

An Experimental Investigation on Removal of Cod from Dairy Waste Water: A Case Study of Shimul Dairy, Shivamogga District

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ABSTRACT:The present research work carried to study about the experimental investigation on removal of COD from dairy waste water. Electro coagulation process is used to treatment of the Dairy waste water. For treatment of the sample the iron and Aluminium Electrodes were used. The study addresses the elimination of COD. This study has been conducted with the aim of optimizing the factors of affecting, the process of COD reduction or removal which includes contact time (0- 90 min), voltages (5, 10, 15v), electrodes gap (2.5cm). It is Observed that the removal efficiency is directly proportional to the electrode material, contact time and voltage and inversely proportional to electrode gaps. The maximum COD removal Efficiency achieved of 84.84%

KEY WORDS: Dairy waste water, Electro coagulation process, Removal of COD.

I. INTRODUCTION

Pollution is the introduction of harmful materials into the environment. These harmful materials are called pollutants. Pollutants can be natural, such as volcanic ash. They can also be created by human activity, such as trash or runoff produced by factories. Pollutants damage the quality of air, water, and land. Many things that are useful to people produce pollution. Cars spew pollutants from their exhaust pipes. Burning coal to create electricity pollutes the air. Industries and homes generate garbage and sewage that can pollute the land and water. Pesticides—chemical poisons used to kill weeds and insects—seep into waterways and harm wildlife. All living things—from one-celled microbes to blue whales—depend on Earth's supply of air and water. When these resources are polluted, all forms of life are threatened. Pollution is a global problem. Although urban areas

are usually more polluted than the countryside, pollution can spread to remote places where no people live. For example, pesticides and other chemicals have been found in the Antarctic ice sheet. In the middle of the northern Pacific Ocean, a huge collection of microscopic plastic particles forms what is known as the Great Pacific Garbage Patch.

Air and water currents carry pollution. Ocean currents and migrating fish carry marine pollutants far and wide. Winds can pick up radioactive material accidentally released from a nuclear reactor and scatter it around the world. Smoke from a factory in one country drifts into another country. Dairy cows and their manure produce greenhouse gas emissions which contribute to climate change. Poor handling of manure and fertilizers can degrade local water resources. And unsustainable dairyfarming and feed production can lead to the loss of ecologically important areas, such as prairies, wetlands, and forests.

II. STUDY AREA

Study area for present work is Shivamogga, Davanagere and Chitradurga Co-Operative Milk Producer's Societies Union Limited (SHIMUL) which is situated at Machenahalli, Shivamogga, Karnataka. SHIMUL dairies will manufacture milk products and Machenahalli plant at Shivamogga has total process capacity of 1.5 lakh litre per day and within its jurisdiction it markets other milk related products of KMF (Karnataka Milk Federation). After the screening unit at 0.4 MLDSHIMUL Effluent Treatment Plant (ETP) wastewater was Collected.

III. 3. METHODOLOGY

For the present study the SHIMUL treatment plant collected dairy waste water was

selected to treat by electro coagulation process. In this study, efficiency of COD removal in dairy wastewater is carried out.

3.1 Wastewater Characteristics

Dairy wastewater Characterization is takes place by following standard methods.

Table -1: IS codes for testing

Parameters	Test Methods
pH value at 25°C	IS:3025(Part-11)1983, Reaffirmed 2012
Biological Oxygen Demand	IS:3025(Part-44)1993, Reaffirmed 2014
Chemical Oxygen Demand	IS:3025(Part-58)2006, Reaffirmed 2012

3.2 Experimental setup

In present study the experimental work is carried out by using batch operation method. The setup includes in two mode of operation I.e., reactor and power supply.

- Reactor includes: 2 litre capacity of dairy effluent sample is transferred to beaker made up of fiber, two type of different materials used

as electrode i.e., Fe and Al electrodes which is immersed in the the beaker.

- Regulated DC supply is used to supply current to the electrodes kept in the beaker, and magnetic Stirrer instrument is used to stirring the effluent for treatment, as shown in below figure 3.1



Fig 3.1: Electro coagulation process

3.3 Variables consideration

In present work of research the consideration of variables is takesplace as listed below,

- Aluminum (Al) and Iron Electrodes used.
- The electrodes are placed in the reactor at a

distance of 2.5cm.

- Voltage given by DC supply of 5, 10, 15V
- Retention time of treatment: 30, 60 and 90 minutes.



Fig 3.2: Fe and Al Electrodes

IV. 4. RESULTS

4.1 Wastewater Characteristics

Effluent Characterization is carried; by following standard IS code methods. Table shows dairy wastewater characteristics results of fresh waste water.

Table -4.1: Characteristics of wastewater

Parameter	Value
Colour	White
pH	4.77
Total Suspended Solids	780 mg/l
Volatile Suspended Solids	665 mg/l
BOD	1970 mg/l
COD	2765 mg/l
Turbidity	1283 NTU
Temperature	30.4°C

4.1 Procedure adopted

The process used in the present study is electro coagulation process, initially the fresh stage of sample is tested using IS standard method and calculated the results and tabulated the results of characteristics of waste water in table 4.1. later the sample was runned in the electro coagulation process by giving 5, 10 and 15V voltages and

retention time of 30, 60 and 90 minutes and also final treated waste water characteristics were calculated and then the efficiency of each parameters were calculated using below formula and presented in below graphs.

$$\text{Efficiency (\%)} = \frac{\text{Final} - \text{Initial}}{\text{Initial}} \times 100$$

Table 4.1: parameters of treated water

Parameter	Value
Colour	Clear water
pH	7.08

Turbidity	263.9 NTU
Temperature	26.2°C
COD	336 mg/l

Table 4.2: Efficiency of each parameters

Parameter	Efficiency
pH	4.8%
Turbidity	79%
Temperature	13.8%
COD	84.84%

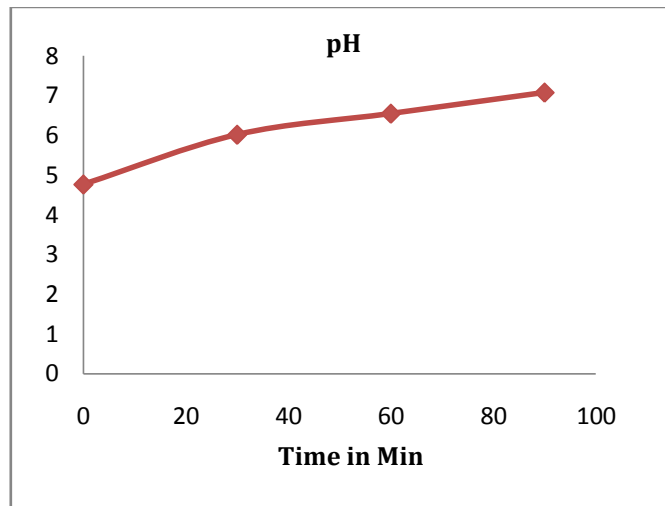


Fig 4.1: Graph of pH of effluent

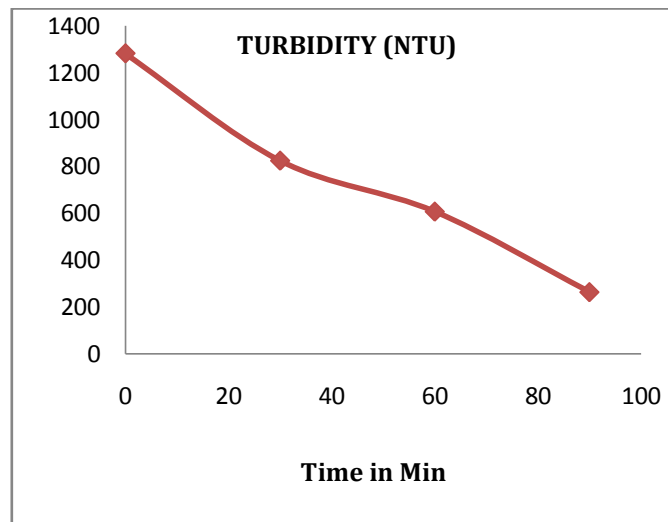


Fig 4.2: Graph of turbidity of effluent

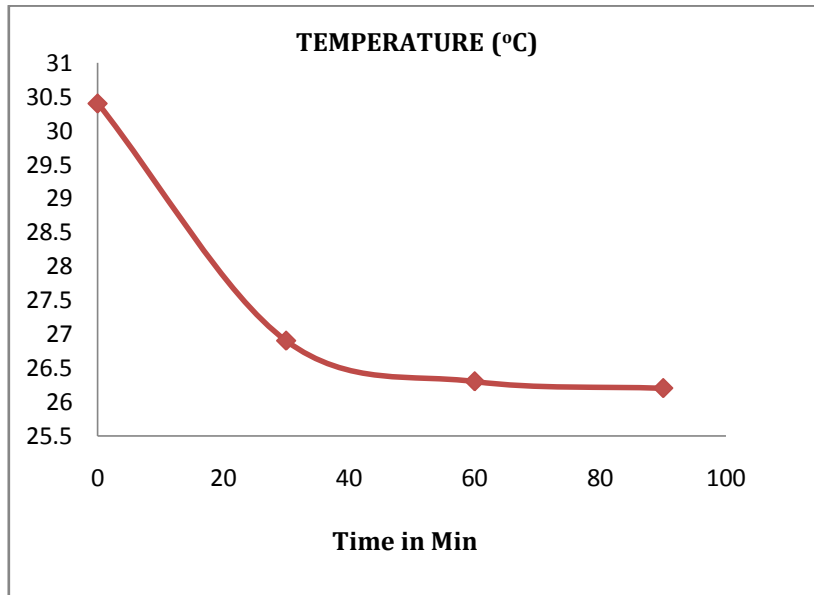


Fig 4.3: Graph of Temperature

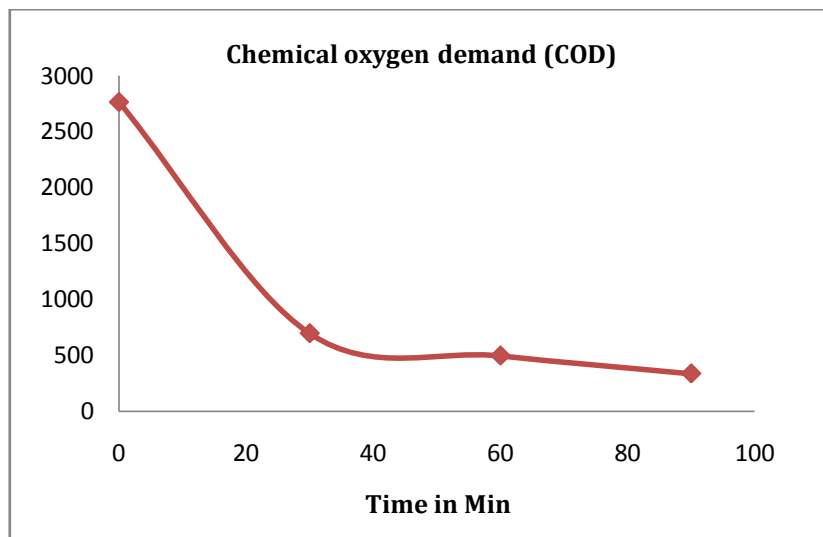


Fig 4.4: Graph of COD of effluent

V. CONCLUSION

The present research is focuses on the treatment of dairy waste water treatment by using the process called Electro coagulation process. The treatment process used is gives the results is very effective and can be adapted to dairy industry. In the research only plate electrodes are used which and simple, effective, low of cost and easily available in all locations. The installation of equipment is easy and less space required. The above results shows 84.84% efficiency removal of COD is takes place, also results shows turbidity removal efficiency 79.18%. from all the results concluded that electro coagulation process plays an very important role in treatment of dairy effluent.

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