



Application of Magnetic Nano Adsorbent Fe_2O_3 for Removal of Hazardous Ponceau-S Dye from Aqueous Solution

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Abstract

The photodegradation of Ponceau-S dye was investigated using UV radiation in presence of nanosized Fe_2O_3 . Removal efficiency of Ponceau-S was sensitive to the operational parameters such as dye concentration, catalyst dose, pH, contact time, TOC and COD. The photocatalytic treatment of red colored Ponceau-S dye by magnetic nano semiconductor (Fe_2O_3) is an effective, economic and faster mode. The kinetics and isotherm studies were carried out. A simple kinetics model was proposed which confirmed pseudo second order reaction. Langmuir isotherm fitted this study. The optimum conditions for the degradation of the dye were initial concentration 50 mgL^{-1} , pH 8, contact time 20 minutes and catalyst dose 5 gL^{-1} of Fe_2O_3 . The semiconductor photocatalyst was also carried out for SEM and XRD analysis which confirms the utilized semiconductor was nanosized.

Keywords. Ponceau-S, Fe_2O_3 , Semiconductor photocatalysis, SEM, XRD, kinetics.

Introduction

Azo dyes are the largest group of dyes for dyeing cotton fabrics in industry [1]. Cotton is the most widely used fabric among all textile materials and hence azo dyes are discharged frequently in large quantities into the environment. Azo dyes represent 60-70% of all dyes and important dye group used in the textile industry. Due to good water solubility and poor biodegradability they are difficult to eliminate by physical as well as chemical treatment [3, 4]. Many dyes and their

breakdown products may be toxic for living organisms [5]. Therefore, decolorisation of dyes is an important aspect of wastewater treatment before discharge. It is difficult to remove the dyes from effluents because dyes are not easily degradable and are generally not removed from wastewater by conventional system [6]. General biological aerobic wastewater systems are not successful for decolorisation of majority of dyes. Therefore in order to achieve the desired degree of treatment it is necessary to integrate

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