

عنوان مقاله:

Removing Methyl Orange Molecules from Aqueous Medium by Magnetic Nanoparticles: Evaluating adsorption factors, isotherms, kinetics and thermodynamics

محل انتشار:

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خلاصه مقاله:

In this paper, Fe₃O₄ and MgFe₂O₄ as magnetic samples were successfully synthesized by coprecipitation and combustion methods, respectively, to be used for adsorption of toxic methyl orange molecules from the aqueous solution. Characteristics of the synthesized samples were evaluated using various analyses. The results of crystalline and surface bonding assessment confirmed the successful synthesis of both samples with an appropriate structure. Moreover, Fe₃O₄ presented higher magnetic properties and surface area as well as lower pore diameter than MgFe₂O₄ sample. However, the maximum adsorption of methyl orange was obtained for MgFe₂O₄ (56.54 mg/g) which was around three times of Fe₃O₄ in the same conditions. This may be related to larger pore diameter of MgFe₂O₄ and the ease of access to the internal surface of the adsorbent by the adsorbate molecules. Among the evaluated isotherms, the predicted Freundlich model showed well correlation with actual results of the adsorption process and the process could kinetically explained by the pseudo-second-order equation. Thermodynamic investigation of the process showed the adsorption of methyl orange was exothermic and spontaneous. The results revealed that MgFe₂O₄ sample ($q_{max} = 181.34$ mg/g) can be suggested as a good adsorbent for the removal of toxic dyes and water pollutants.

کلمات کلیدی:

(Mg-Fe Spinel, Fe₃O₄, Magnetic Particles, Adsorption, Methyl Orange (MO)

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