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COMPARATIVE STUDY ON ADSORPTION OF BB41 FROM AQUEOUS SOLUTION ONTO TWO SGO

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Abstract

The main purpose of the present research was a comparative study of two functionalized sulfonated graphene oxide (SGO) for removal of selected pollutant (Azo-Cationic Basic Blue 41 dye) in aqueous solution. The two nano-adsorbents (GO/1,4-butane sultone (SGO_1) and GO/1,3-propane sultone (SGO_2)) were synthesized, and characterized by Scanning Electron Microscope (SEM), Brunauer-Emmett-Teller (BET), X-ray Crystallography (XRD), Raman spectroscopic, and Fourier-Transform Infrared Spectroscopy (FTIR) analysis. The adsorption process of BB41 dye onto two nano-adsorbents was investigated. Selected parameters including initial solution pH, initial BB41 concentration, adsorbent dose, and contact time were evaluated. pH= 8, initial BB41 dye concentration= 50 and 100 mg/L, adsorbent dose= 0.2 and 0.15 g/L and contact time= 60 and 30 minutes at room temperature, were the optimum values of the parameters for SGO_1 and SGO_2, respectively. The maximum adsorption capacity with SGO_1 and SGO_2 (assuming minimum removal of 80%) were found to be 274 and 434 mg/g. The study of isotherm and kinetics showed that both nano-adsorbents followed the Langmuir equilibrium model and were best fitted to the pseudo-second-order model. Moreover, according to the thermodynamic analysis the adsorption process, at all analyzed temperatures, was endothermic. The SGO_2 nano-adsorbent had shown higher efficiency than the SGO_1 nano-adsorbent during four cycles of the regeneration/ recovery investigation.

Key words: dye adsorption, sulfonated graphene oxide, isotherm, process kinetic, thermodynamic

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