Removal of cadmium (II) from water using fibre fruit lufa as biosorbent

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**ABSTRACT**

This work evaluated the fibre fruit lufa (FL) as a biosorbent thanks its ability to remove cadmium ions from aqueous media in a batch process. The effect of the experimental parameters such as initial cadmium concentrations, biosorbent dose, initial pH, ionic strength and temperature is investigated through a number of batch biosorption experiments. The results show that the increase of initial concentration, time contact, dose of FL, the temperature and pH has a positive impact on the % removal of Cd (II). However, the ionic strength has a negative effect on the % removal of metal. The biosorption kinetic uptake for cadmium onto FL at various initial pH solutions was analyzed using Lagergreen pseudo-first-order, pseudo-second-order and intraparticle diffusion models. The biosorption kinetics for the cadmium on this biosorbent was best represented by the pseudo-second order kinetic model and the diffusion mechanism reveal that intraparticle diffusion is not the only rate limiting step. The experimental data biosorption equilibrium at different temperatures (298–328 K) were analyzed by the Langmuir, Freundlich, Temkin and Kiselev models. The results indicate that the Langmuir model, Freundlich and Temkin suggest that they were suitable to represent the experimental equilibrium data for the biosorption of cadmium onto FL. The monolayer biosorption capacity (q_m) by the Langmuir model was found to be 97.33 mg/g at 25°C. Thermodynamic parameters show that the biosorption process of FL is endothermic and the ΔG° values are negative, which indicates that the biosorption is spontaneous phenomena.

**Keywords:** Biosorption; Fruit of lufa; Cadmium (II); Kinetics; Isotherm; Modelling