



Adsorption performance of modified graphene oxide nanoparticles for the removal of toluene, ethylbenzene, and xylenes from aqueous solution

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ABSTRACT

The purpose of this study was to investigate the effect of graphene oxide nanoparticles modified with 4-aminodiphenylamine (GO-A) on the removal of toluene, ethylbenzene, and p-,o-xylene (TEX). Nano-sorbent was characterized using Fourier transform infrared resonance spectroscopy, carbon, hydrogen and nitrogen elemental analysis, Brunauer-Emmett-Teller analysis, and transmission electron microscopy. The effect of different experimental parameters including contact time, pH, and initial concentration of adsorbate and adsorbent were examined. According to the results, an optimum TEX removal efficiency was observed at contact time = 5 min, pH 4, and adsorbent dose = 1 g/L at 20 mg/L initial TEX concentration. Besides, the point of zero charge (pH_{pzc}) was evaluated to be 4. The adsorption isotherms (Langmuir, Freundlich, and Dubinin–Radushkevich) and kinetics (pseudo-first-order, pseudo-second-order, intraparticle diffusion, and Elovich) were used to indicate the isotherm and kinetic parameters. The adsorption process followed Langmuir isotherm and pseudo-second-order kinetic. Finally, GO-A was regenerated at seven cycles for the TEX removal confirming its good regeneration capacity.

Keywords: Graphene oxide; Adsorption; TEX; Nano-adsorbent; Regeneration

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