

# Environment Audit: A Study and Performance of Waste Water from Industry

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## Abstract

The objective of this study is to investigate the parameter present in the petroleum wastewater. Here we brief detailed our work by using Standard Method to determine the parameters. Mainly petroleum industries and refineries contains organic matter and other compounds which are highly pollutants. The wastewater from petroleum refineries has more hazardous compounds, which affects the ecosystem if they are discharged into the environment. The treatment of this wastewater can be carried out by chemical and biological treatment processes.

**Keywords** — Petroleum waste water Treatment, Chemical treatment processes, hazardous compounds, Electro-coagulation, chemical oxygen demand, hardness, TSS and TDS.

## I. INTRODUCTION

Industrial wastewater treatment is important study area in environment engineering. In increase demand of energy it has been notice a high rise in petroleum industry and refineries. It seems that petroleum waste has highly pollutants organic matter and other compounds, which adversely affects the ecosystem if they are discharged into the environment. Here we have study and investigate the parameter which are present in the wastewater so that we can reduce or overcome the amount of pollutants and hazardous compounds and pollutants in wastewater consist of nitrogen, phosphorus, ammonia and iron chlorides which should be removed before discharge into environment. According to the CPCB there is environmental standards to discharge the wastewater parameters limit which are not harmful to the environment.

## II. METHODOLOGY

### A. Theory Performance

#### a) Chemical Oxygen Demand:

Chemical oxygen demand measures the amount of oxygen which is needed for the oxidation of all organic substances in water. here we have used standard method named Dichromate method. With this method we can determine COD during chromic acid digestion. it takes about 2 hours for oxidation.

### Calculation

$$\text{COD} = \frac{(A - B) * N * 8000}{\text{Sample Volume in ml}}$$

Sample Volume in ml

where ;

A = volume of standard FAS solution used in blank titration, in ml.

B = volume of standard FAS solution used in sample titration, in ml.

N = normality of standard FAS solution.



Fig 1: COD APPARATUS

#### b) Total Suspended Solids and Total Dissolved Solids:

**Total suspended solids:** Total suspended solids is the dry weight of suspended particles, that are not dissolved, in the sample of the water that can be trapped by a filter. here we have used the membrane filter assembly to determine the TSS.

**Total dissolved solids:** Total dissolved solids is a measure of the dissolved combined content of all inorganic and organic substances present in a liquid. It is referred to as parts per million.

Formula's to calculate TDS & TTS

$$\text{TDS} = \frac{(A1 - A2) * 106}{\text{ml of sample}}$$

$$\text{TSS} = \frac{(A - B) * 106}{\text{ml of sample}}$$

where;

A= weight of dried surface + filter paper

B = weight of empty filter paper

Membrane Filter Assembly: Membrane filters assembly is used to determine the amount of TSS and TDS in the waste water. the sample is passed through the assembly by funnel and with the vacuum system allow the liquid to draw completely through the filter . we have used What man filter paper 42 and after removing it from the assembly it has been put in oven to dried and the after weigh.

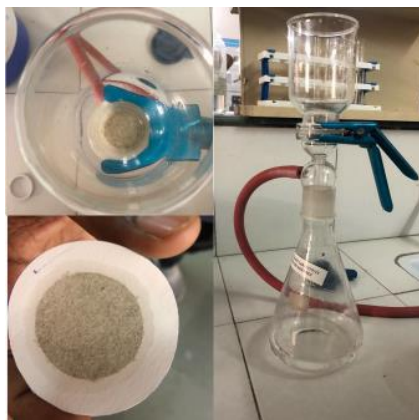


Fig 2: Membrane Filter Assembly

Hardness is basically amount of dissolved calcium and magnesium in the water. Here we have determine the hardness using Standard Method(EDTA Titrimetric Method).

Calculation

$$\text{Total Hardness mg/l} = \frac{(A-B) \cdot 1000 \cdot CF}{\text{Sample Volume}}$$

where;

A= volume of standard EDTA solution used in ml.

B= volume of standard EDTA solution used in ml.

CF=Correction Factor for EDTA.

EDTA = Ethylenediaminetetra acetic acid.



- Hardness by EDTA Method -

Fig 3: Performance by EDTA Method

### III. TREATMENT TECHNIQUES

#### A. Electrocoagulation:

Electrocoagulation is an effective method for waste water treatment. The basic electrocoagulation unit consist of an electrolyte cell

with an anode and cathode metal electrodes which are connected to a DC power source, an immerse in the solution to be treated. Irons and aluminium electrodes are the most extensively used metals for electrocoagulation. Waste water generated from petroleum refinery and petroleum industry usually contains high level of aromatic and aliphatic hydrocarbons, chemicals, COD.

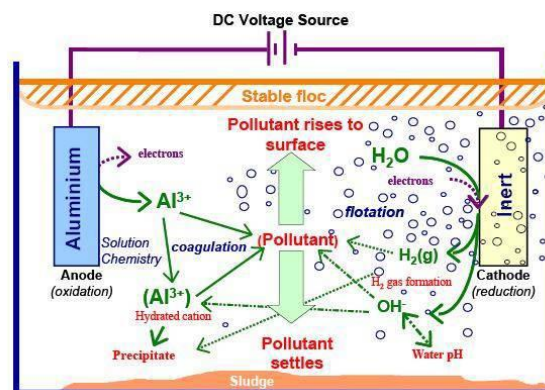


Fig 4: Electrocoagulation

The utilization of aluminium, as anode and cathode, in batch electrocoagulation experiment seems reduction of COD and sulphate from petroleum wastewater.

#### B. Chemical Treatment:

Chemical coagulation process is a pre-treatment which is used before biological and membrane treatment. It is also used in order to reduce non biodegradable organic matter. Flocculation is another process which is used to reduce the turbidity and other process parameters. Hardness is reduce by using alum in chemical treatment.



Fig 5: Chemical Coagulation

### II. RESULT AND DISCUSSION

By research , as per government norms the parameter investigate according to the standard method has more amount of organic matter and other compounds which are toxic and harmful. Thus as shown in the Table1 by using Chemical Electrocoagulation and Membrane separation techniques we can overcome the parameter.

TABLE I

Sr No	Sample Test	Before Treatment (mg/l)	After treatment (mg/l)	Techniques	CPCB (mg/l)
01	COD	1800	1000	Electrocoagulation	250
02	Hardness	1229.76	700	By using alum Chemical treatment	180
03	TDS	3830	2954	Membrane separation	2100

### III. CONCLUSIONS

The wastewater from petroleum was treated to find the parameter like COD, TSS, TDS, Hardness by Standard Method and overcome the parameter by Chemical and Membrane techniques which can be used as small and big industry for waste water treatment. The wastewater from petroleum industries has hazardous compounds which adversely affects the ecosystem if they are discharged into environment.

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