Abstract

This study investigates the effectiveness of ozone treatment in addressing key physicochemical parameters of Textile and Hospital wastewater. The study assesses the impact of coagulation, sequencing batch reactor (SBR), ozonation over three time intervals (20, 40, and 60 minutes) and combined treatment on parameters including pH, electrical conductivity (EC), turbidity, total dissolved solids (TDS), dissolved oxygen (DO), chemical oxygen demand (COD), alkalinity, chloride concentration, color, and odor. The results reveal that the initial pH of the untreated wastewater (pH 8.83) experiences minor fluctuations following ozonation and SBR treatments, remaining within an acceptable range for discharge but coagulation process caused the pH to fluctuate from very low to high range. Ozonation proves highly effective in reducing turbidity, with values diminishing from 40-80% removal, respectively, highlighting improved water clarity and suspended particle removal. Dissolved oxygen levels, initially low at 0.14 mg/L, exhibit significant enhancement, reaching values between 3.71 and 4.65 mg/L post-ozonation. Coagulation-Flocculation treatment were unable to effect the COD of the sample, however SBR was relatively effective with 91% removal after 20 hours. Ozonation also removed up to 87.5% COD for textile effluent and 74.1% for hospital wastewater. Total alkalinity concentrations undergo varying degrees of reduction, indicating changes in wastewater composition. SBR had most effectively removed the total alkalinity by achieving 98.6% removal from hospital wastewater, 95.8% from textile effluent. Most notably, ozonation effectively eliminates the dark green color and rotten, pungent odor characteristic of the untreated wastewater, yielding effluent with a yellow hue and no discernible smell. SBR was effective in removing the odor completely but not much color was removed from the effluents. Coagulation-flocculation process was unable to remove odor of the samples and even increased the odor of samples treated by BWD. In conclusion, ozonation emerges as a promising treatment method for wastewater as compared to other methods used in this study, leading to enhanced water quality parameters, including reduced turbidity, increased dissolved oxygen, and the elimination of color and odor concerns. Ozonation is also effective on removing 100% total Coliform from ground water samples thus converting it into drinking water. Further research is recommended to comprehensively evaluate the removal of specific organic contaminants and to optimize ozonation processes for the efficient treatment of industry effluents.