



Xylenol orange removal from aqueous solution by natural bauxite (BXT) and BXT-HDTMA: kinetic, thermodynamic and isotherm modeling

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ABSTRACT

Sorption is a key factor in removal of organic and inorganic contaminants from their aqueous solutions. In this study, we investigated the removal of Xylenol Orange tetrasodium salt (XOTS) from its aqueous solution by Bauxite (BXT) and cationic surfactant hexadecyltrimethyl ammonium bromide modified Bauxite (BXT-HDTMA) in batch experiments. The BXT and BXT-HDTMA were characterized using FTIR, and SEM techniques. Adsorption studies were performed at various parameters i.e. temperature, contact time, adsorbent weight, and pH. The modified BXT showed better maximum removal efficiency (98.6% at pH = 9.03) compared to natural Bauxite (75% at pH 2.27), suggesting that BXT-HDTMA is an excellent adsorbent for the removal of XOTS from water. The equilibrium data of XOTS adsorption on BXT and BXT-HDTMA surfaces were best fitted with the Freundlich isotherm model. The pseudo-second-order model provided very good fitting for the dye on the two surfaces. The error function, the sum of the absolute errors (SAE), was calculated to identify the best isotherm in this study. The thermodynamic parameters like ΔH° , ΔS° and ΔG° were also calculated. The adsorbent dosage weight and pH were found the most factors influencing the removal process.

Keywords: Anionic dye; Cationic surfactant; Iraqi Bauxite mineral clay; Thermodynamic parameters

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