

An efficient heterogeneous Fenton catalyst based on modified diatomite for degradation of cationic dye simulated wastewater

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ABSTRACT

Heterogeneous catalysts overcome the drawbacks of the homogeneous Fenton process, and have attracted considerable attention for degradation of organic pollutants in wastewater. In this study, a heterogeneous Fenton catalyst system was developed for the degradation of cationic dye by incorporating ferric oxide nanoparticles into modified diatomite composite. The catalyst was synthesized through two simple steps: firstly, the raw diatomite was modified by soaking into nitric acid; then, through forced hydrolysis strategy, the ferric oxide nanoparticles were incorporated into the pre-treated diatomite. The resultant catalyst were characterized by X-ray diffraction, scanning electron microscopy, and energy dispersive X-ray spectroscopy. This novel diatomite-Fe₂O₃ catalyst demonstrated distinct catalytic activity and desirable efficiency for degradation of organic dye. Methylene Blue (MB) was completely decomposed within 20 min, and the decomposition efficiency was remained higher than 90% after 5 cycles of catalyst regeneration. The simplicity and low cost of the demonstrated catalytic material is promising for the efficient degradation of organic pollutants.

Keywords: Modified diatomite; Fenton degradation; Heterogeneous catalyst; Methylene blue; Cationic dye wastewater

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