Application of zeolite prepared from Egyptian kaolin for the removal of heavy metals: II. Isotherm models

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In this study, the adsorption behavior of zeolites A and X, which are prepared from very cheap local Egyptian clay (kaolin), with respect to Cu²⁺, Cd²⁺, Cr³⁺, Ni²⁺ and Zn²⁺ has been studied. The batch method has been employed, using metal solutions ranging from 100 to 400 mg/L. The distribution coefficients (K_d) and adsorption percent were determined for the adsorption system as a function of sorbate concentration. In the uptake evaluation part of the study, adsorption ratios of metal cations on zeolites A and X match to Langmuir, Freundlich, and Dubinin–Kaganer–Radushkevich (DKR) adsorption isotherm data. Also, every cation exchange capacity for metals has been calculated.

According to the equilibrium studies, the selectivity sequence can be given as Pb²⁺ > Cd²⁺ > Cu²⁺ > Zn²⁺ > Ni²⁺. It was found that the uptake depend on hydrated ion diameter.

This study may attract more interest due to the presence of large reservoirs of very cheap kaolin in Egypt from which both zeolite types were prepared.

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