

Table 1 – Isotherm constants of sorption process by modified peels

Model parameters		OP-PEG		PP-PEG	
		Zn ²⁺	Cu ²⁺	Zn ²⁺	Cu ²⁺
Langmuir theory	K	0.0011	0.0038	0.0156	0.0175
	A _∞ , mg/l	26.1780	10.9529	2.0903	1.6150
	R ²	0.0066	0.9436	0.9717	0.9591
Freundlich theory	K _F	0.0501	0.0488	0.0552	0.0499
	1/n	0.8789	0.9157	0.7241	0.7036
	R ²	0.9936	0.9995	0.9976	0.9904
BET theory	K _{BET}	-0.4981	-1.7127	0.8663	0.5803
	A _∞ , mg/l	-1.8126	-0.4610	0.8481	0.6141
	R ²	0.2037	0.8642	0.0447	0.1295

Conclusion

The method of obtaining composite materials based on orange and pomegranate peels was developed. Sorbents based on orange and pomegranate peels modified by PEG were used to remove Zn (II) and Cu (II) ions from water and the following conclusions were made:

1. It has been established that the modification of fruit peels by polyethylene glycol (PEG) increases their sorption activity in comparison to the initial peels. The degree of removal of Zn²⁺ and Cu²⁺ ions by the modified orange peel reaches (80 ± 4) %. In case of modified PP the removal degree of Zn²⁺ ions is (80 ± 3) % and of Cu²⁺ ions is (70 ± 5) %.

2. Based on study results the optimal concentration of PEG (0.1 %) and optimal mass of sorbents (2 g for OP+PEG and 2.5 g for PP+PEG) were determined.

3. For the description of process mechanism Langmuir, Freundlich and BET model isotherms were used. The most applicable was Freundlich theory, at which the correlation coefficients were equal to R² = 0.9936 (OP-PEG-Zn), R² = 0.9995 (OP-PEG-Cu), R² = 0.9976 (PP-PEG-Zn) and R² = 0.9904 (PP-PEG-Cu). It means that the adsorption process goes on a heterogeneous surface with uneven filling and multilayers of adsorbates are formed.

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