

REMOVAL OF COLOR OF PULP AND PAPER MILL EFFLUENT BY ADSORPTION ON COAL FLY ASH

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ABSTRACT

The present study was conducted for the removal of color of pulp and paper mill effluent using coal fly ash as an adsorbent. The effect of adsorbent dose and pH on color removal has been determined. 100 % color removal was achieved when adsorbent dose was 2.4 gm or more and at pH 6.8 and above.

INTRODUCTION

Pulp and paper industry effluents characteristically contain very high C.O.D and Color. Discharge of the untreated colored effluent of pulp & paper effluent create serious water pollution problems. The conventional biological wastewater treatment cannot remove color of pulp and paper mill effluents. Physicochemical methods like coagulation with lime or iron salts, ultrafiltration etc. have not been very effective for color removal of pulp & paper mills effluents (Rohella *et al.* 2001).

Adsorption of activated carbon is a common method for color removal of industrial effluent but the high cost is a limitation for its use for pulp & paper mills. Therefore attempt has been to find out low-cost adsorbent material for removing color of effluents of this industry.

Coal fly ash of power plants has been used as an adsorbent for removing metals like Hg, Pb, Cd, Zn and Fe from water (De, 2005; De & Lal, 1990). But use of coal fly ash for color removal of Pulp and paper efflu-

ents has not been reported. In the present investigation, coal fly ash has been used for the color removal of pulp and paper mill effluents.

MATERIALS AND METHODS

The adsorbent, coal fly ash (C.F.A) was collected from power plants of Calcutta Electric Supply Corporation at Titagarh, W. Bengal. It was sieved through 50 mesh size, dried in an oven and kept in polythene bottles. Paper mill effluent was collected from a large hardwood based paper mill of Uttar Pradesh at the inlet of Effluent treatment plant. The characteristics of the effluent was determined (C.O.D 884 mg/L; Color 420 Pt-Co unit).

100 mL effluent was passed through glass column (length 60 cm; diameter 3 cm) containing C.F.A. at a flow rate of 1 mL/min. The color of the effluent before and after adsorption were measured by a colorimeter (Elico, model CL 154) at 470 nm. The initial and final pH of the effluent was measured by a pH meter (Elico, Model L1 613).

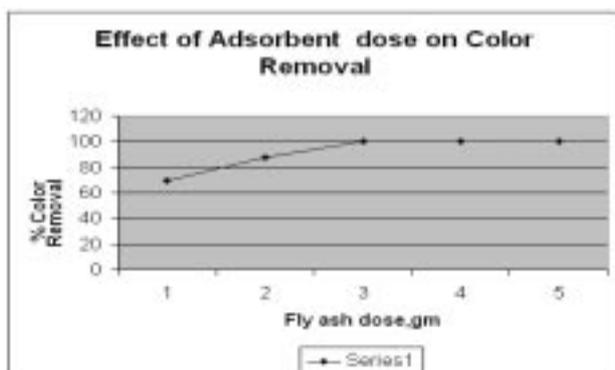


Fig.1 Effect of adsorbent dose on color removal of paper mill effluent

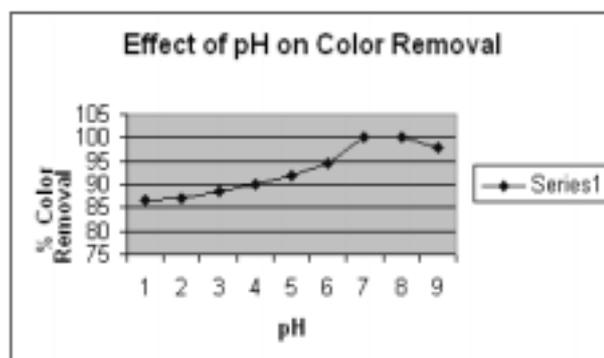


Fig. 2 Effect of pH on color removal

RESULTS AND DISCUSSIONS

Effects of adsorbent dose on color removal

The effect of fly ash dose on color removal was studied by increasing the amount of adsorbent dose (0.5-5.0 gm). The color removal increased with increasing adsorbent dose. 100 % color removal was noted when fly ash dose was 2.4 gm and above. (Fig. 1)

Effect of pH

Effect of pH on color removal of the paper mill effluent was studied using 0.5 M NaOH or 0.5 M HCl (Fig. 2). 100% color removal took place at pH 6.8 and above. This result is significant as normal pH of paper mill effluents are above 8.0, the method may be used for color removal of pulp and paper mill effluents without any pH adjustment.

CONCLUSION

Coal fly ash is an efficient adsorbent in removing color of pulp and paper mill effluents. 100% color removal was achieved at pH 6.8 and above.

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