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• the teacher has the ability to track the logic of the thinking process and, if necessary to intervene at the exact moment when his help is needed (not customized and do not hinder the student).

Actual problem of the educational system in al-Farabi KazNU is the best move of classical university education at a research level. PPP Department of Chemistry, with many years of experience in the preparation of research chemists and chemical technologists, developed and assembled a significant and unique content for educational and methodological materials on chemical and technological disciplines, and it is important that during the period of innovation everything of value that is not was lost, but on the contrary, it was enriched with new content.

P-34
Regimen and Dynamics of Chlorine Organic Pesticides in Pribalkhash Area Ecosystem.

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Pollution of inner water and soil of surroundings area of the Balkhash Lake by the pesticide is more dangerous than the action of industrial poison. By some investigators opinions the time of full decomposition of chlorine organic pesticides in surface water consists from 3 till 8 years in underground water from 15 till 25 years and in soil from 10 till 20 years.

At present time the tendency of pollution by toxins mainly by residual amounts of DDT (dichlorine – diphenyl – threechlorine - methylmethane) and HCCH (hexan-chlorinecyclohexan) differs in ecosystem of fresh unique reservoirs of Kazakhstan. It is known that the pesticides are uneven distributed on the area of the lake in summer and autumn (0,003-0,150 mkg/l). The highest level of water contamination is revealed in the mouth of the Ili River and in the westerly part of reservoir. The less level of water contamination is revealed in the mouth of the Karatal River, the Lepsy River and the northern part of the lake. The more long lived isomers HCCH $\alpha\beta\gamma$ and DDT which do not disappear from water surroundings because of the persistent ion have been registrated at the analysis. In the fact of revealing chlorine organic compounds in the water shows that these toxins are used on the irrigated lands of the lower reaches of the Ili River. Besides lasting pesticides application in this region results in there is accumulation in the soils and bottom sediments of reservoirs. Determining the remaining amounts of herbicides in water and bottom sediments of Balkhash Lake their general presence was shown. The muddiest areas are waters joining to the mouths of the rivers (to 11-543 BPC (breaking permissible concentration) for water and 440-670 BPK for sludge). Within the system «water– bottom sediments» there are difficult physical and chemical processes with participation the different kind of mineral and organic origin compounds is flowing.

In regimen and dynamics this chlorine organic pesticides not reveal of clear regularities, because they are materials of antropogenetic nature.

The higher content of toxins have been jointly defected in the fibbers of fishes which habitats in the western part of the lake by the authors and the researchers of Kazakh Zoology Institute (40-144 mkg/kg crude mass of brain and 4-8 mkg/kg crude mass of muscular fibers).

Drastic remedy of preventing the lake of Pribalkhash area from pesticides contamination is in the wide inculcation of waste less technology in agricultural industry and restoration of natural hydrological regime of the lake.
In the accumulation of chlorine organic pesticides by fishes there are considerable interspecific distinctions, and also uneven accumulations on organs and fabrics. A most concentration takes place in internal fat and cerebrum, less all in myshechnoy fabric. The radical decision of prevention of contamination the Balkhash Lake with contaminants consists foremost in wide introduction of no waste technologies in an agricultural production; creation of bank-protection areas and buildings for the accumulation of flow from agricultural lands, application of biological methods of fight against wreckers and illnesses of plants etc. In addition, renewal of the natural hydrological mode of Balkhash Lake, broken economic activity, will be instrumental in the increase of his self clearing ability and decline of concentration of contaminants.

P-35
Processes of Soil Formation in Ecosystem of the Balkhash Lake and their Bottom Sediments Participation

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Complex physical and chemical processes leading to salt formation and accumulation takes place in the aqua's ecosystem of the lake. Based on the studies determined the optimal ratio of L: S, which accounted for $CaCO_3$ - 200:1, for the other salts - 100:1; equilibrium in the system installed within one month.
It is established that the absorption of manganese, copper and zinc ions are depends on the nature of accompanying ions in the solid and liquid phases. When the concentration of phosphate ions in water more than 0.2 mg / L the sorption process does not occur, and they accumulate in the liquid phase, thereby worsening the water quality pond.
Bottom sediments fix the raised over carbonizing (up to 26%) that confirm the displacement of carbon-calcium balance in water to the side of sediments of calcium and magnesium carbonates promoting some desalination of the aqua Tory. Spatial carbonate differentiation is pronounced.
Silt fraction which occupiers 55% of the bed square and has a great absorption energy takes part the cation exchange. Magnesium and Sodium ions being most active (12,0 and 2,3 mmole per 100 g correspondingly).
Exchange reactions between salts in liquid and solid phases are also possible. This, Sodium carbonate which is available in ground waters reacts with Calcium and Magnesium sulphates of bottom sediments. Calcium bicarbonate available in the lake interacts with Sulphate and Chloride of Magnesium. With the increase of pH value in lake water in the direction from West to East the equilibrium of the reactions mentioned above is displaced to the right, to the side of Calcium and Magnesium carbonates formation.
The study of interactions occurring in heterogeneous system "water – silt – soil of Balkhash lake" carried out under the laboratory conditions allowed to reveal the complex processes of cation exchange, hydrolysis, redox and biochemical reactions with the participation of microelements. A great rate of the transition of silt mineral components into water is observed in the initial period of water interaction with silt. Further, the rate of water saturation with soluble substances decreases due to the solution saturation with almost insoluble salts and their precipitation into the solid phase in the form of carbonates.

Through the underground and ground water the main elements of the chemical composition, including heavy metals enters into the natural water, contaminated water, accumulates and are absorbed by sediments, which consist in 30-650% of the carbonates of calcium, magnesium, and calcium sulfate. In this regard, the processes of sorption of trace elements (Mn, Cu, Zn) and phosphate ions in the solid phases in model systems containing inorganic salts ($CaCO_3$, $MgCO_3$, $CaSO_4$, $CaSiO_3$, $MgSiO_3$) has been study. The absorption of these trace elements in the concentration range corresponding to the maximum and the average of their content in the water of Balkhash Lake has been studied. In general balance of water-soluble salts it is necessary to take into account the salt formation in silt sediments.

P-36
Ecological Aspects of Contamination of Surface-Water of Kazakhstan

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In the complex of questions of environment and sustainable management of natural resources nowadays especially important is the problem of genetic effects of pollution related to receipt in surface water of toxic substances. In the natural complexes of the desert area of the Ili-Balkhash Basin carried out at the ecological level long-term systematic studies of the content of a series of components of the water. The interactions between the chemical composition of some elements in ecosystems: the water-soil-plant and the water-sediment of Balkhash lake were considered. It was found that in all natural hydromorphic complexes of the studied region a high content of manganese in soils (58-325 mg / kg), plants (8-10 mg / kg) and river waters (0.06-0.07 mg / l) is marked. The copper content in soils ranged from 1.0 to 13.5 mg/kg, in plants - from 4.0 to 24 mg / kg, in Ili river water (in Kapchagai hydropower station) - 0.004 mg/l, in the delta ducts - from 0, 07 to 0.09 mg / l, in groundwater of irrigated saline - 0.02 mg/l. It was noted the close relation between the content of these elements to the process of salinization. In soils not exposed to human impact, contains from 0.5 to 2.1 mg/kg of zinc. This is corresponds to its lower background concentration in all soils of Kazakhstan. However on Akdalin irrigated lands in the lower reaches of the Ili river, where microfertilizers containing zinc are used, concentration in the upper soil horizons up to 53 mg/kg, in ground parts of plants - from 4 to 42 mg/kg, in the irrigation water - 0.023 and in the ground water -0.045 mg/l. Water-soluble boron shows an intense migration of water: in the various elements of the aquatic ecosystem it ranges from 0.02 to 13.9 mg/l, in soils and plants - from 0.014 - 10.0 g/kg. All samples of sediments all the Balkhash lake showed the presence of large amounts of heavy metals. Especially distinguished lead and zinc concentrations, in 77-253, and 5 times, respectively, more than the average content in the sediments of ponds located in industrial zones. Water vegetation of Balkhash lake is a good accumulator of heavy metals absorbing them in the following order: Mn, Co, Cu, Pb. All toxic substances that enter the ponds do not remain inert components in them, and are actively involved in all processes in reservoirs.

P-37
Processes in Natural and Slightly Acidic Water Systems Contain Components of Phosphorus Production Wastes

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The introduction of new and implementation of old technologies in the processing of mineral raw materials of Kazakhstan is closely related to problems of environment and waste disposal. Storage of tonnage solid wastes in natural conditions has an impact on chemical processes occurring in the system "solid waste-soil - natural water," "water - sediments of rivers and reservoirs." The wastes of phosphorus production occupy large ground areas and dissolve under the influence of acid rainfall. The study of dissolution processes of compounds of heavy metals (copper, manganese, zinc) from solid wastes in dilute solutions of sulfuric acid, the dynamics and sorption of these microcomponents of inorganic salts and their natural analogues was the purpose of this investigation. The objects of study were phosphorus slag of JSC "Nodfos", LPW "Chimprom", phosphogypsum of Zhambyl superphosphate plant, natural water, sediments of Balkhash lake. Model experiments were conducted with samples of solid wastes in contact with 0.025 N sulfuric acid solutions (the concentration of sulfuric acid in "acid" rain is 0.05-1.5%). It is established that a certain portion (3-15%) of components transfer into the liquid phase, whose composition depends on the ratio of the solid phase (slag) and liquid (dilute sulfuric acid solution) phases. The study of the solubility of phosphogypsum and phosphate slags in the dynamics (2 hours, 2 weeks) showed that as a result of hydrolysis and interaction with the sulfate, chloride - ions of all the toxic components (especially copper, zinc, manganese, strontium), converted to soluble forms. As a result, during the year they reach the lower layers of the dump, accumulate there, concentrating, become a permanent source of pollution. This is confirmed by the analysis of soil samples, samples of snow and ground water from wells sampled in the area adjacent to the plant (Zhambyl town). For example, in the snow samples concentration of the toxic substances exceeds by several times of MPC, mg / l (Cu^{2+} 2-12; PO_4^{3-} 4-5; Co^{2+} to 3; Mn^{2+} to 1,5). To determine the migration of heavy metals in the system of "acid" rain - waste - soil is found that calcium, magnesium, manganese, iron, cadmium, lead well enough (10 - 50%) leached from the waste. Lead, copper, zinc, cadmium, are adsorbed on the soil layer, and then washed away by surface water and pollute the environment. The processes of sorption of copper, zinc and manganese in the solid phases in model systems containing calcium and magnesium carbonates, calcium sulfate are investigated. Decrease of metal content in the whole concentration range (5-500 mg/l), mainly due to the formation of less soluble carbonates than the initial calcium or magnesium carbonates is shown. On the calcium sulfate, ion exchange occurs because of close ionic radius of calcium and manganese. The formation of manganese carbonate proved by IR-spectroscopic and X-ray phase-analysis. The study of dissolution of solid wastes of phosphorus production and sorption by manganese, zinc and phosphate ions by inorganic salts, and sediments showed the possibility of using of mixtures of these salts for disposal of gaseous wastes. The estimated composition of the solid absorbent is a mixture of sulphates of calcium, iron, copper and manganese chloride. It was found that the extraction of phosphorus pentoxide from industrial gas absorber, modified with salts of copper, reaches 92%. When removing the cyanide - containing gas at the absorber, modified by iron salts, extracted up to 96% cyanides.

P-38
The Change of Hydrochemical Regime of Ili River (Kazakhstan) at Long-Term Cycle

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The water of the Ili River is used in many sectors of the economy of Kazakhstan, including the production of inorganic substances and materials. The relevance of studying the current state of the hydrochemical regime of Ili River is not only wastewater discharges right bank canal of Sorbulak storage (RSS) and the construction and commissioning (1970) Kapshagai reservoir as well. To reveal the complete picture of changes in the hydrochemical regime of Ili River is necessary to determine the effect Kapshagai reservoirs and wastewater discharged by RSS. We have a task to determine the influence of the reservoir at the Kapshagai hydrochemical to the Ili River regime during the years of different flow (25, 50, 75, 95%), the impact of sewage on the chemical composition of RSS to the Ili River for real years in representative cross-sections.

Ili River has all kinds of main factors of runoff: melted snow, rain, ice and groundwater, depending on the location of the components of the drainage network. At the same time the bulk of the transported flow usually accounts for floods and flash floods, beginning and ending of which depends mainly on high-altitude watersheds of the tributaries, the distribution of snow cover in the basin, the presence of glaciers and snowfields, the hydrogeological conditions of the pool, etc. An important factor in the chemical composition of surface water supplies are seasonal watercourse within the year, along with the processes occurring, and occurring in the catchment area, for example, the specific conditions of formation waters from the land surface or groundwater. The chemical composition of water is made by conventional methods hydrochemistry. By the Alekin classification the Ili River water for over many years relates to the calcium hydrocarbonate class group, most of the second type. These changes, primarily affected the dynamics of intra-hydrochemical data. Thus, if the value of total mineralization in the natural hydrological and hydrochemical regimes were clearly defined peaks (autumn-winter low water, 600 mg / l) and lows (spring-summer flood, 200 mg / l), the current conditions (2006-2010), regardless of the water content of the river, carried out in the form of discharges into the downstream reservoir, the total mineralization is smoothed in the intra-annual distribution (continuous 400 mg/l). A similar picture is found for the major ions.

The influence of wastewater from the RSS in the hydrochemical regime of disturbed mainly found on the hydrochemical post 500 meters below the water outlet to the following stabilization of the alignment of Kapshagay after construction of the it reservoir.

In the short term, i.e. over the next 5-10 years, a significant change in the hydrological and hydrochemical regimes of Ili River can occur only by increasing economic activity in China.