

KINETICS, THERMODYNAMICS AND ADSORPTION ISOTHERMS OF REMOVAL OF HEAVY METAL IONS (Cu²⁺ AND Pb²⁺) USING KURDISTAN/KIFFRY CLAY

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Local clay sample of Kiffry region was analyzed for its chemical composition by XRF, the SSA and CEC were found to be 77.8 m²/g and 21.54 mmole/100g respectively using methylene blue method. Adsorption characteristics of Cu⁺² and Pb⁺² on the clay surface were studied. Optimum initial pH was found to be 6.5 and 6 for Cu⁺² and Pb⁺² respectively. Adsorption capacity were studied to be increased from 12.28 to 256 mg/g for Cu⁺² and 12.47 to 529 mg/g for Pb⁺² as metal ion concentration increased and the removal percentage decreases from 86 % to 28.45% and 99.5% to 53.6 % for both Cu⁺² and Pb⁺² respectively as volume/mass ratio (v/m) increases from 250 ml/g to 2500 ml/g. The adsorption isotherms show that Langmuir isotherm is best fitted than other isotherm models and the kinetic of the sorption were analyzed to be of the second order, the activation energy was found to be about 40KJ/mole for both metal ions. The thermodynamic parameters, standard Gibb's free energy (G°), standard enthalpy (H°) and standard entropy (S°) calculated for both metals using the Langmuir constants (KL) for metal ion sorption on the clay.

Keywords: removal of heavy metal ion, Kiffry clay, adsorption isotherms