

عنوان مقاله:

Photocatalytic Degradation of Dye Pollutant in Synthetic Wastewater by Nano-Fe₃O₄ Based on Clinoptilolite Zeolite

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خلاصه مقاله:

Background & Aims of the Study: One of the most important environmental pollutants in the alcohol industry is sugar beet molasses. The wastewater of these industries causes the pollution of soil, surface water, and underground water. Iron oxide magnetic nanoparticles have attracted much consideration due to their unique properties, such as superparamagnetism, surface-to-volume ratio, greater surface area, and easy separation methodology. Accordingly, clinoptilolite zeolite has been used due to the low cost and abundance. The purpose of this study was to remove organic and dye pollutants from the wastewater using a new catalyst that can be separated from aqueous solution by magnetic methods and take a step toward the preservation of the environment. **Materials and Methods:** In this study, a new catalyst was prepared by supporting magnetite (Fe₃O₄) on clinoptilolite zeolite, and the characterization of this catalyst was studied by using scanning electron microscopy images, X-ray diffraction patterns, and nitrogen adsorption/desorption. **Results:** The experiments were performed in different operational conditions, such as the amounts of photocatalyst and pH. The mathematical equation for estimating the percentage of dye pollutant removal was obtained using the Box-Behnken experimental design. The optimal conditions were determined as the amount of photocatalyst equal to 200 mg L⁻¹, pH equal to 2, and concentration of H₂O₂ equal to 25 ppm. Removal efficiency in the optimal condition was reported as 85.10%. **Conclusion:** The obtained results of the present study showed that the photocatalytic process can be suitable for the removal of dye pollutants from the alcohol industrial wastewater using the supported Fe₃O₄ nanoparticles on zeolite clinoptilolite.

کلمات کلیدی:

Alcohols, Box-behnken design, Clinoptilolite zeolite, Environmental pollutants, Fe₃O₄, Nanoparticles, Water decolorization

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