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ADSORPTIVE REMOVAL OF 2,4-DICHLOROPHENOL FROM AQUEOUS SOLUTIONS BY USING SURFACTANT MODIFIED TIREBOLU BENTONITE

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Phenols and phenolic compounds are considered as priority pollutants since they are toxic and harmful to living organisms even at low concentrations. The toxicity of phenols generally increases with chlorination. 2,4-dichlorophenol (2,4-DCP) disturbs metabolism by decreasing ATP and NADH levels and also increasing the levels of AMP, NAD^+, lactate dehydrogenase (LDH). In addition, 2,4-DCP is extensively used in the manufacture of pesticides and herbicides [1].

The removal of phenols from wastewaters by adsorption technique is one of the most powerful separation and purification method. Clay minerals are widely used as adsorbents in adsorption process due to their low cost, high specific surface area, chemical and mechanical stability, layered structure and high cation exchange capacity [2].

The objective of present study was to investigate the adsorption potential of Tirebolu (Giresun/Turkey) bentonite for removal of 2,4-DCP from aqueous solutions. The bentonite was modified with a cationic surfactant, cetyl trimethylammonium bromide (CTAB), in order to increase the adsorption capacity. The effects of experimental parameters such as initial pH of the solution, contact time, initial 2,4-DCP concentration, organobentonite concentration etc. were studied. The adsorption mechanisms of 2,4-DCP onto organobentonite were evaluated in terms of thermodynamics and kinetics. The adsorption isotherms were described by using Langmuir and Freundlich isotherm models. The optimum pH was selected as 5.0 (Figure 1). The equilibrium was reached within the contact time of 60 min and the pseudo-second-order kinetic model provided a good correlation for the adsorption of 2,4-DCP onto organobentonite (Figure 2).

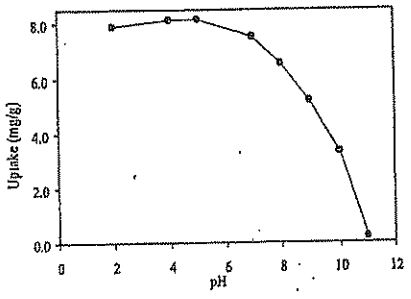

Figure 1. Effect of pH on 2,4-DCP uptake

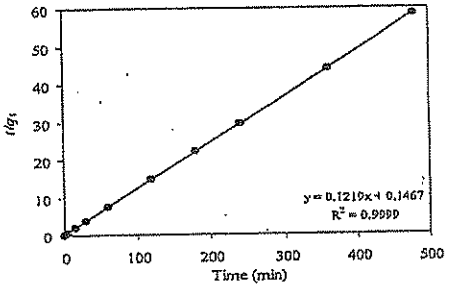

Figure 2. Pseudo-second-order kinetic model

References

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