOI 10.1016/j.matpr.2020.09.254</p> |
| 186. | Resistance Heated Catalytic Converter (RHCC) with copper oxide catalyst for reducing HC/CO emission from automobile | DOI 10.1016/j.matpr.2020.08.330 In Materials Science: General Materials Science | Rigorous enforcement of emission norms requires a control over cold/cool start emissions on a present-day automobile with catalytic converter. After the car warms up, these converters are really capable in controlling HC and CO emissions. The catalyst isn't efficient during warm-up or | Bhaskar K.,Sassykova L.R.,Prabhakar M., Sheeba Percis E.,Nalini A.,Jenish T.,Jayarajan J.,Jayabalakrishnan D.,Sendilvelan S.,Krishnamoorthi S. Resistance Heated Catalytic Converter (RHCC) with copper oxide catalyst for |

| | | | | |
|------|-------------------------------------------------------------------------------|------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>cool start period because of its low operating temperature. Emission reduction is actually possible by heating the catalyst and changing the substrate of the catalyst used in car. In this work, with the help of band type resistance heaters are used to heat the metal oxide catalyst placed in Resistance Heated Catalytic Converter (RHCC) which will help the conventional converter. It is attempted to study the emission from multi-cylinder SI automotive engine, by developing better catalysts. Form the experimental investigation, it's observed that RHCC with copper oxide catalyst when utilized with the conventional catalytic converter (CCC), the CO and HC emissions are significantly reduced. It can be seen that in twelve seconds after cool start the value of CO% by volume is 4.3 and significant reduction of 0.7% of CO at 180 s is observed for RHCC-PC configuration with 90 lpm air supply for duration of forty seconds. It can be seen that in 120 s after cool start the value of HC in ppm is 315 in contrast with baseline readings. The maximum reduction is actually achieved when the RHCC with copper oxide catalyst and 90 lpm of air supply for forty seconds duration from the cool start of the engine.</p> | <p>reducing HC/CO emission from automobile//Materials Today: Proceedings. – 2021. – Vol.45. – P. 5868–5872</p> <p>DOI 10.1016/j.matpr.2020.08.330</p> |
| 187. | The thermal analysis of the linear carbohydrates constructed of glucose rings | IF = 0.806 , Q3 in Engineering: Industrial and Manufacturing Engineering, Chemical | This article presents the results of a thermal analysis of individual linear carbohydrates, the molecules of which consist of pyranose rings interconnected by the same type of α - | Sinyayev, V.A., Toxeitova, G.A., Batyrbayeva, A.A., Sassykova, L.R., Sakhipov, Y.N. The thermal analysis of the linear carbohydrates |

| | | | | |
|------|------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | Engineering: General Chemical Engineering | glycosidic bonds. It is shown that, when heated, substances first lose adsorbed and crystalline hydrate water, some of them melt, and then decompose in two stages. The amount of weight loss with carbohydrates and the temperature of their individual stages depend on the number of pyranose rings in the saccharide molecules. With an increase in the average degree of polymerization of saccharides, their heat resistance generally increases. The temperature, thermal and gravitational effects of each stage, as well as the heat resistance of saccharides depend on the number of pyranose rings in the molecules of carbohydrates. | constructed of glucose rings//Journal of Chemical Technology and Metallurgy. – 2021. – Vol.56, issue 4. – P. 725–729 |
| 188. | Complex Research of Ferroalloys Production Wastes by Physical And Chemical Methods | IF = 0.806 , Q3 in Engineering: Industrial and Manufacturing Engineering, Chemical Engineering: General Chemical Engineering | In this paper results of complex analysis of ferroalloy production wastes are given. Such wastes as dry gas cleaning dust and wet gas cleaning sludge were studied. The work was performed using Mössbauer spectroscopy, IR-spectroscopy, BET method, X-ray diffraction analysis, Electron Microscopy, X-ray fluorescence spectroscopy. The elemental composition, adsorption properties and surface structure were defined. The obtained results show high containing of Mg, Cr, Fe, well-developed surface, dispersion of active phase. All of that allows making a conclusion about the opportunity of using these kinds of wastes in some catalytic | Shomanova Z.,Safarov R., Tashmukhambetova Z.,Sassykova L.,Nosenko Y., Mukanova R. Complex Research of Ferroalloys Production Wastes by Physical And Chemical Methods//Journal of Chemical Technology and Metallurgy. – 2021. – Vol.56, issue 3. – P. 629–636 |

| | | | | |
|------|---------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | processes as catalysts or as an active phase of a catalyst. | |
| 189. | Study of the dehydration of an aqueous solution of maltotriose by the ir-fourier spectroscopy | IF = 0.806 , Q3 in Engineering: Industrial and Manufacturing Engineering, Chemical Engineering: General Chemical Engineering | In this paper, the changes in IR-Fourier spectra of aqueous maltotriose solution taking place during its dehydration have been analyzed. It is established that in the solution there is a reciprocal effect of the components at the level of the chemical bonds and molecules, the value of which depends on the water/carbohydrate ratio. As compared with maltotriose, the dehydration product of its solution contains more tightly bound water, which possibly “stitches” individual molecules of trisaccharide by binding to their α -glycoside bridges. Individual oligosaccharides with a number of pyranose cycles in the molecules 3 - 7 behave like maltotriose. | Sinyayev, V., Toxeitova, G., Batyrbayeva, A., Sassykova, L., Sakhipov, Y. Study of the dehydration of an aqueous solution of maltotriose by the ir-fourier spectroscopy // Journal of Chemical Technology and Metallurgy. – 2021. - Vol. 56, issue 2. – P.315–320 |
| 190. | Influence of molybdenum and tungsten on the formation of zirconium oxide coatings on a steel base | IF = 2.881, Q2 in Engineering: Industrial and Manufacturing Engineering, Chemical Engineering: General Chemical Engineering | In this paper, we have developed conditions for the deposition of zirconium oxide coatings from solutions containing hexafluorozirconic acid as well as tungsten and molybdenum salts on a steel base. Based on electrochemical studies, it was shown that the addition of tungsten and molybdenum salts to the solution to deposit zirconium oxide coatings led to the inhibition of the anodic process of iron ionization. It was shown that the optimal conditions for the deposition of oxide-zirconium coatings on the surface of steel samples from a solution of 0.2 g/L Zr (IV) + 0.15 g/L W (VI) + 0.1 g/L Mo (VI) were | Bold, A., Sassykova, L., Fogel, L., Vagramyan, T., Abrashov, A. Influence of molybdenum and tungsten on the formation of zirconium oxide coatings on a steel base// Coatings. – 2021. – Vol.11, issue 1. - P. 1–11, 42 |

| | | | | |
|------|--------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>a deposition temperature of 30 °C and time of 10 min. The thickness of the oxide-zirconium coatings formed under these conditions was 64.72 nm, the adhesion value was 3.17 MPa/s, and the corrosion resistance was 26 s according to Akimov's drop method. The depth of corrosive penetration, determined in the salt fog chamber, did not exceed 2 mm after 240 h of testing, meeting the requirements for adhesive layers under the paintwork.</p> | |
| 191. | <p>Synthesis and testing of catalysts based on the cenospheres of fly ash of thermal power plant for processing of hydrocarbon raw materials</p> | <p>IF = 0.806 , Q3 in Engineering: Industrial and Manufacturing Engineering, Chemical Engineering: General Chemical Engineering</p> | <p>The purpose of the work was the synthesis of catalysts based on cenospheres obtained from fly ash and testing their activity in hydrocarbon processing: oxidative cracking of fuel oil and oxidation of methanol to formaldehyde. Collection of microspheres is carried out from the water surface of the pond-ash dump of thermal power plant (TPP-2, Almaty), working on the coals of the Ekibastuz coal deposit (Kazakhstan). Oil of Zhetybai oil field (Kazakhstan), commercial fuel oil and M-100 grade fuel oil were used as cracking raw materials. It was found that the catalysts synthesized are effective for producing light gas oil by cracking. Symmetrical decomposition of high-molecular hydrocarbons contained in the fuel oil was found to be associated with the formation of alkenes and alkanes of homologues, starting with heptene-1 and heptane and ending with octadecene-1 and octadecane. With the simultaneous action</p> | <p>Ibrasheva R., Yemelyanova V., Sassykova L., Dossumova B., Shakiyeva T., Shakiyev E., Baizhomartov B. Synthesis and testing of catalysts based on the cenospheres of fly ash of thermal power plant for processing of hydrocarbon raw materials// Journal of Chemical Technology and Metallurgy. - 2021. – Vol.56, issue 1. – P. 105–115</p> |

| | | | | |
|------|----------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>on the cracked molecules of the active centers of the optimal catalyst and atmospheric oxygen, a synergy was established in the yield of the middle distillate fraction. It was shown that for the processing of hydrocarbons by catalytic cracking is very effective to pre-conduct electromagnetic effects on the feedstock. The conditions for isolating aluminosilicate microspheres of a certain dispersion and fixing iron molybdate to them have been optimized. The developed Mo-Fe catalysts were tested in the process of methanol oxidation with oxygen. Under optimal conditions, the degree of conversion of methanol was 99.8 % with a selectivity of 100 % conversion of methanol to formaldehyde. The catalyst showed its stability over time and in the studied temperature range (270°C - 450°C).</p> | |
| 192. | <p>Studying the regularities of oxidative catalytic cracking of vacuum distillates</p> | <p>DOI 10.1016/j.matpr.2020.09.642 In Materials Science: General Materials Science</p> | <p>Improving the efficiency of processing heavy oil residues into light petroleum products and raw materials is an urgent task for Kazakhstan and other countries that produce and consume petroleum products. Really the share of heavy oil and natural bitumen in the balance of hydrocarbon raw materials produced will continuously increase. The aim of the study was preparation of catalysts based on Taizhuzgen zeolite and Narynkol clay (Kazakhstan) and determination their efficiency in the process of oxidative</p> | <p>Shakiyeva T.V., Sassykova L.R., Dzhatkambayeva U.N., Zhakirova N.K., Prabhakar M., Sendilvelan S., Ganesan M., Jaya Chitra N., Hari R. Studying the regularities of oxidative catalytic cracking of vacuum distillates// Materials Today: Proceedings,. – 2021. Vol. 45. – P.6028–6034</p> <p>DOI 10.1016/j.matpr.2020.09.642</p> |

| | | | | |
|------|-----------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>cracking of vacuum distillates of Atyrau and Zhetybai oil. The IR spectra of the obtained gasolines indicate that the reactions of incomplete oxidation of hydrocarbons in the course of oxidative cracking practically do not occur. At low volume feed rates of the initial substance to the reactor, the yield of diene and cyclodiene hydrocarbons in the presence of air additives significantly increases in comparison with cracking carried out without air additives to the reactor. The direction of the oxidative cracking process changes with an increase in the volume rate of the suspension feed. Obviously that the air of definite concentrations in the reactor contribute to a deeper destruction of the hydrocarbons of the vacuum gas oils investigated.</p> | |
| 193. | Preparation of coal briquettes based on coal fines with the addition of vinyl chloride and polyethylene terephthalate | IF = 0.573, Q2 in Engineering: General Engineering | <p>The object of the study is substandard coals of Kazakhstan and solid organic waste in the form of polymers. The effect of additives of chlorvinyl and polyethylene terephthalate on the energy properties of coal briquettes was researched. When coal fines and chlorvinyl are mixed, the phenomenon of adsorption occurs—spontaneous concentration of chlorvinyl on the surface of coal. According to SEM, gaseous chlorovinyl in the presence of coal is characterized by coarsening of particles into a solid polymer phase with a slight increase in temperature due to adhesion and</p> | <p>Tulepov M.I., Baiseitov D.A., Sassykova L.R., Zhapekova A.O., Abdrakova F.Y., Aknazarov S.K., Tureshova G.O., Spanova G.A. Preparation of coal briquettes based on coal fines with the addition of vinyl chloride and polyethylene terephthalate// ARPN Journal of Engineering and Applied Sciences. – 2020. – Vol.15, issue 20. – P. 2311–2317</p> |

| | | | | |
|------|-----------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>the formation of larger aggregates. When added to the composition of polyethylene terephthalate briquettes with different concentrations, the calorific value of briquettes increases linearly. Clay was used as a safe binder, preventing coal briquettes from falling apart. The optimization of the composition of coal briquette involved the addition of both clay and polyethylene terephthalate to the composition of briquettes. The presence of these two components will allow to obtain the optimal composition of durable briquettes with a constant calorific value in the range $Q = 20-25 \text{ kJ / kg}$.</p> | |
| 194. | Catalytic cracking of vacuum distillates on composite catalysts | <p>DOI 10.31788/RJC.2020.1345948 (IF = 1.23, Q2 in Energy: General Energy, Pharmacology, Toxicology and Pharmaceutics: General Pharmacology, Toxicology and Pharmaceutics, Chemistry: General Chemistry, Chemical Engineering: General Chemical Engineering, Biochemistry, Genetics and Molecular Biology: Biochemistry)</p> | <p>The article describes the study of the regularities of oxidative cracking of vacuum gas oils of Atyrau and Zhetybay oil on composite catalysts based on natural zeolite Taizhuzgen and Narynkol clay. During oxidative cracking on synthesized zeolite-containing catalysts, an increase in gas and coke formation is observed in comparison with cracking in an inert atmosphere. These data indicate a magnification in the catalytic destruction of high molecular weight hydrocarbons in the presence of traces of air. The influence of the fractional composition of the processed feedstock on the laws of the catalytic process was determined; the dependence of the composition and yield of cracking products on the ratio of components in the</p> | <p>Ibrasheva R.K., Yemelyanova V.S., Sassykova L.R., Dzhatkambayeva U.N., Shakiyeva T.V., Dossumova B.T., Zhakirova N.K., Sendilvelan S., Seilkhanov T.M. Catalytic cracking of vacuum distillates on composite catalysts//Rasayan Journal of Chemistry. - 2020. – Vol.13, issue 4. – P. 2370–2375</p> <p>DOI 10.31788/RJC.2020.1345948</p> |

| | | | | |
|------|-------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>catalyst was established. When varying the concentration of air in the reaction mixture, a maximum concentration of the kerosene-gas oil fraction in the cracked products is observed, corresponding to the air supply at a speed of 0.15 h⁻¹. The influence of air on the course of the cracking reaction and the relationship between the parameters of oxidative-catalytic cracking were determined. The oxidative cracking of high molecular weight hydrocarbons on composites of natural zeolite and clay proceeds by a radical mechanism. The data confirm that the process of oxidative cracking in the gas phase is an environmentally safe and effective way to obtain cracking products of heavy raw materials.</p> | |
| 195. | Synthesis of modified nanocarbon materials and determination of their adsorption capacity | <p>DOI:10.24247/ijmperdfeb202026 IF = 0.744, Q3 in Engineering: Mechanical Engineering, Aerospace Engineering, Chemical Engineering: Fluid Flow and Transfer Processes</p> | <p>In this work, thermally expanded graphite and carbonized rice husk were obtained by heat treatment at different temperature conditions and different ratios. The samples were purified and characterized by physico-chemical methods. The synthesized samples were tested as oil sorbents in water. The results of determination of sorption capacity of thermally expanded graphite oil showed higher values (5-6%) compared to carbonized rice husks (3.1-3.7%). It should be noted that all samples of thermally expanded graphite have an adsorption capacity at least three times greater than that of natural graphite. The process of</p> | <p>Nyissanbayeva, G.R., Kudaibergenov, K.K., Seidildayeva, A.K., Sassykova, L.R., Tulepov, M.I. Synthesis of modified nanocarbon materials and determination of their adsorption capacity//International Journal of Mechanical and Production Engineering Research and Development. – 2020. Vol. 10, issue 1. - P. 305–314, IJMPERDFEB202026</p> <p>DOI:10.24247/ijmperdfeb202026</p> |

| | | | | |
|------|--------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | carbonization of rice husks was carried out at 600, 700, 800 and 900°C. It was found for samples of carbonized rice husks that the adsorption capacity was maintained in the range of 3.1-3.7% and no special changes were detected which depends upon activation temperature. The results of electron microscopic examination showed that the process of carbonization does not significantly change the macroscopic morphology of rice husks. In general, it is concluded that the carbonization process leads to an increase in the adsorption capacity of samples. | |
| 196. | Investigation of electrohydraulic effect on physicochemical characteristics of high-resinous oil Karazhanbas | DOI: https://doi.org/10.18321/ectj999 IF =0.871, Q3 in Chemical Engineering; General Chemical Engineering, Chemistry: General Chemistry, Materials Science: General Materials Science, Physics and Astronomy: Condensed Matter Physics | In order to change the viscosity of high-resinous oil of the Karazhanbas field (Kazakhstan), the effect of electrohydraulic (EH) action on it was studied. The effect of adding an organic solvent xylene on the rheological properties of oil is investigated. A comparative study of the hydrocarbon composition of oil before and after electrohydraulic impact was carried out by the method of gas chromatography-mass spectrometry. Fragment composition of oil hydrocarbons before and after electrohydraulic treatment was determined by ¹ H and ¹³ C NMR spectroscopy. It is shown that the conversion of heavy oil fractions to light ones begins with a five-time electrohydraulic impact. It is determined that 20–25 electric discharge pulses are sufficient for the quantitative | Salakhov R.Kh., Seitzhanova M., Bodykov D.U., Sassykova L.R., Zhakirova N.K., Seilkhanov T.M. Investigation of electrohydraulic effect on physicochemical characteristics of high-resinous oil Karazhanbas// Eurasian Chemico-Technological Journal. – 2020. – Vol. 22, issue 4. – P. 315–321 DOI: https://doi.org/10.18321/ectj999 |

| | | | | |
|------|---------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>process of splitting hydrocarbons. It was found that the addition of xylene to high-viscosity oil leads to an increase in the conversion of hydrocarbons under electrohydraulic action. The content of paraffins and naphthalenes in high-viscosity oil is slightly reduced during electrohydraulic processing. In oil, after electrohydraulic action, a decrease in the proportion of protons of long alkyl terminal CH₃-groups of hydrocarbons is observed, which indicates the process of decomposition of heavy oil fractions into light fractions.</p> | |
| 197. | Investigation of obtaining low-sulfur coke from heavy oil residues in the presence of a recycling agent | DOI 10.1016/j.matpr.2020.06.060 In Materials Science: General Materials Science | <p>The current state of the oil refining industry requires obtaining high-quality products that meet environmental requirements. An important issue is the deep processing of oil, as well as the use of oil waste as a raw material. The paper is devoted to study of the influence of various technological parameters during delayed coking of tar on the yield and physicochemical properties of hydrocarbon fuel components and solid-phase product - petroleum coke. As raw materials tar obtained from the Kumkol deposit (Kazakhstan) was applied. Heavy oil residues were coked at a temperature of 510 °C and an overpressure of 0.5 MPa in a laboratory coking unit. It was found that the group hydrocarbon composition of gasoline fraction is consisting mainly from isoparaffin (22.04%) and naphthenic</p> | <p>Aubakirov Y.A., Sassykova L.R., Buzayev N.A., Suindikov Zh.A., Bold A., Akhmetova F. Zh. Investigation of obtaining low-sulfur coke from heavy oil residues in the presence of a recycling agent//Materials Today: Proceedings. – 2020. – Vol.31. – P. 514–517</p> <p>DOI 10.1016/j.matpr.2020.06.060</p> |

| | | | | |
|------|--------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>compounds (22.15%), kerosene fraction from paraffin (19.42%) and isoparaffin (25.79%) and diesel fraction composition comprise paraffin (26.04). Raman scattering at 1165 cm⁻¹ belong to CC aromatic and C = C region and indicates a high crystallinity of the coke structure. Coke is obtained with more developed specific surface 6.76 m²/g. The volume of the liquid product is 12.06 g (60.3%) and gas evolution amounted 5%.</p> | |
| 198. | Using of rust converters for deposition of anti-corrosion coatings | <p>DOI 10.1016/j.matpr.2020.05.796 In Materials Science: General Materials Science</p> | <p>This work is devoted to the study of phosphate coatings formed on the surface of iron samples from Tzinkar rust converter solutions manufactured in industry. The optimal conditions for the deposition of anticorrosion coatings from a solution of the Tzinkar rust converter in the presence of accelerators of nitrophenol, sodium m-nitrobenzosulfonate and hydroxylamine are determined. It was shown that the coatings deposited from Tzinkar the presence of an accelerator of sodium m-nitrobenzosulfonate with a concentration of 5 g/l at a deposition temperature of 40 °C and a deposition time of 10 min had the highest corrosion resistance. The corrosion resistance of such coatings is 180 s according to the Akimov method, while the corrosion resistance of coatings deposited from the phosphating solution FR under the same conditions is 25 s. The study of deposited anticorrosion coatings from</p> | <p>Bold A., Fogel L.A., Statsyuk V.N., Sassykova L.R., Sultanbek U., Ait S., Tilepbergen Zh.Zh., Vagramyan T.A., Abrashov A.A. Using of rust converters for deposition of anti-corrosion coatings//Materials Today: Proceedings. – 2020. – Vol. 3. - P. 502–505 DOI 10.1016/j.matpr.2020.05.796</p> |

| | | | | |
|------|--------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>Tzinkar solution was carried out using the EM method with OLYMPUS LEXTOLS 4100 microscope. The thickness of the coatings was determined using a thickness gauge of galvanic coatings Constant K6C. Coating strength was determined on a PosiTestAT. It was shown that the addition of 0.5 g/l m-nitrobenzosulfonate to the Tzinkar solution promotes the formation of a uniform fine-crystalline coating with the smallest thickness of 5.2 lm and the highest adhesion of 3.7 MPa with the surface of the iron sample in comparison with other accelerators.</p> | |
| 199. | New catalysts for toluene oxidation technology in the liquid phase | <p>DOI 10.1016/j.matpr.2020.06.141 In Materials Science: General Materials Science</p> | <p>The purpose of this study was to study the kinetics of the toluene oxidation process and establish the mechanism of the process. For the first time, catalytic systems based on platinum complexes immobilized on a polyimide film (PIP) in the toluene oxidation reaction (ArCH₃) were studied. The general formula of the studied catalytic system can be represented as: ArCH₃ - CH₃CN - O₂ - ML_x/PIP, where M - Pt⁺⁴; L - Cl⁻; x = 2, 3. Metallization of polymer films was carried out by chemical reduction from a solution of platinum salt (0.01 M H₂PtCl₆). The metal concentration in the catalyst ranged from 0.1 -10⁻² mol/L to 1 -10⁻¹ mol/L, while all other values of the catalytic system remained unchanged. Using the method of thermogravimetric analysis (TGA), it was found that in the</p> | <p>Tashmukhambetova Zh.Kh., Sassykova L.R., Aubakirov Y.A.,Dangaliyeva A.Kh., Kanatbayeva M.A.,Rustem A.E. New catalysts for toluene oxidation technology in the liquid phase// Materials Today: Proceedings. – 2020. – Vol. 31. – P. 529–531 DOI 10.1016/j.matpr.2020.06.141</p> |

| | | | | |
|------|--------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | temperature range 65-75 °C the catalyst samples are stable, since they do not undergo mass loss due to thermal decomposition. The presence of benzaldehyde was detected in the catalyst. | |
| 200. | Research of the combustion of gas-generating compositions with additives of carbon powders | DOI 10.1016/j.matpr.2020.08.268 In Materials Science: General Materials Science | Carbon materials obtained from secondary plant raw materials are widely used in various industries, where they are applied as catalysts, adsorbents and in pyrotechnics for creating gas-forming systems. In this work, activated carbon of two types- obtained from the walnut shell and as a product of utilization of gas adsorbents was used. The combustion of a three-component mixture of sodium nitrate, magnesium, and carbon obtained by carbonization of a walnut shell or by grinding gas mask elements was studied. It was found that at a low carbon content, the combustion of the mixture occurs at a high rate in a convective mode. As the working composition, a mixture with a component ratio of 60% - NaNO ₃ , 20% - Mg, 20% - C was chosen, which is characterized by rather high values of gas productivity. The burning rate of a composition based on carbon from walnut is about two times higher than in the case of carbon from a gas mask, and the flame temperature is higher by about 500 K. X-ray phase analysis of solid combustion products showed that the main products are magnesium oxide and sodium carbonate. The presence of a partially unreacted initial | Baiseitov D.A.,Tursynbek S.,Sassykova L.R.,Amir Zh.,Orazbayev A.,Tulepov M.I.,Kudyarova Zh.,Sendilvelan S.,Prabhakar M., Prakash S. Research of the combustion of gas-generating compositions with additives of carbon powders//Materials Today: Proceedings. -2020. – Vol.33. - P. 1216–1220 DOI 10.1016/j.matpr.2020.08.268 |

| | | | | |
|------|-----------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | oxidant of sodium nitrate has also been found, and its content in combustion products of a carbon-based incendiary composition from a gas mask is higher than in the case of combustion of a mixture based on carbon obtained from a walnut shell. This can probably be explained by the fact that gaseous products are released during combustion, and this leads to partial dispersion of the initial components in the combustion wave, which is more pronounced when using carbon obtained from a gas mask. As a result of the research the prospect of using such a mixture in gas generator cartridges is shown. | |
| 201. | Influence of saturated fatty acid material composition in biodiesel on its performance in internal combustion engines | DOI 10.1016/j.matpr.2020.07.626 In Materials Science: General Materials Science | The aim of this research was to study the influence of the composition of saturated fatty acids of biodiesel on the performance, emissions and characteristics of combustion in an engine with compression ignition. An increase in saturated fatty acids may eliminate biodiesel deficiencies. Various 55% mixtures of saturated fatty acids with diesel fuel were studied and compared. Five different combinations of blend were prepared using the following esters such as Palm oil methyl ester (POME), Coconut oil methyl ester (COME), Neem oil methyl ester (NOME), Mahua oil methyl ester (MOME), Jatropha oil methyl ester (JOME) and Pongamia oil methyl ester (PONOME). All five combinations (BD1-BD5) were tested and compared for physicochemical | Tamilselvan P., Sassykova L., Prabhakar M. ^f , Bhaskar K., Kannayiram G., Subramanian S., Prakash S. Influence of saturated fatty acid material composition in biodiesel on its performance in internal combustion engines// Materials Today: Proceedings. – 2020. Vol.33. – P.1181–1186 DOI 10.1016/j.matpr.2020.07.626 |

| | | | | |
|------|----------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>characteristics such as density, viscosity, iodine number, saponification number, energy consumption, thermal efficiency, exhaust gas temperature, toxic gas emissions. Five blended combinations showed viscosity around 5.13 to 5.56 centistokes. The Cetane number of the five blends were in the range of 52-56. The heating value of the five combinations was in the range of 38.92 to 40.65 MJ/kg. Iodine values were found to be in the range of 50-73. The brake thermal efficiency percentage were in the range of 27.15-27.4. All five blends found to emits less amount of Greenhouse gases. The results of the research state that all five combinations of biodiesel are unique, and they show very good performance properties as fuel along with less discharges toxic emissions.</p> | |
| 202. | Protective properties of phosphate coatings based on rust converters | IF = 0.806 , Q3 in Engineering: Industrial and Manufacturing Engineering, Chemical Engineering: General Chemical Engineering | <p>The aim of this work is to study the possibility of using rust converters produced industrially as solutions for the formation of phosphate coatings on the surface of iron samples and to compare them with known phosphate solutions. The effect of nitrophenol, sodium 3-nitrobenzenesulfonate and hydroxylamine as nitrogen-containing accelerators of the phosphating process on the corrosion resistance of the formed phosphate coatings is considered. The optimal conditions (an accelerator concentration, a deposition temperature, deposition time) of the</p> | <p>Statsyuk V.,Fogel L.,Bold A., Sultanbek U.,Ait S.,Sassykova L. Protective properties of phosphate coatings based on rust converters// Journal of Chemical Technology and Metallurgy. - 2020. Vol.55, issue 6. – P.2151–2157</p> |

| | | | | |
|------|------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | formation of phosphate coatings on iron samples in rust converters solutions are determined. It is shown that the highest corrosion resistance is provided by the phosphate coating deposited within 10 min at 40°C in Phosfomet solution using nitrophenol as an accelerator of a concentration of 5 g/l. The effect of the latter on the thickness and the adhesion of the formed phosphate coatings in Phosphomet solution is investigated. | |
| 203. | Using cyclic voltammetry to determine the protective ability of phosphate coatings | DOI 10.15407/fm27.03.605 IF = 0.414, Q4 in Materials Science: General Materials Science | The paper presents experimental material and its discussion on the use of cyclic voltammetry to determine the optimal conditions for the formation of protective anticorrosive coatings on the surface of iron samples deposited from phosphating solutions containing phosphatization accelerators of various nature (hydroxylamine, nitrophenol). The concentration of phosphate accelerators was established on the basis of a change in the cathode current maximum due to the electroreduction of products during the sequential cycling of current-voltage curves on a steel electrode without updating the surface of phosphate films in a solution of 0.3 M Na ₂ SO ₄ . The optimal concentration of the phosphate accelerator was found by the absence of a current maximum on the cathode part of the cyclic current — voltage curves during sequential cycling. According to this method, the optimal | Statsyuk V.,Bold A.,Zhurinov M.,Fogel L.,Sasskyova L.,Vagramyan T.,Abrashov A. Using cyclic voltammetry to determine the protective ability of phosphate coatings// Functional Materials. – 2020. – Vol.27, issue 3. – P.605–610 DOI 10.15407/fm27.03.605 |

| | | | | |
|------|--------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | concentrations of the phosphating accelerators of hydroxylamine and nitrophenol were determined. The data obtained are consistent with the protective ability of phosphate coatings, defined by the drip method of Akimov. | |
| 204. | Synthesis of effective environmentally friendly additives for automotive fuels | DOI 10.31788/RJC.2020.1345852 (IF = 1.23, Q2 in Energy: General Energy, Pharmacology, Toxicology and Pharmaceutics: General Pharmacology, Toxicology and Pharmaceutics, Chemistry: General Chemistry, Chemical Engineering: General Chemical Engineering, Biochemistry, Genetics and Molecular Biology: Biochemistry) | One of the pressing problems when using internal combustion engines is the formation of harmful gas emissions. The synthesis of environmentally friendly additives to automotive fuels is one of the most important directions in the development of the oil refining and petrochemical industries. The greatest distribution among additives increasing the octane number, alkyl tert-butyl ethers (ATBE) received. This study aimed to develop a synthesis technology for several promising tertiary esters with the number of carbon atoms in a molecule of 6-8: ethyl tert-butyl (ETBE); isobutyl-tert-butyl (IBTBE) and iso-propyl-tert-amyl (IPTAE). To prepare ethers, the process of interaction of isobutylene (i-C ₄ H ₈) with aliphatic alcohols on acid catalysts is carried out. The synthesis of additives was carried out according to 2 schemes. As catalysts, standard gel sulfocationites and catalysts prepared based on the systems heteropoly acid (HPA)-aluminum oxide and HPA – natural zeolite were tested. It was found that the selectivity of the synthesis of ATBE on catalysts with HPA | Sassykova L.R.,Kadirbekov K.A., Zhakirova N.K.,Zhumakanova A.S.,Sendilvelan S,Abildin T.S., Batyrbayeva A.A.,Azhibulova R.N.,Ponomarenko O.I., Ryskaliyeva R.G. Synthesis of effective environmentally friendly additives for automotive fuels//Rasayan Journal of Chemistry. – 2020. – Vol.13, issue 4. - P. 2085–2091 DOI 10.31788/RJC.2020.1345852 |

| | | | | |
|------|--------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | increases with an increasing number of carbon atoms in alcohol. The amount of gasoline additives varied from 1 to 12%. It was shown that the additives synthesized allowed to increase the octane number by several points, in some cases up to 20. The results obtained show a good acceptance of the studied base gasoline to the components of the prepared composite additives. | |
| 205. | Catalytic cracking using catalysts based on hetero polyacids | DOI 10.31788/RJC.2020.1335822 (IF = 1.23, Q2 in Energy: General Energy, Pharmacology, Toxicology and Pharmaceutics: General Pharmacology, Toxicology and Pharmaceutics, Chemistry: General Chemistry, Chemical Engineering: General Chemical Engineering, Biochemistry, Genetics and Molecular Biology: Biochemistry) | The paper discusses the issues of catalytic cracking processes and presents the experimental results of the authors with the use of the catalysts based on the natural Shankanai zeolite (Kazakhstan) and heteropoly acids (HPA). SEM analysis of the synthesized catalyst structure indicates the presence of its main elements prevailing on the surface of the zeolite. Also, the intense spectra of the components of the HPA (tungsten and phosphorus) are revealed. Possibly, it is because of the high degrees of dispersion and distribution of PW12-HPA particles over the clinoptilolite surface. In this research an analysis of the final reaction product was carried out by NMR spectroscopy. NMR analysis allowed us to calculate the fraction of each component of the mixture. It was shown that the proton spectrum of the sample contains signals of paraffin compounds, which are the main components of the mixture. Aromatic components are absent. Chemical shifts of up to 1 ppm are | Sassykova, L.R., Zhakirova, N.K., Aubakirov, Y.A., Sarybayev, M.A., Beisembaeva, L.K. Catalytic cracking using catalysts based on hetero polyacids// Rasayan Journal of Chemistry. – 2020. – Vol. 13, issue 3) - P. 1444–1450 DOI 10.31788/RJC.2020.1335822 |

| | | | | |
|------|--------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | characteristic mainly of protons of the methyl groups of saturated hydrocarbons and long alkyl substituents in aromatic systems. In this part of the spectrum, it is also assumed that some CH and CH ₂ groups of naphthenic fragments are resonated | |
| 206. | Sorbents based on rice husk and graphite: Synthesis, characterization and determination of their sorption capacity in the oil-water system | IF = 0.806 , Q3 in Engineering: Industrial and Manufacturing Engineering, Chemical Engineering: General Chemical Engineering | The expanded graphite (EG) and carbonized rice husk (CRH) used in this study are obtained by a heat treatment at various temperatures and activation conditions. A natural graphite of the Zavalievsky deposit (Zavalievsky Graphite Ltd., Kiev) of Ukraine is used. The samples are tested as oil-in-water sorbents aiming to remove emulsified oils from wastewater. The efficiency of the oil removal in presence of CRH and EG is determined. The results show that it increases by 10-15% in case of EG samples after basic leaching. The adsorption capacity of CRH samples is almost the same with no perceptible changes observed with an activation temperature increase. All samples are characterized by various physico-chemical methods of an analysis. According to the elemental analysis, the heat treatment results in an increase of the carbon content compared to that of the feedstock and the other components presence, but a decrease of the hydrogen content. A noticeable decrease of the hydrogen content is detected with an | Gulnura R. Nyssanbayeva ^{1,2} , Kenes K. Kudaibergenov ² , Larissa R. Sassykova ^{2,3} , Almagul R. Kerimkulova ^{2,3} , Zulkhair A. Mansurov ^{2,3} , Raushan A. Berkutbayeva Sorbents based on rice husk and graphite: Synthesis, characterization and determination of their sorption capacity in the oil-water system//Journal of Chemical Technology and Metallurgy. – 2020. – Vol.55, issue 5. – P.1034–1040 |

| | | | | |
|------|----------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | increase of the activation temperature. It is shown that in general the carbonization process leads to an increase of the adsorption capacity. | |
| 207. | Combustion processes of gas generators in the form of cartridges on the basis of ammonium nitrate, flammable nanoaluminum and nanocarbon additives | IF = 0.806 , Q3 in Engineering: Industrial and Manufacturing Engineering, Chemical Engineering: General Chemical Engineering | A pyrotechnic composition containing oxidizing agents, nanocarbon and nanoaluminum additives is developed in the course of the investigation reported. The burning rate of the composition containing 80 % of ammonium nitrate, 5 % of nanoaluminum and 15 % of nanocarbon meets the requirements of a chemical gas-generating composition. It is found equal to 1.25 mm/s. The flash point of nanoaluminum amounts to 750°C, while that of the nanocarbon fuel is equal to 350°C. The laws which determine the burning of the pyrotechnic composition as a function of the nanoaluminum content are investigated. The novelty of the gas-generating composition developed in this work lies in a new mechanism of decomposition of the ammonium nitrate flowing in the confined space. In this case, the aluminum nanopowder is oxidized to aluminum oxide which accelerates the thermal decomposition of ammonium nitrate turning it completely into a gaseous state. | Marat Tulepov, Nurgul Rakhova, Larissa Sassykova, Fedosya Abdrakova, Igor Pustovalov, Gulmira Tureshova, Olga Golovchenko, Dana Tolep, Almagul Kerimkulova, Galiya Spanova Combustion processes of gas generators in the form of cartridges on the basis of ammonium nitrate, flammable nanoaluminum and nanocarbon additives//Journal of Chemical Technology and Metallurgy. – 2020. – Vol. 55, issue 5. – P. 1001–1007 |
| 208. | A comparative investigation of the IR spectra of a carbohydrate series | IF = 0.806 , Q3 in Engineering: Industrial and Manufacturing Engineering, Chemical | The IR-Fourier spectra of a series of carbohydrates whose molecules contain pyranose rings interconnected by a-1.4-glycosidic chemical bonds are recorded and | Sinyayev V.A.,Toxeitova G.A.,Batyrbayeva A.A.,Sassykova L.R., Azhigulova R.N.,Sakhipov Y.N. A comparative investigation of |

| | | | | |
|------|-------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | Engineering: General Chemical Engineering | compared. The compounds studied include oligosaccharides from maltose to maltoheptaose, amylose, amylopectin and several samples of starch. The main difference found in the spectra studied relates to the dominant lines in the range of 960 cm ⁻¹ -1060 cm ⁻¹ referring to two gaussian components. Most probably, one of them corresponds to the stretching vibrations of α -glycosidic bonds, while the other relates to the complex of C-O, C-C, and C-O-H vibrations. The ratio of the two components values depends on the glycosidic bonds and pyranose rings number in the sugar molecules and can therefore be used to characterize the degree of carbohydrates polymerization. The comparison of the IR-Fourier spectra of starch, amylose, and amylopectin in the range investigated shows that the former is much closer in its character to amylose than to amylopectin. There are spectral lines which are almost indistinguishable from those of amylose, which suggests that they refer to weakly branched forms with a prevalence of identical glycosidic bonds. | the IR spectra of a carbohydrate series// Journal of Chemical Technology and Metallurgy. - 2020. – Vol. 55, issue 4. – P. 724–729 |
| 209. | Selective Catalytic Reforming of Methane into Synthesis Gas | DOI 10.1002/ceat.202100247 (IF = 1.728,Q3 in Engineering: Industrial and Manufacturing Engineering, Chemical Engineering: General Chemical Engineering, Chemistry: General Chemistry) | Syngas is an important product of methane processing of natural gas, from which a wide range of chemical products can be obtained in the future. The results of a study of the developed Ni multicomponent catalysts in the partial oxidation of CH ₄ to syngas are presented. A series of samples | Zhumabek M.,Kaumenova G.,Augaliev D.,Alaidar Y.,Murzin D., Tungatarova S.,Xanthopoulou G.,Kotov S. ^f ,Baizhumanova T. Selective Catalytic Reforming of Methane into Synthesis Gas//Chemical Engineering and |

| | | | | |
|------|---------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | with different percentages of active components in a Ni-Cr-Al-Mg-glycine catalyst was prepared by the solution combustion synthesis method giving synthesis gas with a high yield. The optimum conditions for the highest yields of H ₂ and CO were identified. | Technology. – 2021. – Vol. 44, issue 11. – P. 2026–2033 DOI 10.1002/ceat.202100247 |
| 210. | Direct reduction in greenhouse gases by continuous dry (CO ₂) reforming of methane over ni-containing shs catalysts | DOI 10.3390/en14196078 (IF = 3.004, Q2 in Mathematics: Control and Optimization, Engineering: Engineering (miscellaneous), Engineering: Electrical and Electronic Engineering, Energy: Energy (miscellaneous), Energy: Energy Engineering and Power Technology, Energy: Fuel Technology) | The world of energy is on the cusp of profound transformation. Hydrogen or hydrogen-containing fuel mixtures in the form of synthesis gas, as carriers of clean energy, will be in the short term among the most efficient solutions to pressing environmental problems, reducing the amount of greenhouse gases as well as pollution of cities and dependence on oil-based fuels. Carbon dioxide conversion of methane is the most promising method for the production of synthesis gas due to the simultaneous consumption of two greenhouse gases and, accordingly, a successful solution to environmental problems. Ni/Mn-based catalysts have been prepared by self-propagating high-temperature synthesis (SHS) for this process. The samples were characterized by X-ray diffraction, scanning electron microscopy, and nitrogen porosimetry. The effects of the catalysts' composition on activity, selectivity, and product yield were investigated. The influence of the content of Ni, Mn on the behavior of catalysts has been | Xanthopoulou G., Varitis S., Zhumabek M., Karanasios K., Vekinis G., Tungatarova S.A., Baizhumanova T.S. Direct reduction in greenhouse gases by continuous dry (CO ₂) reforming of methane over ni-containing shs catalysts//Energies. – 2021. – Vol. 14, issue 19. – P. 6078 DOI 10.3390/en14196078 |

| | | | | |
|------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | established. Comparison of spinels with different component ratios showed that they have a defective structure. Non-stoichiometric spinels with highly defective catalyst structures were obtained due to very high heating and cooling rates during SHS. They work as active sites, which underlies the high activity of the catalysts. | |
| 211. | Biogas reforming over al-co catalyst prepared by solution combustion synthesis method | DOI 10.3390/catal11020274 (IF = 3.934, Q2 in Chemistry: Physical and Theoretical Chemistry, Chemical Engineering: Catalysis) | The results of carbon dioxide reforming of CH ₄ (model biogas) on catalysts prepared by solution combustion synthesis (SCS) and impregnation of moisture capacity methods are presented. Investigation of the activity of catalysts synthesized from initial mixtures of Co(NO ₃) ₂ -Al(NO ₃) ₃ -urea of different compositions was carried out for the production of synthe-sis-gas, and SCS and traditional incipient wetness impregnation catalyst preparation methods were compared. The methane conversion reached 100%, and the conversion of CO ₂ increased to 86.2%, while the yield of H ₂ and CO was 99.2% and 85.4%, respectively, at 900 °C. It was found that CoAl ₂ O ₄ spinel formation was due to substitution of Al ³⁺ with Co ²⁺ cations. Consequently, CoAl ₂ O ₄ lattice parameters increased, since the ionic radius of Al ³⁺ (0.51Å) less than Co ²⁺ (0.72 Å). Advantages of SCS catalysts in comparison with catalysts prepared by the traditional incipient wetness impregnation method in dry reforming of methane were shown. The | Zhumabek M.,Xanthopoulou G,Tungatarova S.A.,Baizhumanova T.S.,Vekinis G.,Murzin D.Yu. Biogas reforming over al-co catalyst prepared by solution combustion synthesis method// Catalysts. – 2021. – Vol. 11, issue 2. – P. 1–16, 274 DOI 10.3390/catal11020274 |

| | | | | |
|------|-------------------------------------------------------------|-------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | aim of this work is to develop a new catalyst for the conversion of model biogas into synthesis gas, which will contribute to the organization of a new environmentally friendly, energy-saving production in the future. | |
| 212. | Oxide Ni-Cu catalysts for the purification of exhaust gases | DOI 10.3303/CET2081155 (IF = 0.681 Q3 in Chemical Engineering: General Chemical Engineering) | Currently, special attention is paid to the environmental friendliness of modern chemical industries. Significant volumes of volatile organic compounds are released into the air annually and harm the environment as well as human health. Industrial waste gas treatment is an important component in environmental protection. The catalytic purification of toxic compounds occupies a special place in minimizing the generated waste. Compositions based on noble metals, especially platinum, palladium and ruthenium, which are very expensive, are the best catalysts. The aim of this work is to create catalysts for the purification of gases that do not contain noble metals. The results of the development of low-cost selective multicomponent oxide catalysts based on Ni, Cu, and Cr supported on 2 % Ce/ θ - Al ₂ O ₃ for the purification of volatile organic compounds using toluene as an example are presented in the paper. It was found that the highest degree of toluene conversion (up to 98.8 %) is observed on a three-component Ni - Cu - Cr/2 % Ce/ θ - Al ₂ O ₃ catalyst with an optimal ratio of | Zhang X., Zheksenbaeva Z.T., Sarsenova R.O., Tungatarova S.A., Baizhumanova T.S., Zhevnikitskiy S.I. Oxide Ni-Cu catalysts for the purification of exhaust gases//Chemical Engineering Transactions. – 2020. – Vol. 81. - P. 925–930 DOI 10.3303/CET2081155 |

| | | | | |
|------|---------------------------------------------------|-------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | metals Ni: Cu: Cr = 1.0: 3.0: 0.1 at a temperature of 723 - 773 K. | |
| 213. | Catalytic reforming of methane into synthesis-gas | DOI 10.1016/j.matpr.2020.07.406 in Materials Science: General Materials Science | Using h-Al ₂ O ₃ as a carrier and Ni and Co as active materials, a series of catalysts were prepared by traditional method of air impregnation on moisture capacity. Test the catalyst with XRD and other characterization methods. The performance of the methane dry reforming reaction was investigated on a fixed reactor. The optimal process conditions were: T = 700 and 900 °C, GHSV = 6000 h ⁻¹ and CH ₄ : CO ₂ : Ar = 1: 1: 1, 5%Ni-5%Co/h-Al ₂ O ₃ has the best activity and the smallest particle size. | Zhang X.,Maki-Arvela P.,Palonen H.,Murzin D.Y.,Aubakirov Y.A.,Tungatarova S.A.,Baizhumanova T.S. Catalytic reforming of methane into synthesis-gas// Materials Today: Proceedings. – 2020. – Vol. 31. – P.595–597 DOI 10.1016/j.matpr.2020.07.406 |
| 214. | Catalytic processing of natural gas into olefins | DOI 10.3303/CET2081177 (IF = 0.681 Q3 in Chemical Engineering: General Chemical Engineering) | The problem of environmentally friendly utilization of natural gas in important products is relevant. The solution to this problem will minimize environmental pollution from products of burning of natural gas. A significant part of natural and associated petroleum gas is flared during their production, polluting the environment. The rest is used for heating and a small part is processed into valuable products. This leads to irreparable losses of valuable natural raw materials, the loss of potential profit due to the price difference between expensive products and cheap raw materials and creates complex environmental problems in the mining regions. In recent years, much attention has been paid to various methods of oxidative conversion of methane. Catalysts based on heteropoly | Kassymkan K.,Zhang X.,Sarsenova R.O.,Zheksenbaeva Z.T.,Tungatarova S.A., Baizhumanova T.S. Catalytic processing of natural gas into olefins//Chemical Engineering Transactions.- 2020. – Vol.81. – P. 1057–1062 DOI 10.3303/CET2081177 |

| | | | | |
|------|-------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>compounds supported on supports were studied by the oxidative condensation of methane into ethylene. Using a set of methods (TPR, IR spectroscopy, XRD), it was shown that the exposure of the H₄SiW₁₂O₄₀ heteropoly acid in the components of the air-water vapor reaction medium leads to the preservation of its secondary structure in the temperature range 20 - 400 °C, the formation of oxide-like W compounds at T ≥ 650 °C, along with the preservation of oxygen-containing fragments W - O - W, W = O, Si - O - W heteropoly acids.</p> | |
| 215. | <p>Oxidation of iso-propanol and n-butanol by catalase encapsulated within macroporous polyampholyte cryogel matrix</p> | <p>DOI 10.1002/pat.5396 (IF = 3.665, Q1 in Materials Science: Polymers and Plastics)</p> | <p>Iso-propanol and n-butanol were oxidized using catalase encapsulated within monolithic polyampholyte cryogel, p(APTAC-co-AMPS), derived from an anionic monomer, 2-acrylamido-2-methyl-1-propanesulfonic acid sodium salt (AMPS), and a cationic monomer, (3-acrylamidopropyl) trimethylammonium chloride (APTAC). Macroporous polyampholyte cryogels containing various amounts of catalase were synthesized in situ under cryo-polymerization conditions at a molar ratio of monomers [APTAC]:[AMPS] = 75:25 mol.% in the presence of 10 mol.% cross-linking agent, N,N-methylenebisacrylamide (MBAA). The oxidation of alcohols was carried out inside of a monolithic macroporous sample by passing the mixture of alcohol and</p> | <p>Smagulova, I., Tatykhanova, G., Shakhvorostov, A., Akbayeva, D., Kudaibergenov, S. Oxidation of iso-propanol and n-butanol by catalase encapsulated within macroporous polyampholyte cryogel matrix//Polymers for Advanced Technologies. – 2021. – Vol. 32, issue 9. - P. 3817–3826</p> <p>DOI 10.1002/pat.5396</p> |

| | | | | |
|------|----------------------------------------------------------------------------------------------------------------|------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | hydrogen peroxide through at a fixed flow-rate. Analysis using gas-liquid chromatography and gas chromatography-mass spectrometry showed that iso-propanol is converted to acetone at a yield of 87.6%, whereas n-butanol is converted to butyraldehyde at a yield of 80% at 20°C and atmospheric pressure. The influence of pH, temperature, and ratios of substrate to hydrogen peroxide on the degree of conversion of iso-propanol was evaluated. SEM images of cryogel-encapsulated catalase before and after several cycles of oxidation of iso-propanol show collapsing, among other alterations, in the morphology of the cryogel matrix. The oxidation mechanism of iso-propanol and n-butanol using cryogel-encapsulated catalase was suggested. | |
| 216. | Conference Paper Catalytic activity of bimetallic catalyst Pd(II)(PVP)-Cu(II)(PVP) in oxidation of octene-1 | DOI 10.1016/j.matpr.2020.06.521 | The oxidation of octene-1 in aqueous organic solutions in the presence of bimetallic catalytic system (Pd (II)(PVP)-Cu(II)(PVP) (PVP - polyvinylpyrrolidone)) at 60-80 °C under mild conditions was studied. Kinetics, products and optimal reaction conditions were studied by the methods of kinetics, volumetry, gas chromatography and mass spectrometry. It have been found the optimal composition of the catalyst system [Pd(II)(PVP)]:[Cu(II)(PVP)]:[C ₈ H ₁₆] = 1:(5-10):22. The maximum rate of oxygen absorption in most experiments was | Akbayeva, D.N., Bakirova, B.S., Smagulova, I.A., Rsaldina, D.E. Catalytic activity of bimetallic catalyst Pd(II)(PVP)-Cu(II)(PVP) in oxidation of octene-1// Materials Today: Proceedings. – 2020. – 31. – P. 572–575 DOI 10.1016/j.matpr.2020.06.521 |

| | | | | |
|------|----------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | observed at 80 °C. Dimethylsulfoxide (DMSO) was used as solvent. The main reaction product was octanone-2 (34-70%). The maximum number of TONs was 236 mol of product/ (mol Cat), and the maximum number of TOFs was 71 mol of product/ (mol of Cath). | |
| 217. | Aromatisation and desulphurisation of liquefied petroleum gas over Zn-containing zeolite catalysts modified by transition metals | DOI 10.1504/IJOGCT.2020.105456 (IF = 0.82, Q3 in Energy: General Energy) | In this paper, treatment of liquefied petroleum gas (LPG) over Zn-containing zeolite catalysts modified by Mn, Cu and Fe was studied. The authors investigated catalytic activity in the aromatisation and desulphurisation reactions of propane-propylene and propane-butane fractions (PPF and PBF respectively). It was found that the feedstock composition did not actually affect conversion at elevated temperatures (550-600°C); however, yield of the resulting aromatic hydrocarbons was higher when using PPF. The activity of catalysts mainly depended on the structure and state of active sites and reaction conditions. During PPF desulphurisation, the Zn-Mn-ZSM-Al ₂ O ₃ catalyst was the most active, while the Zn-Fe-ZSM-Al ₂ O ₃ catalyst showed the highest activity with the PBF. Physical and chemical characteristics of the obtained catalysts were studied using various methods. | Tuktin, B.T, Shapovalova, L.B, Nurgaliyev, N.N, Tenizbayeva, A.S, Bagasharova, B.MAromatisation and desulphurisation of liquefied petroleum gas over Zn-containing zeolite catalysts modified by transition metals// International Journal of Oil, Gas and Coal Technology. – 2020. – Vol.23, issue 2. – P. 186–198 DOI 10.1504/IJOGCT.2020.105456 |
| 218. | Conference Paper Characterization and catalytic activity of Ni/mesoporous | DOI 10.1016/j.matpr.2020.06.562 in Materials Science: General Materials Science | Mesoporous aluminosilicate HMS was synthesized and adopted as a support for Ni and Mo-containing catalysts. Characterization of various samples was | Vassilina, G., Umbetkaliyeva, K., Otkar, N., Karaman, B.P., Vassilina, T. Characterization and catalytic activity of |

| | | | | |
|------|---------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | aluminosilicate HMS and Mo/mesoporous aluminosilicate HMS in the conversion of n-hexadecane | | performed through XRD and DRIFT techniques. Textural and morphological characteristics were examined using nitrogen adsorption/desorption isotherms. The presence of a mesoporous and ordered structure in the aluminosilicate and catalysts based on it is confirmed by the data of low-temperature adsorption/desorption of nitrogen and X-ray diffraction. A correlation was established between the structural, acidic and catalytic properties of HMS-based catalyst samples. The catalytic activity of Ni/HMS-H-bentonite and Mo/HMS-H-bentonite was investigated during the conversion of n-hexadecane. It was shown that the sample of molybdenum-promoted HMS-based catalyst possesses the highest activity and selectivity in the process of hydroisomerization of n-hexadecane under optimal conditions (320 °C, 1 h ⁻¹). The yield of isoparaffins on this sample is 42 wt% with a selectivity of 91%. | Ni/mesoporous aluminosilicate HMS and Mo/mesoporous aluminosilicate HMS in the conversion of n-hexadecane// Materials Today: Proceedings. – 2020. – Vol. 31. - P. 580–583 DOI 10.1016/j.matpr.2020.06.562 |
| 219. | Research possibility of involvement Kazakhstani nickel ore in the metallurgical treatment | IF = 0.896, Q3 in Materials Science: Metals and Alloys, Materials Science: Materials Chemistry, Engineering: Mechanics of Materials, Physics and Astronomy: Condensed Matter Physics | The work results of laboratory tests on the involvement of Kazakhstan oxidized (silicate) nickel ores with a 0,5 – 1 % nickel content into metallurgical processing to obtain nickel-containing cast iron with a 3 – 5 % nickel content. The tests include the study of nickel ores by nonisothermal kinetics, the study of the structure of the phase structure of nickel ores by petrography, the process of agglomeration | Kelamanov B.,Samuratov Y.,Akuov A.,Abdirashit A.,Burumbayev A.,Orynassar R. Research possibility of involvement Kazakhstani nickel ore in the metallurgical treatment//Metalurgija. – 2021. Vol.60, issue 3-4. – P. 313–316 |

| | | | | |
|------|-----------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | of nickel ores and smelting of nickel-containing cast iron from the obtaining sinter using 2 types of reducing agents (coke and coal). | |
| 220. | Conference Paper It solutions for the oil and gas industry | DOI 10.1145/3410352.3410763 | When robots (like Shell and Total) are involved in the production process, we can talk about an intelligent well. The use of drones and the use of 3D visualization (as Chevron does) help to identify pipeline faults. Almost all oil and gas companies in the world already use digital technology. | Kosmbayeva, G.T., Tastanova, L.K., Orynassar, R.O., Sultanova, D.D., Zhanabayev, M.A. It solutions for the oil and gas industry// PervasiveHealth: Pervasive Computing Technologies for Healthcare. – 2020. – 3410763 DOI 10.1145/3410352.3410763 |
| 221. | Complex Oil-containing Waste Treatment by Applying Solar Energy | DOI 10.2478/rtuect-2020-0045 (IF = 2.476, Q2 in Environmental Science: General Environmental Science, Energy: Renewable Energy, Sustainability and the Environment) | The article describes in detail the complex oil-containing waste treatment by applying solar energy. The developed Helio devices are equipped with concentrating elements to extract oil in the purification of dump oil. The questions of practical application of pre-treated oil-contaminated soils and oil sludge to strengthen road surfaces are considered. The results of the experimental study on the production of soil concrete is based on oily dump. The structures of the soil concrete made on the basis of oil-contaminated soils and oil sludge are investigated and relevant proposals are made. | Abdibattayeva, M., Bissenov, K., Zhubandykova, Z., Orynassar, R., Tastanova, L. Complex Oil-containing Waste Treatment by Applying Solar Energy// Environmental and Climate Technologies. – 2020. – Vol.24, issue 1. – P. 718–739 DOI 10.2478/rtuect-2020-0045 |
| 222. | Conference Paper Production of bitumen by oxidation of liquid waste oil products and | in Materials Science: General Materials Science DOI: 10.1016/j.matpr.2020.06.059 | The aim of this work is to obtain bitumen by effective methods based on the oxidation of liquid wastes of various processes in laboratory conditions and the analysis of its | Zhakirova, N.K., Bakyt, A.M., Sagindykov, Z.A. Production of bitumen by oxidation of liquid waste oil products and determination |

| | | | | |
|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | determination of its properties | | physical properties. The study of physical and chemical parameters shows how much bitumen obtained from liquid waste meets the requirements of standard bitumen for road transport. The presence of functional hydrocarbon groups have been proved by NMR. | of its properties// Materials Today: Proceedings. – 2020. – Vol.31. - P. 509–513 DOI: 10.1016/j.matpr.2020.06.059 |
| 223. | The use of Lewis acid AlCl ₃ as a promoter in the Pd-complex catalytic system of the cyclohexene hydroethoxycarbonylation reaction Циклогексенді гидроэтоксикарбонилдеу реакциясының Pd-комплексті каталитикалық жүйесінде AlCl ₃ Льюис қышқылын промотор ретінде қолдану | DOI 10.31489/2021Ch2/8-17 | This paper presents the results of detailed studies of the possibility of using Lewis acid AlCl ₃ as a promoter of the catalytic three-component system PdCl ₂ (PPh ₃) ₂ -PPh ₃ -AlCl ₃ in the hydroethoxycarbonylation reaction of cyclohexene at low carbon monoxide pressures (2.5 MPa). As a result a high catalytic activity of the three-component system was established and the reaction proceeds regioselectively with the formation of ethyl ether of cyclohexanecarboxylic acid. The optimal conditions of the process have been elaborated (molar ratio of the starting reagents [Cyclohexene]:[Ethanol] = 1:1; molar ratio of the components of the catalytic system = [PdCl ₂ (PPh ₃) ₂]:[PPh ₃]:[AlCl ₃] = 1:6:9; carbon monoxide pressure PCO = 2.5 MPa; process temperature T = 120 °C and reaction time τ = 5 h) at which the target product yield reaches 80.7 %. To identify the obtained ethyl ester of cyclohexane carboxylic acid gas chromatographic analysis and mass- and IR- spectra were | Kudaibergenov N.Zh., Shalmagambetov K.M., Vavasori A., Zhaksylykova G.Zh., Kanapiyeva F.M., Almatkyzy P., Mamyrkhan D.B., Bulybayev M. The use of Lewis acid AlCl ₃ as a promoter in the Pd-complex catalytic system of the cyclohexene hydroethoxycarbonylation reaction Циклогексенді гидроэтоксикарбонилдеу реакциясының Pd-комплексті каталитикалық жүйесінде AlCl ₃ Льюис қышқылын промотор ретінде қолдану//Bulletin of the Karaganda University Chemistry Series. - 2021. – Vol. 101, issue 2. – P. 8–17 DOI 10.31489/2021Ch2/8-17 |

| | | | | |
|------|------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | carried out. Based on the data obtained, a possible mechanism of the reaction route of cyclohexene carbonylation with carbon monoxide and ethanol in the presence of the three-component system PdCl ₂ (PPh ₃) ₂ -PPh ₃ -AlCl ₃ is proposed and discussed. | |
| 224. | Experimental Determination of Electrochemical Sorption/Desorption Properties of Gold(III) Ions | IF = 0.605, Q3 in Mechanics of Materials, Metals and Alloys, Surfaces, Coatings and Films | Abstract: For the Republic of Kazakhstan, like for any country with a developed mining and processing sector, it is important to develop knowledge to improve methods and technologies for the complex processing of raw materials, including those for the more complete extraction of precious metals. This is needed due to the high loss of precious metals during their processing and separation and the need to improve the process of their concentration. Advances in the field of carbon nanomaterials offer great prospects for improving existing technologies for the extraction of precious metals from waste solutions and pulps. The goal of the work is to conduct comprehensive studies on the influence of the flow rate of solutions, pH, and the presence of ions of other metals on the extraction of gold on a carbon nanostructured material from rice husk (with its further regeneration and reuse). The effect of the pH of the solution on the degree of extraction of gold(III) ions is studied, it is found that the highest recovery for gold ions is observed at pH ~ 2. The selectivity of gold extraction is established | Z. A. Mansurov, Zh. A. Supiyeva, M. A. Yeleuov, A. T. Taurbekov, V. V. Pavlenko, G. T. Smagulova Experimental Determination of Electrochemical Sorption/Desorption Properties of Gold(III) Ions//Russian Journal of Non-Ferrous Metals. – 2021. – Vol.62, issue 3. – P. 257–264 |

| | | | | |
|------|-------------------------------------------------------------------------------|-----------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | <p>in the combined presence of copper, nickel, and silver. The dependence of the electrochemical reduction sorption of gold on the flow rate of solutions is investigated. It is found that the optimal flow rate of solutions is 10 mL/min. The sorption capacity of the sorbent based on carbonized rice husk is calculated. The investigation into the electrochemical sorption/desorption of gold(III) ions showed that the desorption process proceeds better in an acetone/water/NaOH mixture; the degree of desorption is 96%, which demonstrates the possibility of regeneration of the carbon material of the electrode for reuse. The results can be applied to optimize the processes of extraction of precious metals from their solutions.</p> | |
| 225. | Recycling of Low-Density Polyethylene Waste for Synthesis of Carbon Nanotubes | IF = 0.711, Q1 in Condensed Matter Physics, General Engineering | <p>The authors have presented results of synthesis of carbon nanotubes from low-density polyethylene. The synthesis was carried by thermal destruction of the polyethylene in a chemical-vapor-deposition unit. The process of decomposition of the polyethylene and the synthesis of carbon nanotubes were implemented in one stage in a triple-fired furnace for chemical vapor deposition. Consideration has been given to the influence of temperature on the decomposition products of polyethylene in the range of temperatures 450–550oC. The</p> | <p>G. T. Smagulova, N. Vassilyeva, B. B. Kaidar, N. Yesbolov, N. G. Prikhod'ko, Zh. Supiyeva, M. T. Artykbaeva , Z. A. Mansurov Recycling of Low-Density Polyethylene Waste for Synthesis of Carbon Nanotubes//Journal of Engineering Physics and Thermophysics. – 2021. – Vol. 94, issue 2. – P. 431–436</p> |

| | | | | |
|------|------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| | | | <p>gas- and vaporphase decomposition products of polyethylene, obtained at different temperatures, were investigated by the infrared spectroscopy method. It has been established that the necessary and sufficient temperature of decomposition of polyethylene is 450°C. Carbon nanotubes were grown on a catalyst that represented cenospheres impregnated with a ferrous nitrate solution. On exposure to high temperatures, ferrous nitrate decomposes to form pure iron particles on the cenospheric surface, which are active sites of growth of carbon nanotubes. The formation of iron particles on the cenospheric surface upon the impregnation with ferrous nitrate and thermal treatment is confirmed by the results of x-ray phase analysis. A semiquantitative analysis shows that the content of iron in the total catalysts mass amounts to about 2.3%. The synthesis gives rise to carbon nanotubes with diameters of 50–60 nm on the cenospheric surface. Thus, it has been shown that carbon nanotubes can be synthesized from low-density polyethylene waste.</p> | |
| 226. | Application of carbons produced from rice husk in the process of capacitive deionization | DOI 10.18321/ectj996 IF = 0.871, Q3 in Condensed Matter Physics, General Chemical Engineering, General Chemistry, General Materials Science | Nanoporous carbon materials are well recognized as the main components of electrodes in capacitive deionization. Herein, the activated carbons were produced based on rice husk which is an abundant waste material in southern regions of Kazakhstan. The resulting carbons were | Pavlenko, V., Supiyeva, Z. Eurasian Chemico-Technological Journal, 2020, 22(4), стр. 277–284 DOI 10.18321/ectj996 |

| | | | | |
|------|-------------------------------------------|------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|
| | | | <p>characterized electrochemically by comparing their performance with well-known brands of commercial porous carbons (i.e. Norit DLC Super 30, Kuraray YP 50F). The features of carbon/ carbon electrochemical cells were analyzed using the means of galvanostatic cycling with potential limitation and cyclic voltammetry. Whilst the surface morphology and elemental composition of carbons were observed using scanning electron microscopy combined with energy dispersive X-ray spectroscopy. Using the method of low-temperature nitrogen adsorption it has been established that the specific surface of home-made carbon produced based on rice husk is equal to $2290 \text{ m}^2\text{g}^{-1}$. The salt adsorption analysis has been performed using different concentrations of inlet solutions of sodium chloride. Our study has shown that the manufacturing and application of activated carbons based on rice husk can be highly efficient because the resulting electrode materials exhibit a high electrosorption capacity of 20.02 mg g^{-1}, which exceeds similar values obtained in the case of application of commercial porous carbons. © 2020 Eurasian Chemico-Technological Journal.</p> | |
| 227. | Adsorption of Au (III) ions by carbonized | IF = 0.806 , Q3 in Engineering: Industrial and Manufacturing Engineering, Chemical | The adsorption of gold ions on carbonized apricot stones (CAS) is studied. The carbonization applied is carried out at a | Mansurov, Z.A., Mansurova, R.M., Zakharov, V.A., Supiyeva, Z.A. Adsorption of Au (III) ions by |

| | | | | |
|------|---------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | apricot stones in presence of heavy metal ions | Engineering: General Chemical Engineering | temperature of 500oC in an argon atmosphere. The CAS characterized by electron microscopy are used as adsorbents of [AuCl ₄] ⁻ . It is found that Au (III) ions are quantitatively (99-100 %) adsorbed within a wide range of HCl concentrations. The values of the sorption rate, the semi sorption time, the sorption rate constant and the sorbent dynamic and static capacity are determined. It is shown that the presence of excessive amounts (100-800 times) of Fe ⁺³ , Cu ⁺² , Cd ⁺² , Zn ⁺² , Hg ⁺² , Pb ⁺⁴ ions does not affect Au ⁺³ sorption by CAS-2 sorbent. | carbonized apricot stones in presence of heavy metal ions// Journal of Chemical Technology and Metallurgy. – 2020. – Vol.55, issue 5. – P. 1047–1056 |
| 228. | Studies of smelting products of high-sulfur low copper concentrates | IF = 0.165, Q3 in Engineering: Industrial and Manufacturing Engineering, Earth and Planetary Sciences: Geotechnical Engineering and Engineering Geology, Environmental Science: Environmental Chemistry, Environmental Science: Waste Management and Disposal | High-sulfur and relatively copper-poor Boshchekul Concentrate (BC) were smelted together with copper concentrates of Zhezkazgan (ZhBP) in Aktogay (AC) Beneficiation plants. The experimental melts were carried out with a mixture of concentrates of copper-containing materials - converter slag (CS) of Zhezkazgan Copper Plant (ZhCP) and concentrate obtained by flotation of converter slag (CSC) of the Balkhash Copper Plant (BCP). At the same time, it was experimentally established that it is possible to obtain mattes containing 50.06 to 52.14 % copper and suitable for their conversion under the conditions of ZhCP. Thus, an X-ray phase analysis of a sample of low-iron and high-calcium slag showed that its main part is an amorphous phase, represented by a glass type on the | Kozhakhmetov, S., Gemeal, A.M.B., Sokolovskaya, L., Semenova, A. Studies of smelting products of high-sulfur low copper concentrates// World of Metallurgy - ERZMETALL. - 2020. – Vol. 73, issue 3. – P. 134–140 |

| | | | | |
|------|------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | polished sections of the sample in reflected light, small (0.01 to 0.015 mm) and several larger grains (up to 0.1 mm) in matte composition were found. Thermal analysis of all investigated slag found that the smelting point of the slags takes place in the range of 992.9 to 1,120.4 °C. | |
| 229. | Influence of different factors on the structure of metallurgical slags | IF = 0.165, Q3 in Engineering: Industrial and Manufacturing Engineering, Earth and Planetary Sciences: Geotechnical Engineering and Engineering Geology, Environmental Science: Environmental Chemistry, Environmental Science: Waste Management and Disposal | Samples of furnace slag was taken from Vaniukov smelter of the Balkhash copper plant. Using mineralogical, X-ray phase analysis and scanning microscopy, as well as X-ray spectral microanalysis, revealed that with a content of 23 to 29 % Silicon dioxide in them and a corresponding increase in slag temperature by 50 °C, the samples have identical matrices with an almost complete coincidence of the mineralogical and phase compositions. Almost all of the iron is oxidized and is in the form of fayalite, hortonolite, maghemite, hematite and spinelides. Copper in the slag was detected both in native and sulfide and sulfide-oxide form. Flux Silicate ore contains less than 70 % SiO ₂ and minerals such as albite, muscovite and grossularite, which upon heating provoke the formation of a viscous melt. An increase in the feed of such a flux of the smelt increases the amount of glass phase, which contains the bulk of the oxide-sulfide Suspension. | Kvyatkovskiy, S., Sitko, E., Gemeal, A.M.B. Influence of different factors on the structure of metallurgical slags// World of Metallurgy - ERZMETALL. – 2020. – Vol.73, issue 2. - P. 78–82 |
| 230. | Partial hydrogenation of sunflower oil on platinum | DOI 10.1016/j.mcat.2021.111819 | In this work, γ -Al ₂ O ₃ supported Pt catalysts (Pt/ γ -Al ₂ O ₃) were prepared by | Toshtay K.,Auyezov A.,Korkembay Z.,Toktassynov S.,Seytkhan |

| | | | | |
|------|--------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | catalysts: Influence of process conditions on the mass content of geometric isomers | (IF = 5.062, Q1 in Chemistry: Physical and Theoretical Chemistry, Chemical Engineering: Process Chemistry and Technology, Chemical Engineering: Catalysis) | adsorption method. The characteristics of the Pt catalysts were evaluated using X-ray diffraction, nitrogen adsorption, CO chemisorption analysis and transmission electron microscopy. The influence of temperature, partial pressure of hydrogen, concentration of catalyst, and agitation speed on the formation of trans isomers during hydrogenation of sunflower oil was investigated. The results indicated that the prepared Pt catalysts exhibit excellent activity and selectivity and produce solid fat that meet the international standards, owing to the considerable decrease in the percentage of trans isomers. Low concentration of platinum (0.2%) and the possibility to reuse it opens up new perspectives for its industrial application in the process of partial hydrogenation of vegetable oils. | A.,Nurakyshev A. Partial hydrogenation of sunflower oil on platinum catalysts: Influence of process conditions on the mass content of geometric isomers// Molecular Catalysis. – 2021. – Vol. 513, 111819 DOI 10.1016/j.mcat.2021.111819 |
| 231. | Hydrogenation of Vegetable Oils over a Palladium Catalyst Supported on Activated Diatomite | DOI 10.1134/S2070050420010109 IF = 1.159, Q4 in Chemical Engineering: Catalysis | A possibility of lowering the formation of trans-isomers during hydrogenation of vegetable oils over a low-loaded palladium catalyst supported on activated diatomite was studied. The comparison to the commercial nickel catalyst led to establish that the activated diatomite is a promising support of the catalyst for hydrogenation of plant oil. Palladium particles of 2–10 nm in size (3–6 nm particles predominated) were shown to be uniformly distributed over the support surface. It was shown experimentally that the Pd catalyst was | Toshtay, K., Auezov, A.B. Hydrogenation of Vegetable Oils over a Palladium Catalyst Supported on Activated Diatomite// Catalysis in Industry. – 2020. – Vol. 12, issue 1. - P. 7–15 DOI 10.1134/S2070050420010109 |

| | | | | |
|--|--|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| | | | more active and selective at low temperature than the nickel catalyst to provide two-fold decrease in the concentration of trans-isomers in the hydrogenated fat. | |
|--|--|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|