

Comparison of sorption properties of vermiculites with adsorbed copolymers of N- and S-containing oxyquinoline derivatives for ions Cu^{2+} , Cd^{2+} , Fe^{3+} and Pb^{2+}

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It is known that a composite based on vermiculite with adsorbed poly(8-oxyquinoline methacrylate) shows good sorption properties for ions Cu^{2+} , Cd^{2+} , Fe^{3+} and Pb^{2+} . Therefore, this study is aimed at establishing optimal conditions for the extraction of toxic metal ions from new vermiculite-based composites with adsorbed copolymers of N- and S-containing oxyquinoline derivatives and comparison with the properties of other vermiculite-based composites with adsorbed oxyquinoline-containing polymers.

The method of low-temperature adsorption-desorption of nitrogen, thermogravimetric analysis was used to analyze the parameters of the vermiculite surface after physical adsorption by the copolymer, infrared and mass spectrometry. The data obtained showed that the specific surface area and average pore volume of both composites decreased compared to the original mineral, and the average pore diameter increased slightly.

The introduction of S-groups into the composition of the adsorbed copolymer on the surface of vermiculite instead of N- and azo groups causes a deterioration in the sorption characteristics of these ions. Also, both composites show similarities in the sorption properties of ions Pb^{2+} , for example, the sorption capacity of a composite Ver–AzoQN-MMA is about 1.2 times higher than the capacity of the original vermiculite, and the sorption capacity of the composite Ver–PQS-MMA is 1.4 times higher compared to the initial one. As for ions Cd^{2+} vermiculite modified with a copolymer of an S-containing oxyquinoline derivative exhibits better sorption properties, which can be explained by the affinity of cadmium ions for sulfur compared to nitrogen atoms in complexation processes.