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REMOVAL OF 2,4 DICHLOROPHENOL FROM WASTEWATER ON COST-EFFECTIVE SORBENTS: KINETICS AND THERMODYNAMICS INVESTIGATIONS

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Abstract

Maximum removal ($94 \pm 1.2\%$) of 2, 4 dichlorophenol ($50 \text{ mg} \cdot \text{dm}^{-3}$) was achieved on silica with agitation of 4 hours, at pH 8 and 42°C . The positive enthalpy (ΔH) and negative free energy values ($\Delta G_{315\text{K}}$) suggested the endothermic and a spontaneous nature of sorption. The free energy of the process at all temperature was negative and increased with the increase in temperature. The values of free energy suggested a spontaneous process where the spontaneity decreased with the rise in temperature. Positive values of ΔS described the randomness and a greater stability of sorption process with no structural changes at the solid-solution interface during the sorption. The data was subjected to Freundlich and Langmuir isotherms and the values of q_e ($\text{mg} \cdot \text{g}^{-1}$), $K_{1,\text{ads}}$ and $K_{2,\text{ads}}$ (min^{-1}) demonstrated that pseudo first order model was not fit for process, whereas, the pseudo second order kinetic model was best to describe the kinetics of process. The Elovich model and Intra particle diffusion kinetic model graph were best to describe the kinetics for DCP. A comparative experimental data revealed that developed method might be employed for removal of DCP from the aqueous industrial effluents before discharging them into water bodies.

Key words: 2,4 dichlorophenol, remediation and kinetics, thermodynamics parameters, waste treatment application

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