Desalination and Water Treatment
www.deswater.com

27 (2011) 204–209
March

1944-3994/1944-3986 © 2011 Desalination Publications. All rights reserved
doi: 10/5004/dwt.2011.1388

Photocatalytic degradation of Acid Red 1 dye using ZnO catalyst in the presence and absence of silver

B.H. Hameed*, U.G. Akpan, K.P. Wee

School of Chemical Engineering, Engineering Campus, Universiti Sains Malaysia, 14300 Nibong Tebal, Penang, Malaysia
Tel. +60 45996422; email: chbassim@eng.usm.my

Received 28 November 2009; Accepted 18 August 2010

ABSTRACT

The investigation of the degradation of Acid Red 1 (AR1) dye was carried out in an aqueous suspension photoreactor. Different parameters that affect the degradation of AR1 dye such as the presence and absence of a photocatalyst, light source, air, catalyst loading, initial substrate concentration were studied. The activity of Ag-doped ZnO prepared by photoreduction of Ag^+ ion on ZnO catalyst for AR1 dye degradation was investigated. The effects of different amount of Ag^+ deposited on ZnO particles and catalysts loading on the photocatalytic degradation rate of AR1 dye were evaluated. The surface morphologies of both Ag-doped ZnO and ZnO catalysts were studied by scanning electron microscopy (SEM), while X-ray diffraction (XRD) was used to study the crystallography of the catalysts. The experimental results revealed that the presence of photocatalyst, light, and air are significant for the photodegradation process. The optimum catalyst loading was 2 g catalyst per liter solution. The presence of Ag^+ in the catalyst does not significantly enhance the photocatalytic activity of ZnO in the degradation process.

Keywords: Degradation; Acid Red 1; Activity; Photoreduction; Zinc oxide

*Corresponding author.