



Photocatalytic degradation of acid red 14 from contaminated water using immobilized TiO₂ nanoparticles on glass beads activated by UV/peroxydisulfate

Mohammad Hossein Rasoulifard^{a,*}, Seyed Mohammad-Mahdi Doust Mohammadi^b, Azam Heidari^c, Gholam Hossein Shahverdizadeh^d

^aFaculty of Science, Department of Chemistry and Environmental Sciences, University of Zanjan, P.O. Box: 45195-313, Zanjan, Iran

Tel. +98 241 515259; Fax: +98 241 5152477; email: m_h_rasoulifard@znu.ac.ir

^bYoung Researchers Club, Zanjan Branch, Islamic Azad University, Zanjan, Iran

^cFaculty of Medicine, Zanjan University of Medical Sciences, Zanjan, Iran

^dResearch Laboratory, Department of Applied Chemistry, Tabriz Branch, Islamic Azad University, Tabriz 1655, Iran

Received 6 January 2012; Accepted 8 May 2013

ABSTRACT

The present study investigates the photocatalytic degradation of C. I. acid red 14 (AR 14) as a textile dye, in aqueous medium using immobilized TiO₂ nanopowder on glass beads illuminated by a UV-C lamp (30 W). Photocatalytic degradation of organic pollutants is done with photogenerated holes as a result of UV light irradiation on surface of TiO₂ nanoparticles and generation of hydroxyl radicals as power oxidant. This process is performed under a set of variables (concentration of peroxydisulfate, AR 14, and temperature). AR 14 photocatalytic degradation increased with increasing peroxydisulfate concentration and temperature. The increase in dye concentration caused a decrease in removal efficiency. The progress of photocatalytic decolorization of the AR 14 was studied by measuring the absorbance at $\lambda_{\max} = 514 \text{ nm}$ by UV-Vis spectrophotometer. The results indicated no observable loss of the color when the UV or UV/TiO₂ was applied in the absence of S₂O₈²⁻. The results reveal that a considerable decrease in the concentration of the dye occurs when the sample was photocatalytic degraded by S₂O₈²⁻.

Keywords: Advanced oxidation process; C. I. acid red 14; Immobilized TiO₂ nanoparticles; UV irradiation; Wastewater treatment

*Corresponding author.