*Desalination and Water Treatment*
www.deswater.com
1944-3994/1944-3986 © 2012 Desalination Publications. All rights reserved
doi: 10/5004/dwt.2012.3006

Taylor & Francis
Taylor & Francis Group

44 (2012) 174–179
June

# Photocatalytic decolorization of methylene blue using immobilized ZnO nanoparticles prepared by solution combustion method

Abbas Rezaee[a,*], Hossein Masoumbeigi[b], Reza Darvishi Cheshmeh Soltani[a], Ali R. Khataee[c], Seyedjamalodin Hashemiyan[d]

[a]*Department of Environmental Health, Faculty of Medical Sciences, Tarbiat Modares University, Tehran, Iran*
*Tel. +98 21 82883575; Fax: +98 21 82883575; email: rezaee@modares.ac.ir*
[b]*Health Research Center and Environmental Health engineering department, Faculty of Health, Baqiyatallah University of Medical Scienc, Tehran, Iran*
[c]*Department of Applied Chemistry, Faculty of Chemistry, University of Tabriz, Tabriz, Iran*
[d]*Institute of water and Energy, Sharif University of Technology, Tehran, Iran*

Received 31 May 2011; Accepted 22 November 2011

**ABSTRACT**

Photocatalytic decolorization of methylene blue (MB) in aqueous solution was investigated using ZnO nanoparticles immobilized on glass plate. The ZnO nanoparticles were prepared by solution combustion method (SCM) using zinc nitrate as oxidant and glycine as fuel. In the slurry ZnO system the separation and recycling of the photocatalyst is practically difficult. Thus, the ZnO nanoparticles were immobilized on glass supports to solve this problem. The effects of process parameters like, catalyst loading, initial dye concentration, and UV-radiation intensity have been investigated. The best results of MB removal were reported in the 1800 μW $cm^{-2}$ UVC using two layers immobilized ZnO nanoparticles. In addition to removing the color from the wastewater, the photocatalytic reaction simultaneously reduced 62% COD. These results suggest that the photocatalytic decolorization of MB using immobilized ZnO nanoparticles prepared by SCM can be proposed and developed as a method for the treatment of colored wastewaters.

*Keywords:* ZnO nanoparticles; Methylene blue; Photocatalysis; Solution combustion method

*Corresponding author.