Isothermal and linear regression modelling of Cu (II) and Fe (II) using orange peel as an adsorbent in Batch studies

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Abstract : The influence of process parameters like pH,agitation rate, adsorbent dosage, metal ion concentration, External temperature and contact time played an important role in the adsorption of Copper and Iron on orange peel adsorbent. The equilibrium adsorption capacity of orange peel for Copper and Iron is examined by various models like isotherm modelling, Kinetic modelling and thermodynamic modelling studies. The results proved that the biosorption capacity of orange peel for Copper and Iron was endothermic, efficient, and very rapid in nature. Various standard isotherm models like Langmuir, Freundlich, Temkin models were studied along with kinetic models like Pseudo First order, Pseudo second order models. Linear regression has been carried out for both Cu (II) and Fe (II) using Analysis of Variance ANNOVA.The maximum adsorption capacities were observed at 6 pH for copper and 5 pH for iron.The Isothermal modelling studies for both Cu (II) and Fe (II) have been studied using Langmuir and Freundlich adsorption isotherms which are used to evaluate the adsorption behaviour with higher values of correlation / regression coefficients (R^2) ranges from 0.9 to 0.99.Various models like Temkin, Dubinin Radushkevich **(**DR), Intraparticle, Pseudo fist order and Pseudo second order models were verified successfully with higher R^2 values for both the metals. Linear Regression analysis for both Cu (II) and Fe (II) showed that the % removal depends upon mainly 3 parameters namely pH (P), Biomass/ adsorbent dosage (B) and Contact time (C).

Key words : Langmuir, Freundlich, Temkin, Pseudo First order, Pseudo second order models, Analysis of Variance, Temkin model, Dubinin Radushkevich (DR) Isotherm model, Intraparticle diffusion model, pH, Biomass dosage, Contact time.

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