

عنوان مقاله:

Feasibility Study of Using graphene Oxide/silica Gel Nanocomposite Prepared by Sol-gel Method for Removing Malachite Green from Aqueous Solutions: Optimization, Kinetic, and Isotherm Studies

محل انتشار:

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خلاصه مقاله:

The main objective of this work was to evaluate the feasibility of the application of GO/Na₂SiO₃ nanocomposite as highly efficient adsorbent for the removal of malachite green as a cationic dye from aqueous solutions. To do so, first the synthesized nanosorbent was characterized via FTIR, SEM, TEM and XRD techniques. Surface area and pore mean size of above mentioned nanocomposite were determined using BET technique. Also, some important parameters affecting the efficiency of the absorption of malachite green, such as pH, adsorbent dosage, contact time, primary concentration of dye and salt effect were optimized. The malachite green (water-soluble) dye was analyzed at a maximum wavelength of 618 nm. The optimal conditions for removal of malachite green from aqueous solution included a 20 mg l⁻¹ initial concentration with 25 mg adsorbent at pH 7, and adsorption equilibrium was achieved within 5 min. Kinetic studies confirmed that dye adsorption process followed pseudo-second order kinetic models (R² = 0.9999) and adsorption equilibrium data showed good correlation with Freundlich isotherm (R²=0.9982 at 298 K). Thermodynamic analysis indicates that the adsorption process is spontaneous and exothermic in nature. In addition, the experimental data obtained from reusability studies showed that the prepared adsorbent could be used in up to six adsorption-desorption cycles without significant decrease in removal efficiency.

کلمات کلیدی:

graphene, Sodium silicate, Removal, Malachite Green, Adsorption Isotherm, Kinetic

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