Removal of reactive blue 19 from aqueous solutions using NiO nanoparticles: equilibrium and kinetic studies

Zahra Monsef Khoshhesab*, Monavar Ahmadi

Department of Chemistry, Payame Noor University, Tehran, I.R. of Iran, email: monsef_kh@pnu.ac.ir (Z. Monsef Khoshhesab), ahmadi.ch90@yahoo.com (M. Ahmadi)

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ABSTRACT

Adsorption of reactive blue 19 (RB19) dye onto NiO nanoparticles was investigated at various NiO dosages, dye concentrations, solution pHs, contact times, and temperatures in a batch system. Analysis of the adsorption data indicated that the adsorption process follows the pseudo-second-order kinetics and the adsorption equilibrium data fit to Langmuir–Freundlich (Sips) isotherm better than the Freundlich and Langmuir isotherm models. Evaluation of the thermodynamic parameters ($\Delta G^\circ$, $\Delta H^\circ$, and $\Delta S^\circ$) revealed that the adsorption process is spontaneous, endothermic, and feasible. This study suggested NiO nanoparticles as effective adsorbents for removing RB19 from polluted water.

Keywords: Anthraquinone dye; Nanoparticles; NiO; Reactive blue 19; Removal

*Corresponding author.