

Murat Efgan Kibar^{1*}, Sevil Veli², Ayla Arslan², Serap Ketizmen²,
Ayşe Nilgün Akın¹

CATALYTIC WET AIR OXIDATION OF PULP AND PAPER INDUSTRY WASTEWATER

¹Department of Chemical Engineering, Kocaeli University, Turkey;

²Department of Environmental Engineering, Kocaeli University, Turkey

*efgankibar@kocaeli.edu.tr

Paper bleaching effluent was treated by catalytic wet oxidation method and the effect of the type of the catalyst on the efficiency was investigated. Cerium oxide, cobalt oxide and copper oxide based ($\text{CuO}_x - \text{CoO}_x - \text{CeO}_2$) composite catalysts which were varying with regard to CuO_x , CoO_x and CeO_2 compositions were prepared by co-precipitation method. The efficiency of the process was determined by measuring the chemical oxygen demand (COD), total organic carbon (TOC), adsorbable organic halides (AOX) and Cl^- removal yields. When the COD, TOC and AOX removal yields were considered, better results were achieved with copper and ceria based catalysts than the cobalt based catalysts. At the optimum reaction conditions ($T - 473 \text{ K}$, $t - 120 \text{ min}$, $P - 130 - 250 \text{ psig}$), the maximum removal yields obtained by the 50 % $\text{CuO}_x - 50 \text{ % CeO}_2$ catalyst. When the wastewater of the I stage of paper bleaching process was treated, removal yields of TOC, COD and AOX were detected as 89; 94 and 95 %, respectively. Whereas, removal yields of 53 % COD, 84 % TOC, 90 % AOX and 76 % Cl^- were achieved for the III stage wastewater. It was shown that removal of the toxicity of wastewater samples that were collected from the paper bleaching process by the proposed treatment methods.

Keywords: catalytic wet oxidation, paper wastewater, mixed-oxide catalyst, adsorbable organic halides, toxicity unit.

Introduction

The effluents from the pulp and paper industry cause serious problems such as; slime growth, thermal impacts, scum formation, color problems and loss of aesthetic beauty in the environment. Moreover, they increase the amount of toxic substances in the water, causing death of the zooplankton and fish. The

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