

# **Cu (II) and Cd (II) removal from aqueous solution using mixed iron oxide/oxyhydroxides synthesized through surfactant mediation**

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## **Abstract**

The mixed nano iron oxide and oxy-hydroxide sample was synthesized following surfactant mediation-precipitation technique. Effects of various experimental parameters including contact time, pH, amount of adsorbent, concentration of adsorbate and temperature were studied to evaluate the adsorption behavior of Cu(II) and Cd(II) on the synthesized sample. Contact time data was fitted to the pseudo first order and second order kinetic models. Both Cd(II) and Cu(II) adsorption followed pseudo second order reaction model with  $r^2$  values of  $> 0.99$ . The adsorption capacities decreased from 63.9 to 18.06 mg/g and 64.1 to 15.7 mg/g for Cd(II) and Cu(II) respectively by increasing the adsorbent dose from 0.5 to 2.5 g/L. The adsorption of both the metal ions increased with a rise in temperature, indicating the process to be endothermic in nature. The equilibrium adsorption data for Cd(II) fitted only to Freundlich isotherms where as that of Cu(II) fitted to both the models. The loading capacities under similar conditions were estimated to be ~94.3 and 38.37 mg/g on the synthesized sample for Cd(II) and Cu(II) respectively. Due to short contact time coupled with high adsorption capacities for Cu(II) and Cd(II) removal from aqueous solutions the synthesized sample can be regarded as a good adsorbent.

**Keywords:** Mixed iron oxides, adsorption, Cu (II), Cd (II), thermodynamic parameters