



Journal of Applicable Chemistry

2013, 2 (3): 492-501

(International Peer Reviewed Journal)



Studies on Decolourization and COD reduction of dye effluent using advanced oxidation processes

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Received on 7th May and finalized on 11th May 2013.

ABSTRACT

The present paper involves the application of chemical and photochemical homogeneous advanced oxidation processes on the decolourization of textile effluent and Methyl Orange (MO) Dye. The decolourization efficiency of various oxidants such as hydrogen peroxide (H₂O₂), fenton reagent i.e. hydrogen peroxide and hydrated ferrous sulphate (H₂O₂/Fe²⁺), sodium hypochlorite (NaClO), UV/H₂O₂/Fe²⁺, Solar/H₂O₂/Fe²⁺, UV/NaClO and Solar/NaClO has been investigated. The effect of process parameters viz., oxidant dose, pH, concentration of dye and source of light (UV/Solar) for decolourization and COD reduction of dye effluent and MO has been studied. The decolourization efficiency was estimated from residual concentration spectrophotometrically. The experimental results show that the maximum decolourisation (more than 95 %) and COD reduction (40 %) of effluent occurred using combined Solar/NaClO (20 mg L⁻¹) system at pH 6 within 20 minutes. The decolourization efficiency of MO dye with H₂O₂ or UV alone was found to be negligible but more than 95% efficiency could be achieved either with UV/H₂O₂/Fe²⁺ (450 mg L⁻¹ /150 mg L⁻¹) at pH 2 or Solar/NaClO (120 mg L⁻¹) at pH 6 within 30 minutes.

Keywords: Decolourization, COD (Chemical oxygen demand), Textile effluent, Methyl Orange, Absorbance, Photo oxidant.
