

# Surfactant Mediated Nano Iron Oxides: Potential Adsorbent for Pb (II) Removal from Aqueous Solutions

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## Abstract

Lead adsorption behavior on high surface area (208.17 m<sup>2</sup>/g) nano-structured iron oxides synthesized through surfactant mediation-precipitation technique has been presented. Adsorption of Pb (II) on the prepared sample was studied under various experimental conditions including contact time, pH, temperature, adsorbent and adsorbate concentrations. With the increase in pH from 2.0 to 4.0, the % Pb(II) adsorption increased from 13.25 to 61.25% and further increase in pH had only marginal effect. The contact time data showed that the equilibrium was reached within 120 minutes. The kinetics of adsorption followed pseudo second order kinetics model and Elovich kinetic equation. The isothermic data showed better fit to Langmuir isotherm model when compared to the Freundlich model. Maximum monolayer loading capacity estimated from Langmuir isotherm was 76.33 mg/g. The negative Gibbs free energy values increased from -1.83 to -4.30 kJ/mole with the increase in temperature in the range of 25 to 52°C.  $\Delta H^\circ$  and  $\Delta S^\circ$  were determined to be 25.55 kJ/mole and 91.93 J/mole/deg respectively. The positive value of  $\Delta H^\circ$  confirms the endothermic adsorption of Pb(II) on the studied sample. The positive  $\Delta S^\circ$  value reflects significant change occurring in the internal structure of adsorbent during the adsorption process. The synthesized adsorbent has shown potential for Pb(II) removal from aqueous solutions.