

عنوان مقاله:

Proficient Adsorption, Photodegradation and Sonodegradation of Methylene Blue by $\text{Fe}_3\text{O}_4/\text{Graphene}$ Nanocomposite

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خلاصه مقاله:

In this research, Fe_3O_4 and $\text{Fe}_3\text{O}_4/\text{Graphene}$ materials were prepared and characterized via different techniques such as X-ray diffractometer (XRD), Vibrating Sample Magnetometer (VSM), and energy-dispersive X-ray spectroscopy (EDX). The efficiency of prepared samples were investigated by elimination of methylene blue as a cationic dye from aqueous solutions via different methods such as adsorption, photodegradation and sonodegradation processes. The results indicated that the degradation rate of methylene blue by $\text{Fe}_3\text{O}_4/\text{Graphene}$ nanocomposite under sonocatalytic process was considerably higher than the adsorption and photocatalytic procedures. Sonocatalytic degradation of methylene blue by $\text{Fe}_3\text{O}_4/\text{Graphene}$ nanocomposite could be explained by the mechanisms of hot spots and sonoluminescence. The degradation pathways between sonocatalytic oxidation and methylene blue solution was described. The results showed that the conjugate structure of nitrogen-sulfur heterocyclic material was broken and aromatic ring was oxidized to open the ring. Methylene blue molecules were finally mineralized to H_2O and CO_2 in the sonocatalytic degradation process. Furthermore, the figures-of-merit based on electric energy consumption (electrical energy per order (EEO)) were estimated in the degradation of methylene blue in the presence of $\text{Fe}_3\text{O}_4/\text{Graphene}$ nanocomposite. The results showed that less energy is consumed during the sonodegradation of methylene blue in the presence of $\text{Fe}_3\text{O}_4/\text{Graphene}$ nanocomposite in comparison with photodegradation procedure.

کلمات کلیدی:

$\text{Fe}_3\text{O}_4/\text{Graphene}$ nanocomposite, Methylene Blue, Sonocatalytic degradation, Electric energy consumption

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