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## Removal of Malachite Green dye from aqueous solution using a new nanocomposite: Equilibrium, kinetic and thermodynamic studies

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In this study, trisodium citrate based magnetite nanocomposite ( $\text{Fe}_3\text{O}_4$ -TSC) was used for the removal of malachite green (MG) dye from aqueous medium. The adsorption tests were performed at different parameters. The optimized pH and time were found to be 7 and 40 min, respectively. The equilibrium adsorption data were demonstrated using Langmuir and Freundlich isotherms and better agreement was attained with the Langmuir model. The maximum adsorption capacity was calculated  $435 \text{ mg g}^{-1}$  using Langmuir equation. The kinetic parameters displayed that MG adsorption onto  $\text{Fe}_3\text{O}_4$ -TSC followed pseudo-second-order kinetic model. The thermodynamic parameters were evaluated and it was found that adsorption of MG onto  $\text{Fe}_3\text{O}_4$ -TSC was spontaneous and exothermic. The desorption studies showed the best recovery of MG dye in 0.1 M HCl. Finally, it was found that  $\text{Fe}_3\text{O}_4$ -TSC can be effortlessly separated from mixed solutions using external magnetic field.