Desalination and Water Treatment
www.deswater.com
25 (2011) 233–240
January
1944-3994 / 1944-3986 © 2011 Desalination Publications. All rights reserved.
doi: 10.5004/dwt.2011.1935

Application of advanced oxidation processes to remove refractory compounds from dye wastewater

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Received 26 March 2010; Accepted in revised form 20 July 2010

ABSTRACT

The purpose of this study was to investigate the efficacy of ozonation and three AOPs (O_3/H_2O_2, O_3/UV, and O_3/H_2O_2/UV) on synthetic dye-containing wastewater with regard to the removal of chemical oxygen demand (COD) and color and biodegradability (BOD_5/COD). At hydrogen peroxide levels above the optimal value, H_2O_2 tended to accumulate in the reactor, leading to a decrease in COD removal efficiency, because it acted as a radical scavenger. Higher recirculation flow rates increased COD and color removal in the combined UV process. Compared with the O_3/H_2O_2 process, the O_3/UV process enhanced COD removal mildly. Biodegradability increased approximately 12-fold after 150 min of retention time. Although all processes removed color within a short operational time, the O_3/H_2O_2/UV process had the highest removal efficiency of COD and enhancement of biodegradability of the processes that we tested.

Keywords: Advanced oxidation processes (AOPs); Biodegradability; Dye wastewater; Ozonation; Refractory compounds

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