

Isothermal, kinetics and thermodynamics studies of the biosorption of Pb(II) ion from aqueous solution using the scale of croaker fish (*Genyonemus lineatus*)

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Abstract

Biosorbent prepared from the scale of croaker fish (*Genyonemus lineatus*) has been used for the removal of Pb(II) ion from aqueous solution in a batch system. The effects of some important parameters such as pH, initial metal concentration, temperature and biosorbent dosage on biosorption capacity were investigated. Equilibrium time for the biosorption process is 20 and 30 min at lower and higher concentrations, respectively. The process at 28 °C is in agreement with a pseudo-second-order kinetics model. The equilibrium data obeyed the Langmuir adsorption isotherm with a maximum monolayer adsorption capacity of 14.58 mg g⁻¹. The study showed that the sorption process depends on biomass dosage, temperature, pH and initial metal ion concentration. The calculated thermodynamics parameters (ΔG_0 , ΔH_0 and ΔS_0) indicated that the biosorption of the metal ion onto fish scale is feasible, spontaneous and exothermic in nature.

Keywords: Biosorption, Croaker fish, Isotherms, Kinetics, Scale

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