Heavy Metal Removal "lead" from aqueous solution using activated sewage sludge "isotherm and kinetic study"

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Abstract

Heavy metals are toxic and detrimental water pollutant. Their presence not only affects human beings but also animals and vegetation because of their mobility in aqueous ecosystem, toxicity and non-biodegradability. Removal of heavy metals from the effluent is one of the major researches carried out by researchers in the field of environment. Although different methods such as ion exchange, precipitation, evaporation, membrane filtration and adsorption are used for heavy metals removal, adsorption process has attracted attention of many researchers because of low cost, design flexibility, and high efficiency. [1].

The study begins with a characterization and a follow-up of the process of humification and maturation (activation) of the sewage sludge.

The elimination of Pb +II ions from aqueous solutions by the activated sewage sludge was investigated as a function of initial pH (from 2 to 10), initial metal ion concentration, temperature (25, 40 and 55°C) and contact time. Optimum pH for the removal of Pb +II was found to be around 5 and equilibrium was obtained at less than 2 hours of contact time and 2nd order model was a better fit with R²=0.999. Two equilibrium models, the Langmuir and Freundlich isotherms, were analyzed in order to study the sorption isotherm. The Langmuir model was found to have a better fit with the experimental data for lead adsorption with a regression coefficient, R² =0.997 and
$Q_{\text{max}} = 16 \text{ mg/g.}$

Key words: Activated Sludge, Heavy metals, Lead (Pb+II), Adsorption

References

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