



## **Kinetic Model for the Sorption of Ni(II), Cu(II) and Zn (II) onto Coconut (*Cocos nucifera*) Fibers Waste Biomass from Aqueous Solution**

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**Abstract:** Sorption of divalent metals ions Ni(II), Cu(II) and Zn(II) onto coco-nut (*Cocos nucifera*) fibers waste biomass over a wide range of operation conditions and equilibrium-sorption kinetics were studied. The batch experiment showed that pH 2-3, was the best range for the sorption of the metal ions onto the biomass. The time-dependent experiments showed that the binding of the metal ions onto the adsorbent, was quite rapid and occurred within 25 minutes and completed within 50minutes. The sorption process was examined by means of the Langmuir and the Freundlich isotherm models. The monolayer sorption capacity obtained using the Langmuir equation was 0.09mg/g Ni (II), 0.08mg/g Cu(II) and 0.09mg/g Zn(II). The Freundlich isotherm model was not too appropriate for the sorption process, since  $R^2$  for all the three metals are less than 0.90. However the  $K_F$  value of Zn(II) (0.880), is greater than that of Ni(II) (0.077) and Cu(II) (0.075), suggesting that Zn(II) has greater adsorption tendency towards the biomass. The kinetics of the sorption mechanism was evaluated using the pseudo-first order rate model and pseudo-second rate model. The results indicated that the pseudo-second order model provides a more appropriate description of the single and mixed metal-ion sorption process of Ni(II), Cu(II) and Zn(II) onto coco-nut fiber biomass.

**Keywords:** *Metal, adsorption process, Adsorption conditions, sorption kinetics*

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