Sorption of Zn^{2+} by poly-5-vinyltetrazole from aqueous solutions

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In continuation of our studies of the sorption properties of tetrazole-containing polymers [1], we explored the possibility of using poly-5-vinyltetrazole (PVT) to extract Zn^{2+} ions from dilute (0.0005–0.005 M) aqueous solutions of $ZnSO_4$. PVT samples with various content of tetrazolyl group were obtained by azidation of polyacrylonitrile. The sorption was carried out at room temperature under dynamic conditions using PVT powders with dispersion of 450–600 μm. After sorption, the quantitative content of Zn^{2+} cations in the final solution and the sorbent was determined. The obtained analytical data have good convergence, which confirms their correctness.

It was found that the sorption capacity of PVT towards Zn^{2+} cations increases with an increase in tetrazolyl group content in the sorbent. This shows that tetrazolyl moieties, included in PVT, participate in the ion-exchange sorption. The dependence of the sorption capacity of PVT on the concentration of Zn^{2+} cations in the solution indicates the equilibrium nature of the sorption (Fig.). "Sorption-desorption" equilibrium is achieved within 20 h under studied conditions. Taking into account the fact that the experimentally determined exchange capacity of PVT towards Zn^{2+} cations is about 20% of the theoretically possible one, it can be assumed that ion-exchange processes occur mainly on the surface of PVT particles. Regeneration of the sorbent can be achieved by treating it with dilute hydrochloric acid.

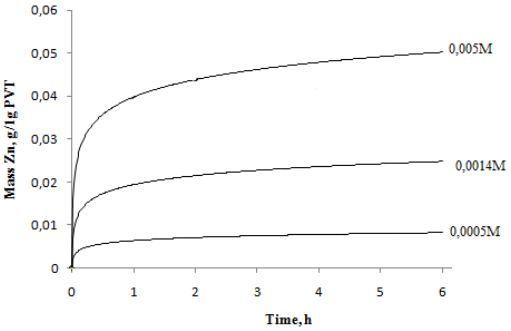

Fig. Sorption curves at various concentrations of Zn^{2+}.

References

[1] Y.V. Grigoriev et al. Doklady NAS of Belarus (2016) 6: 59.