**The adsorption kinetics and modeling for heavy metals removal from wastewater by Moringa pods**

Abstract

The investigation of the effectiveness of the removal of copper, nickel, chromium and zinc ions from synthetic waste water by using Moringa aptera Gaertn (MAG) was studied. The effect of biosorption experimental parameters such as initial metal concentration, contact time, temperature and adsorbent dose has been presented and discussed in details. The equilibrium data for biosorption were analysed by using Langmuir, Freundlich, Temkin and Dubinin-Radushkevich isotherm models to define the best correlation for each metal. Among the four isotherm models, both Freundlich and Temkin models were fitted with the equilibrium isotherm for copper, while Temkin and Dubinin-Radushkevich models best correlated for nickel and Langmuir isotherm model best describe the experimental data for chromium. The adsorption capacity for each studied heavy metals is reported as follows: copper qe = 6.07 mg Cu/g MAG, nickel qe = 5.53 mg Ni/g MAG and chromium qe = 5.497 mg Cr/g MAG with a removal percentage of 90%, 68% and 91%, respectively for each ion at 1 g dose of biosorbent. Results also show that MAG pods are not a good biosorbent for the removal of zinc from wastewater. Kinetics results were best described by pseudo-second order model for all metals. 