

Adsorption of methyl violet from aqueous solution using gumxanthan/Fe₃O₄based nanocomposite hydrogel

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Abstract

This research paper reports the utilization of gum xanthan-grafted-polyacrylic acid and Fe₃O₄ magnetic nanoparticles based nanocomposite hydrogel (NCH) for the highly effective adsorption of methyl violet (MV) from aqueous solution. Synthesized NCH was characterized using various techniques, such as FTIR, XRD, SEM-EDS, TEM and BET. Adsorption behavior of NCH was studied for the adsorption of MV and it was found to remove 99% dye from the solution. Adsorption process followed Langmuir isotherm model ($q_{\text{max}} = 642 \text{ mg/g}$) and pseudo-second-order kinetics model. Thermodynamic studies suggested that the adsorption process was endothermic and spontaneous. Moreover, the adsorbent was successfully utilized for successive five cycles of adsorption-desorption.