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Characterization and Treatment of Paint Industry Effluents Using Coagulation and Fenton Oxidation

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The wastewater released from the paint industry contains a large number of toxic chemicals including dyes and organic matter. These toxic effluents have been reported to have adverse effects on the environment and human health. Therefore effective treatment procedures need to be followed before discharging them into the environment. The research work reporting here aimed to characterize the effluents released by a local paint industry and then apply the coagulation and Fenton oxidation technique to treat the effluents. The initial characterization of the effluents revealed that the wastewater is high in COD (5870 ppm), Oil & grease (3000 ppm), Turbidity (>800 NTU), BOD (35 ppm), TDS (1023 ppm) and TSS (1121ppm). All these parameters exceeded the tolerance limits imposed by CEA. The coagulation studies were carried out by using $Al_2(SO_4)_3.16H_2O$ (Alum), polyaluminum chloride (PAC), polyaluminum chloride with polyacrylamide polymer. The reduction of COD was evaluated as an indicator of treatment efficiency. The maximum COD reduction 78% was observed at Al^{3+} dosage of 1000 ppm when the Alum and PAC were used as the coagulants at pH=8. A very low Al^{3+} concentration (100 ppm), an 83% reduction of COD was observed when the 50 ppm polyacrylamide was mixed with PAC. Fenton oxidation of the waste resulted in a 90% COD reduction when 6 $mmoldm^{-3}$ of Fe (II) and 60 $mmoldm^{-3}$ of H_2O_2 (1:10 ratio) were used at pH=4 with 600 rpm stirring rate at temperature 30 ^{0}C. The results of the current study will be useful when waste treatment plants are designed to treat the paint industry effluents.

Keywords: Coagulation, COD, Fenton Oxidation, Wastewater, Polyaluminum chloride