

## Abstract

This study aims to determine the efficiency of a pilot-scale ozonation plant for the treatment of textile dye bath effluent by an integrated process of coagulation with ozonation. Initially, the treatment was carried out by coagulation using different coagulants such as polyaluminum chloride (PAC) 8085, PAC 60, BWD-01 decolorizing agent, and cationic and anionic polyacrylamide (PAM) as flocculant at different dose concentrations of 200 mg, 400 mg and 600 mg. Wastewater treatment parameters such as pH, TSS, TDS, COD, salinity, turbidity, and electrical conductivity were analyzed to determine the removal efficiencies of each unit process before and after the treatment process. Significantly, BWD-01 showed maximum removal against COD as it was 94%. Hereafter, the combined coagulation-coagulation and coagulation- flocculation process proceeded. The textile effluent was also treated with commercial coagulant alum ( $\text{Al}_2\text{SO}_4$ ) $\cdot$ 3.18H $_2$ O, which showed unsatisfactory results. The commercial coagulant was compared with BWD-01 decolorizing agent that showed % removal of COD as 48% and 78% respectively. Finally, the wastewater was then treated with AOPs. The direct ozonation was also carried out on raw wastewater. The result of order of removal efficiencies after ozonation of these processes was; coagulation-flocculation > coagulation based on decolorizing agent > coagulation-coagulation > coagulation based on alum. The electrical energy per order (EE/O) was found 35.8 kWh/m $^3$ . The decolorization of wastewater was achieved up to 98% after treatment with ozone. Moreover, regression coefficient ( $R^2$ ) was also evaluated to depict the fitness of 1st order kinetic reaction mechanism. Hence, the efficiency of ozonation was increased with primary treatment of coagulation that showed successful removal of pollutants. This integrated process could be feasible option and eco-friendly process that would lead towards reuse of wastewater.