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Treatment of Textile Dye Effluent Using Peroxi-Electrocoagulation

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Abstract - During recent years, industrialization has been under steady growth. Almost every Industry, uses water as one of their basic resources, due to which discharge of wastewater has also increased. One such industry is textile industry. There are various methods to treat these effluents. One of those methods is Peroxi-Electrocoagulation. This method is an advanced electrochemical oxidation process which involves principles of electrocoagulation and electrochemical oxidation by addition of hydrogen peroxide. The objective of this study is to treat textile dye effluent and find out the COD and Sulphate removal efficiency under different operational parameters.

Key Words: Textile Effluent, Peroxi-Electrocoagulation, Stainless steel electrode, Hydrogen peroxide

1.INTRODUCTION

Textile industries are more polluting due to their high degree of Total dissolved solids and suspended solids. The wastewater is colored and highly viscous. Peroxi-Electrocoagulation is an advanced electrochemical oxidation process in which electrocoagulation and electrochemical oxidation takes place. Stainless steel electrodes are used for electrocoagulation and hydrogen peroxide is used to induce electrochemical oxidation. Hydrogen Peroxide reacts with the metal ions produced during electrocoagulation and produces Hydroxyl radicals (OH) ions. These highly reactive hydroxyl radicals act as oxidants. The destabilized contaminants and oxidized products form larger flocs and precipitates which can be removed settling, sedimentation or filtration.

2. METHODOLOGY

The primary object of this study is to treat textile dye effluent using peroxi-electrocoagulation and find out the COD and sulphate removal efficiency under different operating parameters. First, the textile dye effluent's parameters are tested then it is diluted to 100ppm. Then electrocoagulation is carried out with the presence of different quantities hydrogen peroxide (30%). Then treated water is tested and COD and sulphate removal efficiencies can be found.

3. EXPERIMENTAL PROCEDURE

The experimental setup consists of a 500ml beaker and an magnetic stirrer. The stainless-steel electrode is attached to plastic bar which is attached to a burette stand. 250ml of effluent is filled in the 500ml beaker and the electrode is lowered to make it dip inside the effluent. The electrode is connected to the DC varying power supply. And the magnetic stirrer is dropped inside the beaker. Hydrogen peroxide is added in the required quantity. 30% Hydrogen peroxide is used for this Experiment. Then DC varying power supply and Magnetic stirrer is turned on. After treatment, the treated water is left undisturbed for 2 hours and then it is tested by collecting treated water sample using a syringe.

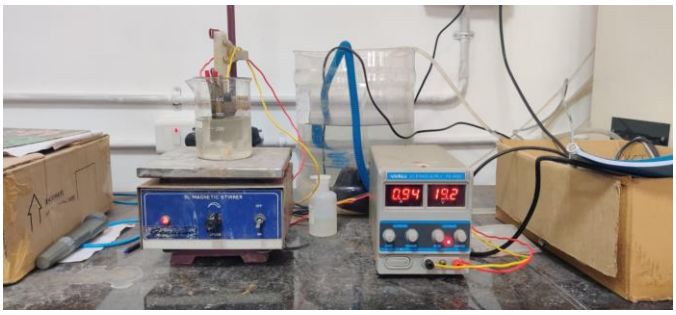


Fig -1: Experimental setup

3.1 EFFLUENT CHARECTERISTICS

The dye effluent was obtained from times dye Tirupur. Initial concentration of the raw effluent is 2170PPM. It is reduced to 100PPM by adding 46ml of effluent to 956ml of distilled water. The characteristics of 100PPM are shown in Table -1

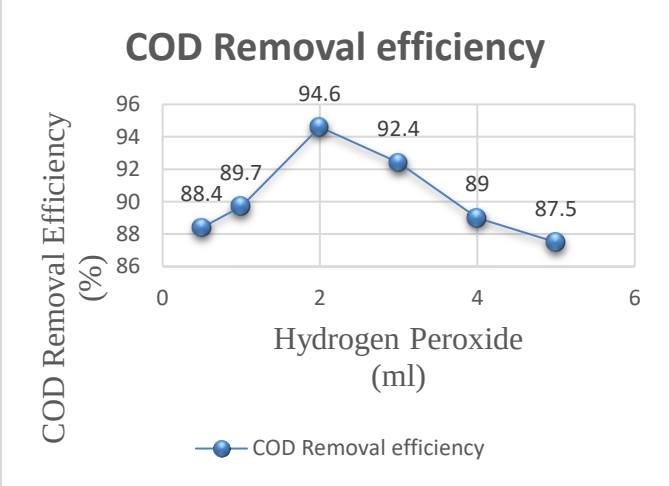
Parameters	Values Obtained
pH	9.43
TDS (PPM)	2890
Salinity (PPM)	2750
COD (mg/l)	586.6
Sulphates (mg/l)	403.78
Conductivity (µS)	4.88

Table -1: Effluent parameters

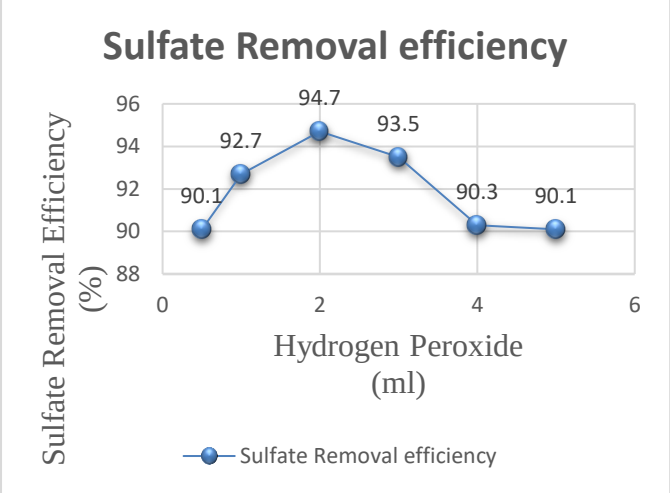
4. RESULTS

Graphs

A. Effect due to varying hydrogen peroxide quantity

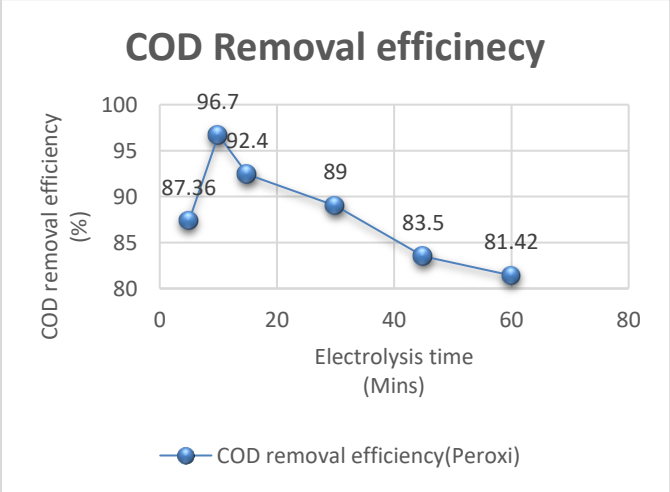


Graph -1

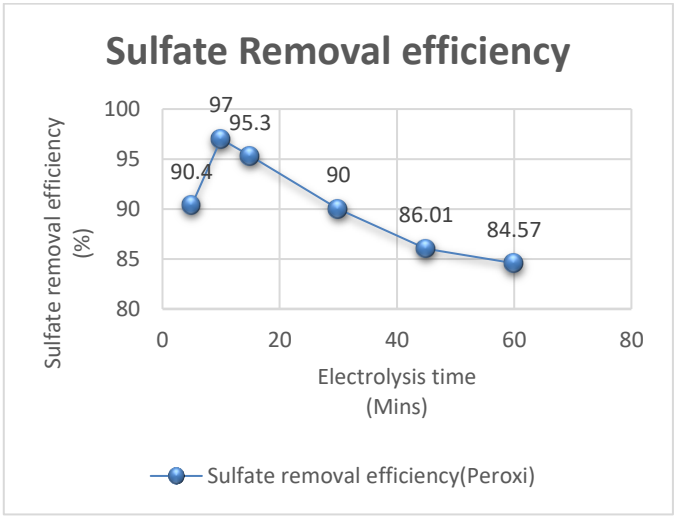


Graph -2

B. Effect due to varying electrolysis time

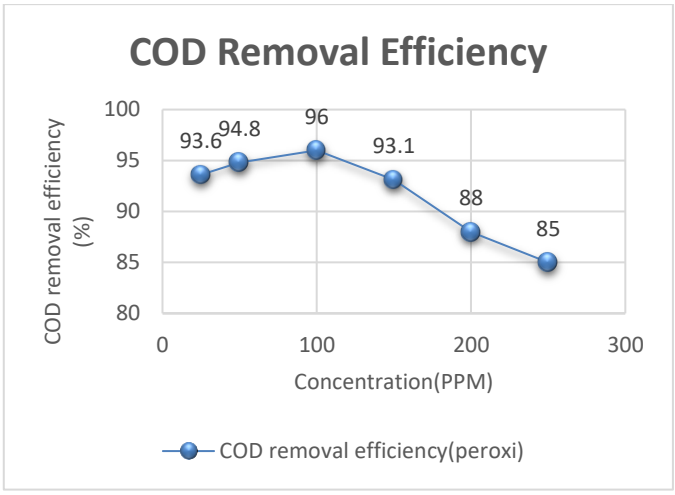


Graph -3

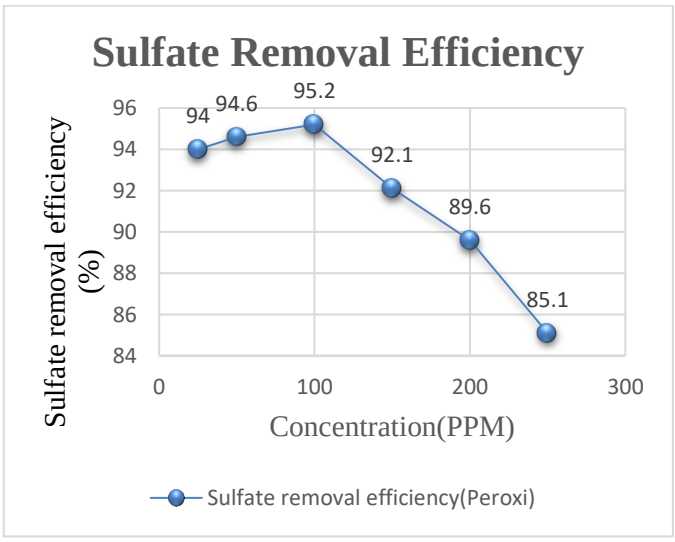


Graph- 4

C. Effect due to varying dilution concentration of effluent

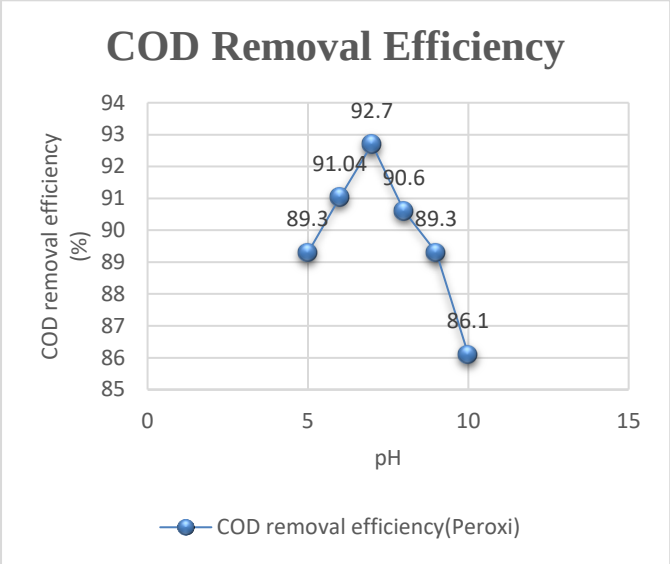


Graph -5

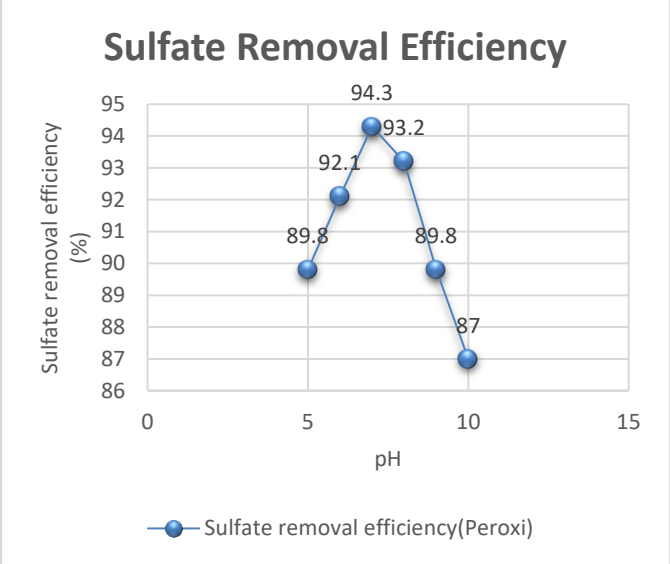


Graph-6

D. Effect due to varying effluent pH



Graph -7



Graph -8

5. CONCLUSIONS

The peroxi-electrocoagulation has been successfully used to treat textile dye effluent. From this study optimum parameters have been found which are 2ml of hydrogen peroxide, 10mins of electrolysis time, 100ppm dilution concentration, and 7pH. Maximum removal efficiency was achieved during these operational parameters.

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