

Estimation and Removal of Chlorophenolic Compounds from Paper Mill Waste Water by Electrochemical Treatment

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Abstract : A number of toxic chlorophenolic compounds are formed during pulp bleaching. The nature and concentration of these chlorophenolic compounds largely depends upon the amount and nature of bleaching chemicals used. These compounds are highly recalcitrant and difficult to remove but are partially removed by the biochemical treatment processes adopted by the paper industry. Identification and estimation of these chlorophenolic compounds has been carried out in the primary and secondary clarified effluents from the paper mill by GCMS. Twenty-six chlorophenolic compounds have been identified and estimated in paper mill waste waters. Electrochemical treatment is an efficient method for oxidation of pollutants and has successfully been used to treat textile and oil waste water. Electrochemical treatment using less expensive anode material, stainless steel electrodes has been tried to study their removal. The electrochemical assembly comprised a DC power supply, a magnetic stirrer and stainless steel (316 L) electrode. The optimization of operating conditions has been carried out and treatment has been performed under optimized treatment conditions. Results indicate that 68.7% and 83.8% of chlorophenolic compounds are removed during 2 h of electrochemical treatment from primary and secondary clarified effluent respectively. Further, there is a reduction of 65.1, 60 and 92.6% of COD, AOX and color, respectively for primary clarified and 83.8%, 75.9% and 96.8% of COD, AOX and color, respectively for secondary clarified effluent. EC treatment has also been found to increase significantly the biodegradability index of wastewater because of conversion of non-biodegradable fraction into biodegradable fraction. Thus, electrochemical treatment is an efficient method for the degradation of chlorophenolic compounds, removal of color, AOX and other recalcitrant organic matter present in paper mill waste water.

Keywords : chlorophenolics, effluent, electrochemical treatment, wastewater

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