Visible light induced photocatalytic decolourisation of rhodamine B by magnetite nanoparticles synthesised using recovered iron from waste iron ore tailing

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Received 22 February 2014; Accepted 21 September 2014

\textbf{ABSTRACT}

The photocatalytic activity of highly dispersed magnetite nanoparticles (MNP), synthesised using ferric iron recovered from waste iron ore tailing and reagent grade ferrous chloride by coprecipitation, for the decolourisation of rhodamine B (RhB) under visible light (VL)/sunlight was evaluated. The effects of different reaction parameters such as pH, dye concentration, catalyst dose and externally added H\textsubscript{2}O\textsubscript{2} were also investigated. MNP with sizes in the range 8–23 nm and relatively low band gap (1.67 eV) showed good photocatalytic activity, magnetic separability and stability for repeated use. More than 85\% of RhB (10 mg/l) is found to be decolourised within 2 h under VL with a MNP dose of 0.51 g/l. Suitable mechanisms have been proposed to account the photocatalytic activities in the presence and absence of H\textsubscript{2}O\textsubscript{2}. Results obtained in the current study may be useful to prepare suitable photocatalyst combinations with other semiconducting materials for photocatalytic remediation of different water contaminants including organic dyes.

\textbf{Keywords}: Iron ore tailings; Magnetite nanoparticles; Nanophotocatalyst; Rhodamine B; Decolourisation

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