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Preparation and characterization of new low cost adsorbent beads based on activated bentonite encapsulated with calcium alginate for removal of 2,4-dichlorophenol from aqueous medium

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Abstract

This study explored the potential of composites organo-bentonite/alginate beads as adsorbents for the removal of 2,4-dichlorophenol (2,4DCP) from aqueous solution. Bentonite was firstly modified with cationic surfactants octadecyltrimethylammonium, hexadecyl trimethylammonium and phenyltrimethylammonium, then encapsulated with calcium alginate to form adsorbent composite beads. X-ray diffraction was used to study the change in the structural properties of the samples. The intercalated cationic surfactants were characterized by Fourier transform infrared spectroscopy (FTIR). The adsorption was studied using various operating parameters such as contact time, temperature, pH and initial 2,4DCP concentration. The results showed that the amount of 2,4DCP increased with increasing initial concentration, contact time and temperature indicating that the adsorption process of 2,4DCP onto composites is endothermic. Adsorption of 2,4DCP followed pseudo-second-order kinetics. The Langmuir