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TREATMENT OF DOMESTIC WASTEWATER BY ADVANCED METHOD OF ELECTRO COAGULATION

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Abstract - *Growing water scarcity in Pakistan is compelling people to use the treated wastewater at least for landscape irrigation and plantation to augment available water resources. In the present study, a laboratory scale electrocoagulation (EC) process was utilized to treat the raw wastewater in order to bring the quality up to the international wastewater reuse standards. However, raw wastewater is not suitable for direct. Since their various parameters (solids, turbidity, and pH) were above international standards. A laboratory scale EC process was utilized to treat the raw wastewater in order to bring the quality up to the required level.. Result shows that the quality of treated wastewater is safe for landscape irrigation and plantation.*

Keywords: Electrocoagulation, Wastewater, Removal efficiency, Operating parameters.

1. INTRODUCTION

Waste water is the main point-source pollutant on global scale. Waste water, on the one hand, normally contained of biological, chemical and physical composition which is usually high in Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD) and Suspended Solid (SS). So, direct discharge of raw or improper treated sewage into the water body is one of the main sources of pollution on a global scale. There are two main objectives of wastewater treatment, one is protecting the environment and the other one is conserving fresh water resources. Electrocoagulation-flotation is an alternative method to classic chemical coagulation for many reasons. ECF is capable of reducing the need for chemicals due to the fact that the electrodes provide the coagulant. However, many individuals still use chemical coagulants to attempt to enhance treatment. Traditionally, chemical coagulation involves the use of alum (aluminium sulphate), ferric chloride (FeCl3), or ferrous sulphate (Fe2SO4) which can be very expensive depending on the volume of water treated. When applying the coagulant, the coagulant performs a similar function as the electrodes, neutralizing the charge of the particulates, thereby allow them to agglomerate and settle at the bottom of the tank. In addition, electrocoagulation-flotation is capable of reducing waste production from wastewater treatment and also reduces the time necessary for treatment.

2. MATERIALS AND METHODOLOGY

2.1 Construction of experiment

We collected waste water from different sources (outlet water from waste water treatment plant, fountain water near n-cadd lab) Experiment needs of same metals (i.e. Aluminium). These are called **electrodes**. These rods given a constant supply of Dc current. Dc adapter is used for conversion the Ac voltage to Dc voltage. This experiment should be conducted in batch wise. Before going to start the experiment we have to test the sample with following parameters.

- Conductivity test
- Turbidity test
- pH value test

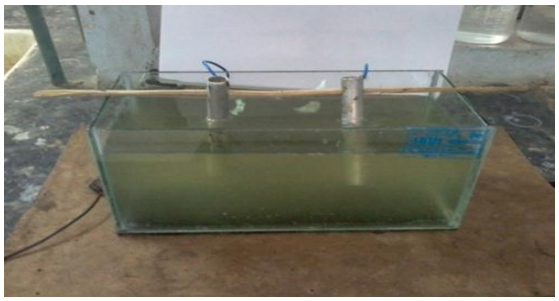

Fig 1: represents the block diagram of the electrocoagulation setup

2.2 Experimental Procedure Of electrocoagulation

In this experiment we are going to do purify the waste water by supplying the constant of dc voltage of 5volts. In a solution of waste water as sample is taken in a jar. This water can be treated by electro coagulation method. Water sample of 5 litre was collected and electrodes dipped into the sample. This experiment constant supply of dc voltage is applied, with varying contact time of 5, 10, 15, 20 minutes. Then this treated water is kept undisturbed for 20 minutes in order to allow the flocks are to settle. After the settling the flocks the water is filtered and tests are to be conducted with same parameters. This tests are to be conducted to know how much pollutant is removed from the samples.

2.3 Experimental procedure of Conventional method

In this method firstly we take different weights of alum like 2,4,6,8 grams are to be taken and mixed with samples of water. These jars are kept under the stirring experiment. Keep fast rotation of 2 minutes and slow rotation of 20 minutes kept for stirring. Then samples are kept aside to settle the sludge. Take sample in which more sludge is settled. Then conduct the tests with same parameters.

Fig 2 :Represents the mechanism of the electrocoagulation method

3. RESULTS AND DISCUSSIONS

3.1Characteristics of Raw Wastewater

Characteristics of the raw wastewater used in the experiments are presented. As observed, the average Conductivity, pH and Turbidity concentrations are at the medium strength side as compared to the characteristics of typical domestic wastewater (Metcalf & Eddy, 2003). The high value of TDS or electrical conductivity is advantageous to the EC treatment of wastewater since it will eliminate the need to add an electrolyte that is necessary to facilitate the passage of current in the wastewater solution.

3.1 Conductivity Test For 5 liters: Outlet from mineral water treatment plant

S.No	Time (mins)	Before treatment (ms/cm)	After treatment (ms/cm)
1	5	2.5	2.3
2	10	2.5	2.1
3	15	2.5	1.8
4	20	2.5	1.8

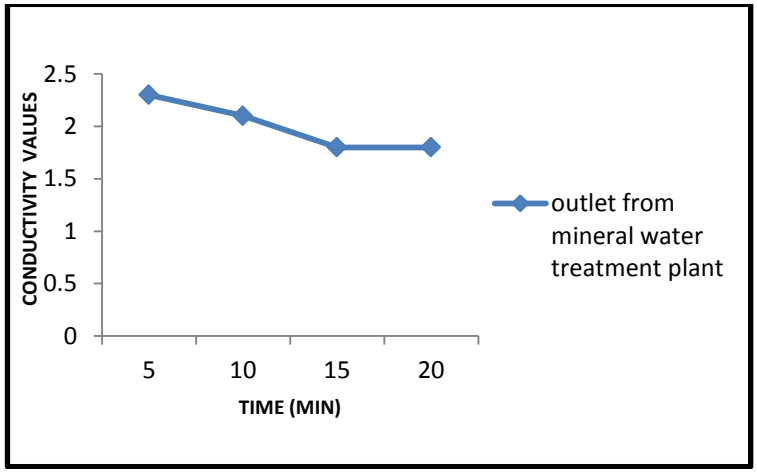

Fig 3: outlet from mineral water treatment plant by conductivity test

3.2 Turbidity Test for 5 liters : Outlet from mineral water treatment plant

S.No	Time (mins)	Before treatment (ms/cm)	After treatment (ms/cm)
1	5	29.7	38.8
2	10	29.7	40.4
3	15	29.7	45.2
4	20	29.7	58.8

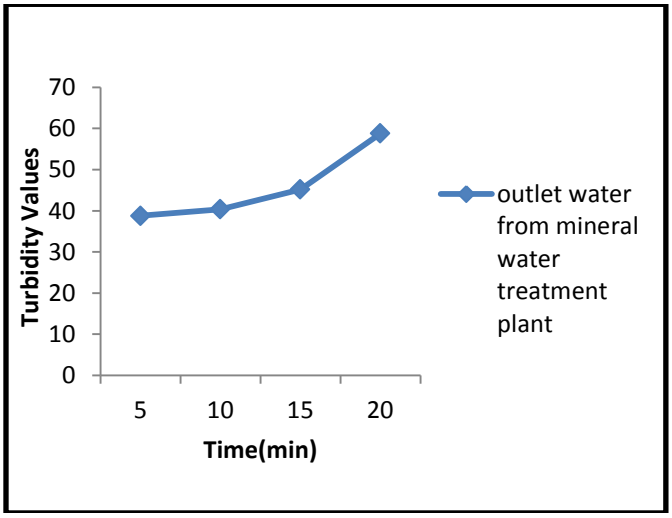

Fig 4: Outlet from mineral water treatment plant by turbidity test

3.3 pH value Test for 5 liters: Outlet from mineral water treatment plant

S.No	Time (mins)	Before treatment (ms/cm)	After treatment (ms/cm)
1	5	8.25	8.86
2	10	8.25	8.81
3	15	8.25	8.80
4	20	8.25	8.79

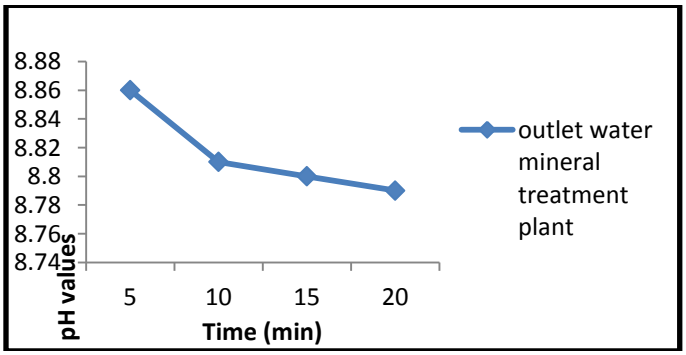

Fig 5: outlet from mineral water treatment plant by pH test

3.4 Results for Outlet Water from Mineral Water Treatment Plant

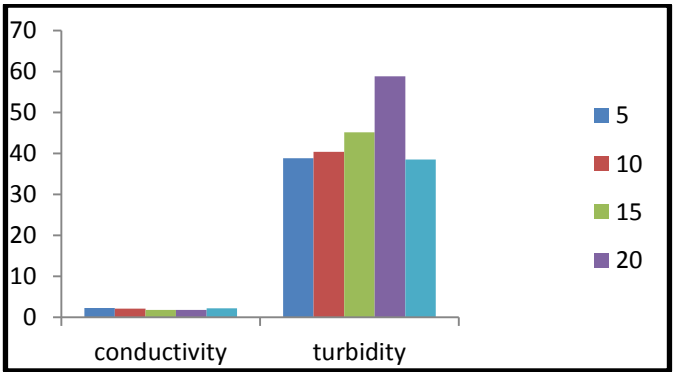

Fig 6: Outlet from mineral water treatment plant efficiency

4. CONCLUSION

In this study, electrocoagulation method in 20 minutes conductivity value is decreases and turbidity value is increases and pH value is also increases. From above graph electrocoagulation method is best method for removal of pollutant than conventional method. Still some experiments are needed to know why the turbidity values are increasing. Still some studies are needed to complete this experiment successfully. Electrocoagulation is a treatment process that is capable of being an effective treatment process as conventional methods such as chemical coagulation. Having observed trends over the last three years, it has been noted that electrocoagulation is capable of having high removal efficiencies of colour, chemical oxygen demand (COD), biochemical oxygen demand (BOD), and achieving a more efficient treatment processes quicker than traditional coagulation and inexpensive than other methods of treatment such as ultraviolet (UV) and ozone.

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