

Adsorption of zinc on bed sediments of river Ganga

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ABSTRACT

The report presents original study range of zinc adsorption according to the experimental data on the bed sediments of river Ganga at Hardwar. The effect of various operating variables, viz., solution pH, sediment dose, contact time, and particle size, have been studied on the adsorption of zinc ions. The optimum contact time needed to reach equilibrium is of the order of 60 minutes and is independent of initial concentration of zinc ions. The adsorption curves are smooth and continuous leading to saturation, suggesting the possible monolayer coverage of zinc ions on the surface of the adsorbent. The extent of adsorption increases with an increase of pH. Furthermore the adsorption of zinc increases with increasing adsorbent doses and decreases with adsorbent particle size. The important geochemical phases, iron and manganese oxide, act as the active support material for the adsorption of zinc ions. The adsorption data has been analysed with the help of Langmuir and Freundlich adsorption models to determine the mechanistic parameters associated with the adsorption process. An attempt has also been made to obtain thermodynamic parameters of the process, viz., free energy change, enthalpy change and entropy change. The negative values of free energy change (ΔG°) indicated spontaneous nature of the adsorption of zinc on the bed sediments and positive values of enthalpy change (ΔH°) suggest the endothermic nature of the adsorption process.

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