Desalination and Water Treatment
www.deswater.com
1944-3994/1944-3986 © 2012 Desalination Publications. All rights reserved
doi: 10/5004/dwt.2012.2270

Taylor & Francis
Taylor & Francis Group

44 (2012) 36–43
June

Decolorization of CI Reactive Black 8 by electrochemical process with/without ultrasonic irradiation

Jie Wu, Fang Liu, Hui Zhang*, Jianhua Zhang, Lu Li†

Department of Environmental Engineering, Wuhan University, P.O. Box C319, Luoyu Road 129#, Wuhan 430079, China
Tel. +86 27 68775837; Fax: +86 27 68778893; email: eeng@whu.edu.cn

Received 11 October 2010; Accepted 15 November 2011

ABSTRACT

The decolorization of CI Reactive Black 8 by anodic oxidation with Ti/RuO_2-IrO_2 anode and stainless steel cathode was carried out in an electrochemical cell with or without ultrasonic irradiation. The effect of current density, initial pH value, initial dye concentration and electrolyte concentration on the decolorization rate of CI Reactive Black 8 in both two processes was investigated. The results showed that the decolorization followed pseudo-first-order kinetics. The decolorization rate increased with increasing the current density, but decreased with increasing the initial dye concentration and electrolyte concentration. The acidic condition favored CI Reactive Black 8 decolorization. The presence of ultrasonic irradiation could enhance electrochemical oxidation (EC) of CI Reactive Black 8, and the enhancement effect tended to increase with increasing the initial dye concentration, pH value, and electrolyte concentration, but decrease with increasing the current density. In the presence of ultrasonic irradiation, a 32.4% COD removal efficiency was achieved after 90 min EC when initial concentration was 100 mg l^{-1}, current density was 31.7 mA cm^{-2}, initial pH value was 5.4, the electrolyte concentration was 0.1 mol l^{-1} and the acoustic power was 100 W l^{-1}. The specific oxygen uptake rate (SOUR) tests showed that SOUR decreased during the first 15 min, but it increased with reaction time afterwards.

Keywords: Sonoelectrochemistry; Anodic oxidation; Ti/RuO_2–IrO_2 anode; CI Reactive Black 8; Decolorization; COD

*Corresponding author.
†Present address: China University of Geosciences (Wuhan)