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Studying synthesis of a new polymer sorbent based on *o*-phenylenediamine and epichlorohydrin and its sorption properties

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This article is devoted to the synthesis and sorption properties of a new polymer sorbent (FD-EXG) based on *o*-phenylenediamine and epichlorohydrin, which separates metal ions from solutions with high precision. In the process of synthesis, the starting materials: *o*-phenylenediamine and epichlorohydrin are taken in a 1:2 mol ratio. Ethylenediamine is used as a polymerizing and binding agent. The composition, physicochemical and sorption-desorption properties of the obtained polymer sorbent have been studied. In the IR spectrum analysis of the sorbent, we can see the presence of n(OH) functional groups in the 3371 cm^{-1} and 3313 cm^{-1} and n(NH) ion exchange functional groups in the 1558 cm^{-1} region. Based on X-ray phase analysis methods, the degree of crystallization of the obtained sorbent and its compound with metal cation (Ni(II)) has been determined. Also, the morphology and thermal properties of the obtained sorbent have been studied using SEM analysis and TGA and DTA analysis methods. The surface area and the pore size of the polymer sorbent have been determined, and its morphology has been determined to be macroporous. It has been proven that the synthesized polymer sorbent can be reused many times during the sorption process. It is proved that the obtained polymer sorbent can efficiently remove Ni(II), Co(II), Cu(II), Zn(II) and Cd(II) ions from aqueous solutions. The static exchange capacity (SEC) of the obtained polymer sorbent has been determined to be SECNi=9.67, SECCo=8.33, SECCu=7.01, SECZn=6.67 and SECCd=5.01. It has been proven that the static exchange capacity is high in the range of *p*H 4-6. The time dependence of the sorption process and desorption processes have also been studied.

Keywords: *o*-Phenylenediamine, Epichlorohydrin, Polymer sorbent, X-ray phase analysis