



“Gheorghe Asachi” Technical University of Iasi, Romania



REMOVAL OF CHROMIUM, COPPER, CADMIUM AND LEAD IONS FROM AQUEOUS SOLUTIONS BY DIATOMACEOUS EARTH

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Abstract

This paper presents the uptake of Cr³⁺, Cu²⁺, Cd²⁺ and Pb²⁺ from aqueous solutions on diatomaceous earths. The mineral was characterized by XRD and XRF spectroscopy. Surface areas were determined using BET and Methylene Blue sorption methods. Cation exchange capacity (CEC) was estimated using the ethylenediamine copper complex. Batch experiments were carried out at pre determined equilibration time, adsorbent amount, pH, temperature and initial metal cation concentration. The systems were investigated at 298.15, 308.15 and 318.15 K using Langmuir, Freundlich and Dubinin-Radushkevich (D-R) isotherms. Best fits were obtained with Langmuir plots for Cr³⁺, Cd²⁺ and Pb²⁺ while Cu²⁺ obeyed more closely Freundlich isotherm. Apparent thermodynamic parameters ΔG , ΔH and ΔS were obtained from the temperature dependence of Langmuir K values. The ΔH values indicated that the removal of these cations from water is enthalpically favorable (exothermic reaction) and therefore in most cases the extraction is enthalpy controlled given the loss of entropy observed in all cases with the exception of Cd²⁺.

Key words: adsorption, diatomaceous earth, heavy metals, isotherms, thermodynamic parameters

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