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Decolorization Of The Textile Wastewater By Electro Coagulation Process Using Stainless Steel As Electrodes

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Abstract

Electrocoagulation method is an advanced technology which is able to treat textile waste water having high COD,TDS, and color efficiency before it is treated further or discharged in to water bodies. And this method is considered as effective method to removal of dyes from colored waste water. The electrochemical cell which has reactor called both anode and cathode. Here in this experiment cathodes were worked in monopolar method by associating anodes to the power supply. Effluents were treated for 10 volts ,20 volts and 30 volts for 20 min intervals until it becomes clear. The results are reported in terms of percentage removal of COD ,color by varying p^H and current density, it was observed that increasing the current density will decolorize and reduce the COD percentage by 85% to 90%.

Keywords: *Textile Industry, Electrocoagulation, Stainless Steel, pH, Color..*

INTRODUCTION:

Fresh water is what makes earth special, it is essential for all living organisms, which unreliably makes it almost valuable resource on the planet. Today it is very crucial for many business and communities to require large amount of fresh water to survive but sadly also they create vast amount of contaminated water. Increasing industrialization and urbanization are the causes of environmental pollution Textile industries are one the huge volume of wastewater generating industries, and amongst the high strength wastewater generating industries. Common contaminants in textile wastewater include materials containing biochemical oxygen demand and chemical oxygen demand, suspended solids, color and other soluble inorganic and organic substances.

METHOD:

This gives the materials and strategies received throughout this investigation, which incorporates reactor arrangement, operational conditions and test examination technique.

Electro coagulation:

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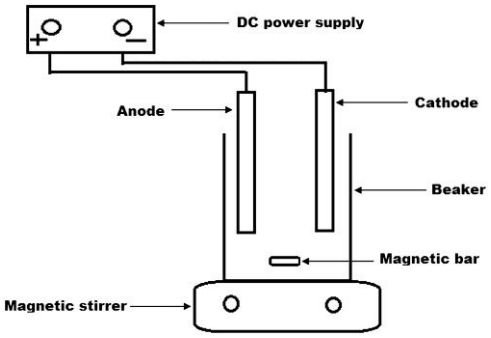

Fig.1:The schematic diagram of the experimental setup

The goals of the test are:

- Probable effective treatment to make the waste water pollutant free.
- To analyze various parameters of textile waste water by varying the pH (4,6,8).
- To check the efficiency of Stainless Steel used as electrodes in electrocoagulation process at different current densities.
- To evaluate removal rate and energy consumption in terms of various parameters COD ,TDS and Colour.

Experimental setup:

Electrocoagulation :

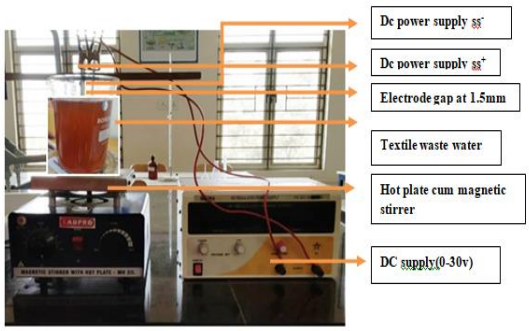

Fig 2:Electro- coagulation Reactor setup.

The Electrocoagulation process is carried out in the monopolar method by using the stainless steel electrode and by varing the voltage of 10V,20V,30V by using the Stainless steel as a anode and stainless steel as a cathod and the spacing between the electrode is maintained as 15cm. The samples were draw at the regular intervals and these samples were tested for COD, Color and TDS.After the one trial the electrode were rubbed in the sand paper and reused for next trial. The parameters considered for this study is voltage, material of electrode, Ph, contact time.

Fig:3 Shows the Raw Effluent, Treated Effluent and Settled Sludge

RESULTS AND DISCUSSION:

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The series of tests were conducted with the electrode gap of 1.5cm and the sampleas were drawn at the regular interval and its tested for COD, Color and TDS. Below is the results obtained.

PARAMETER	UNIT	STANDARD VALUES	FINAL VALUES
Ph	-	5.5-9	6.99
Colour	Hazen Units	Colorless	202
Turbidity	NTU	100	85
Total Dissolved Solids	mg / L	2100	2236
Total Suspended Solids	mg / L	< 30	675
Chloride as Cl	mg / L	1000	146
BOD	mg / L	< 30	1286
COD	mg / L	< 250	5600

Table:1 Shows the consequence of fundamental charcterstics of textile wastewater sample

Voltage	Time (min)	20	40	60	80	100
10 volts	pH	7.0	7.1	7.3	7.5	7.9
	TDS Removal (mg/lt)	1029	917	827	671	604
	%TDS Removal	54%	59%	63%	70%	73%
20 volts	pH	7.2	7.4	6.9	6.3	
	TDS Removal (mg/lt)	537	447	291	179	
	%TDS Removal	76%	80%	87%	92%	
30 volts	pH	5.9	7.1	9.9		
	TDS Removal (mg/lt)	224	201	156		
	%TDS Removal	90%	92%	93%		

Table 2: TDS Removal for different voltage and time

Voltage	Time (min)	20	40	60	80	100
10 volts	pH	7.0	7.1	7.3	7.5	7.9
	COD Removal (mg/lt)	2912	2128	1736	1344	1176
	%COD Removal	48%	62%	69%	76%	79%
20	pH	7.2	7.4	6.9	6.3	

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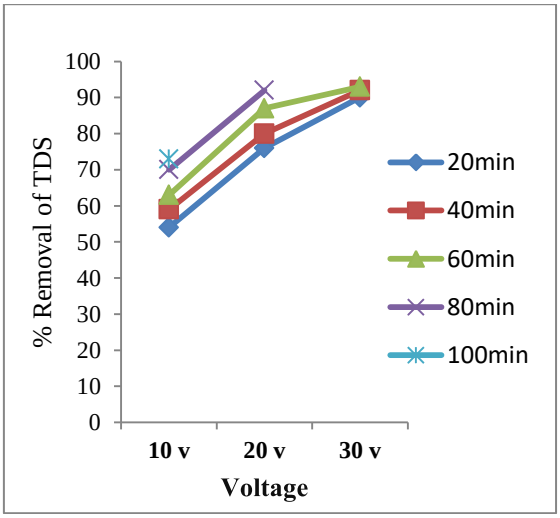
volts	COD Removal (mg/lt)	1512	1232	896	560	
	COD Removal	73%	78%	84%	90%	
30 volts	pH	5.9	7.1	9.9		
	COD Removal (mg/lt)	448	392	280		
	%COD Removal	92%	93%	9%		

Table 3: COD Removal for different voltage and time

Voltage	Time (min)	20	40	60	80	100
10 volts	pH	7.0	7.1	7.3	7.5	7.9
	Colour Removal (mg/lt)	99	91	77	65	54
	%Colour Removal	51%	55%	62%	68%	73%
20 volts	pH	7.2	7.4	6.9	6.3	
	Colour Removal (mg/lt)	73	67	50	30	
	%Colour Removal	64%	67%	75%	85%	
30 volts	pH	5.9	7.1	9.9		
	Colour Removal (mg/lt)	34	20	16		
	%Colour Removal	83%	90%	92%		

Table 4: Color Removal for different voltage and time



Graph 1: **TDS Removal for different voltage**

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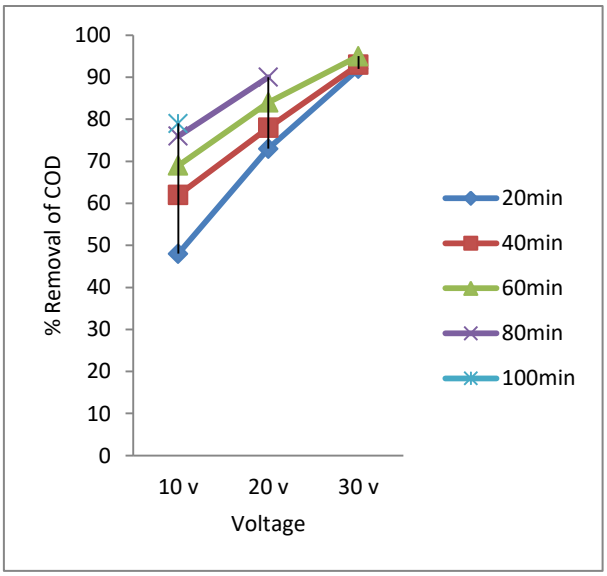
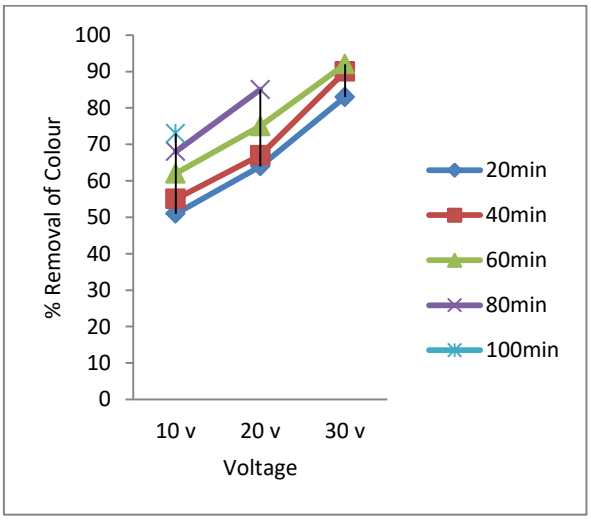
Above graph indicates voltage in x-axis and % removal of TDS in y-axis. In this graph the effluents are removed with best result of 93% efficiency. The graph also shows that as the voltage increases the removal efficiency of the effluent also increases.



Graph 2: **COD removal for different voltage**

indicates voltage in x-axis and % removal of COD in y-axis. In this graph the effluents are removed with best result of 95% efficiency. The graph also shows that as the voltage increases the removal efficiency of the effluent also increases.



Graph 3: **Color removal for different voltage**

Graph 3 indicates voltage in x-axis and % removal of colour in y-axis. In this graph the effluents are removed with the best result of 92% efficiency. The graph also shows that efficiency of the effluent also increases.

CONCLUSION:

Waste water from textile industry was processed by electrocoagluation process. The suspended solids were removed to the extent of 93% from its initial concentration 2236 mg/l by electrocoagulation. The initial COD of 5600 mg/l was reduced to 280 mg/l in the presence of SS electrodes. When electrodes are placed with an efficient distance of 1.5 cm, best removal efficiency was achieved. The optimum removal of TDS, COD and COLOUR was achieved during 30v for the time duration of 60min.

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