COMMON EFFLUENT TREATMENT PLANT
OF
WALUJ MIDC, WALUJ, AURANGABAD

A

DISSERTATION

Submitted in the partial fulfilment for the degree of

Master of Science

In

ENVIRONMENTAL SCIENCE

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CERTIFICATE

This is to certify that ***Mr. Bimlesh Kumar S/o Shri Ram Gopal Lal*** *has conducted his M.Sc Dissertation work titled* ***“**COMMON EFFLUENT TREATMENT PLANT STUDY REPORT***”*** *under my supervision. This dissertation is being submitted to fulfill the partial requirement of the degree of M.Sc. Environmental Science.*

Date:

Location: Jaipur

Sharma

(Dr. Prerna Sharma)

DECLARATION

*This is to certify that dissertation entitled, "*COMMON EFFLUENT TREATMENT PLANT STUDY REPORT*" submitted by me in partial fulfill for the award of the degree of M.Sc. (Environmental Science) of Department of Environmental science, St. Wilfred's P.G. College Jaipur (Rajasthan) is a record of the original work carried out by me. The matter embodied in this dissertation has not been submitted for the award of any other degree or diploma.*

Date

Location: Jaipur

(Mr. Bimlesh Kumar)

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INDEX

INTRODUCTION

Water is the largest common liquid of the Earth, very important to all life forms. It is dispersion medium for all biological or biochemical reactions of the living process. Wickedness of chemical cleanness the water molecule & its physical properties are quite remarkable that is one might say weird! And been major research topic from many years.

Much mor experiments give great approaching into the structure and dynamics of water, but these often require the resources of a major research laboratory. In addition, some must take place under extreme conditions, such as those leading to superheated or super cooled water. Water is an essential nutrient and is a vital component of every cell, tissue, and organ in the body. Water is the most abundant compound in the human body and makes up about 70% - 75% of body weight at birth, dropping to about 61% - 65% by 12 months, similar to the adult percentage.

Water is one of the most amazing compound in nature, consists of two common elements, Hydrogen (H2) and Oxygen. It is un-dispensable for life, both for plants and animals. It acts as a solvent for many more compounds than any other liquid providing balance and nutrients which support life.

Water has many uses and since everybody uses it, a study of water from different aspects becomes important. The consideration of efficient utilization of the available water resources needs maximum emphasis.

There is need to give serious consideration which making decisions relating to water management in future.

Water pollution is a major problem at all levels or global level (international down to individual aquifers and wells). It has been suggested that it is the leading worldwide cause of deaths and diseases, and that it accounts for the deaths due to water pollution are about m more than 14,000 people per day.

All of Earth's water not sits on its surface, however. A huge deal of water is held in underground rock structures known as aquifers, which we cannot see and seldom think about. Stored water underground in aquifers is known as groundwater.

Aquifers supply our rivers and supply much of our drinking water. They too can become polluted, for example, when weed killers / weedicide / herbicide used in gardens & f time the surface water pollution occurred also the remaining weed killer / weedicide / herbicide drain on land that may occurred water pollution during water runoff.

Groundwater pollution is much less obvious than surface-water pollution but is not a big pollution or less pollution issue. In 1996, a study in Iowa in the United States found that over half the state's groundwater wells were contaminated with weed killers / Weedicide / herbicide

Groundwater & Surface water are the two types of water resources that pollution affects. There are also two different ways In which pollution can occur, mentioned as below.

1) Point source pollution - If the water pollution comes from a single location, such as a Industrial effluent discharge pipe attached to any rivers or point-source pollution. Some other examples the point source pollution include an oil spill from a oil tanker, or a discharge from a factory stack (factory chimney), or some pouring oil from their car down a drain.

2) Non point water pollution - A great deal of water pollution happens not from one single source but from many different scattered sources. This is called nonpoint-source pollution.

How do we know when water is polluted?

There are two focal ways of measuring the quality of water. One is to take samples of the water and measure the concentrations of different chemicals forms value (pH , COD, BOD, TSS, TDS, SULPHATE, CHLORIDES, PHOSPHATES, HEAVY METALS Etc.). If the chemicals concentration are exceeded Pollution Control Board (PCB) norms or its harm to hying & non-living things that water called as polluted water.

Other one way to measure water quality which involves examining the survival of fish, insects, and other invertebrates in the water. If many different types of creatures can live in a river, the quality is likely to be very good; if the river have not able to survive fish life or aquatic life, that water obviously much poorer & called as Polluted water.

Causes of Water pollution:

- Waste from industries.
- Waste from agriculture.
- Waste from households' activity.
- Waste from hotels, hospitals etc.
- Waste from Institutes, school & colleges.

Why the treatment is needed?

- To avoid pollution problems such as
  - Water Pollution
  - Soil Pollution
  - Air Pollution
- To Save Natural resources of Water by recycling Treated Effluent.
- To save Aquatic life.

We are focus on waste which is coming from different industries. Now a day's industrial waste is the major problem facing all over the India & so many small scale or large scale Industries not able to achieve zero liquid discharge

Zero Liquid Discharge means the Different types of Industries generated different type of effluent & same effluent volume 100 % recycled & reuse after treatment in same factory called as Zero Liquid Discharge

Different industries like as Distilleries, Beverages, Textile, chemical, food, pharmaceuticals, automobile & many other the waste are generated in huge quantity. The generated waste or effluent should be treated first to avoid the pollution problem.

Due to inadequate treatment of Effluent in Individual factory that may have many reasons like as lack of treatment facility, lack of required area for treatment facility or lack of fund to ZLD………etc. The Pollution Control Board introduced to Common Effluent Treatment Facility known as CETP.

On this topic we have set goals, objective & collected data & concluded conclusions & suggested additional scope to full-flagged treatment facility'

Image of water pollution:

REVIEW OF LITERATURE

1) Wastewater Engineering: Treatment, Disposal and Reuse — METCALF AND EDDY

2) Chemical Methods for Nitrification Control ---Young .J.C.

3) Sewage and Sewage disposal ---Metcalf and Eddy

4) Wastewater Treatment Design --- Water pollution control Federation.

5) Principles of Gas Adsorption --- Lewis. W.K. and W.C. Whitman.

6) Water and Wastewater Engineering ---Fair. G.M., J.C. Geyer; and D.A. Okun

7) Kinetics of Methane Fermentation in Anaerobic Treatment --- Lawrence. A.W. and P.L.

8) Anaerobic Waste Treatment --- Mc. Carty. P.L

Material & Methods

INTRODUCTION OF SMS WALUJ CETP PVT LTD., WALUJ, AURANGABAD.

Waluj industrial area located near Aurangabad city 12- 15 KM away from Aurangabad CENTRAL BUS STAND as well as Aurangabad RAILWAY STATION.

This Area is one highly grown industrial area of Maharashtra Industrial Development Corporation. In this area many large, medium and small-scale industries and export-oriented units available

As a part of National Environmental Policy and to abet industrial pollution, it is proposed to set up common effluent treatment plant (CETP) by Maharashtra Industrial Development Corporation (MIDC) and Maharashtra Pollution Control Board (MPCB).

The CETP Design, construction, installation, commissioning and operation and maintenance are entrusted to SMS Infrastructure Ltd., Nagpur on BOOT basis for 17 years. This CETP have capacity is 10 MLD, which is treated or untreated effluent from various Industries located in Waluj MIDC area.

Objectives: -

1) The main objective of this project is to reduce the treatment cost for individual units while protecting the environment.

2) To achieve 'Economics of scale' in waste treatment, thereby reducing the cost of pollution abatement for individual factory.

3) To minimize the problem of lack of technical assistance and trained personnel as fewer plants require fewer people.

4) To solve the problem of lack of space as the centralized facility can be planned in advance to ensure that adequate space is available,

5) To reduce the problems of monitoring for the pollution control boards

6) To organize the disposal of treated wastes and sludge and to improve the recycling and reuse possibilities.

Common Effluent Treatment Plant (CETP)

Common Effluent Treatment Plant concept is for treating effluents by means of a collective effort mainly for a collect of small-scale industrial units. This concept is similar to the concept of Municipal Corporation Sewage Treatment Plants.

The MoEF (Ministry of Environment & Forest), Govt. of India has launched the centrally sponsored scheme, namely, Common Effluent Treatment Plant (CETP) in order to make a co-operative movement of pollution control specially to treat the effluent, emanating from the clusters of compatible Small-Scale Industries.

The proposal for set up of CETP's by such industries is to be submitted by the CETP relationship to the respective State Pollution Control Board, which after examining the proposal and obtaining commitment from the concerned State Government regarding its contribution will give their recommendation to the Ministry of Environment & Forests for consideration , the Ministry examines the proposal and takes the conclusion through a Screening Committee constituted in this regard for providing sustain from the Central Government.

We have selected M/s Waluj CETP Pvt. Ltd for this project located at Waluj, Aurangabad.

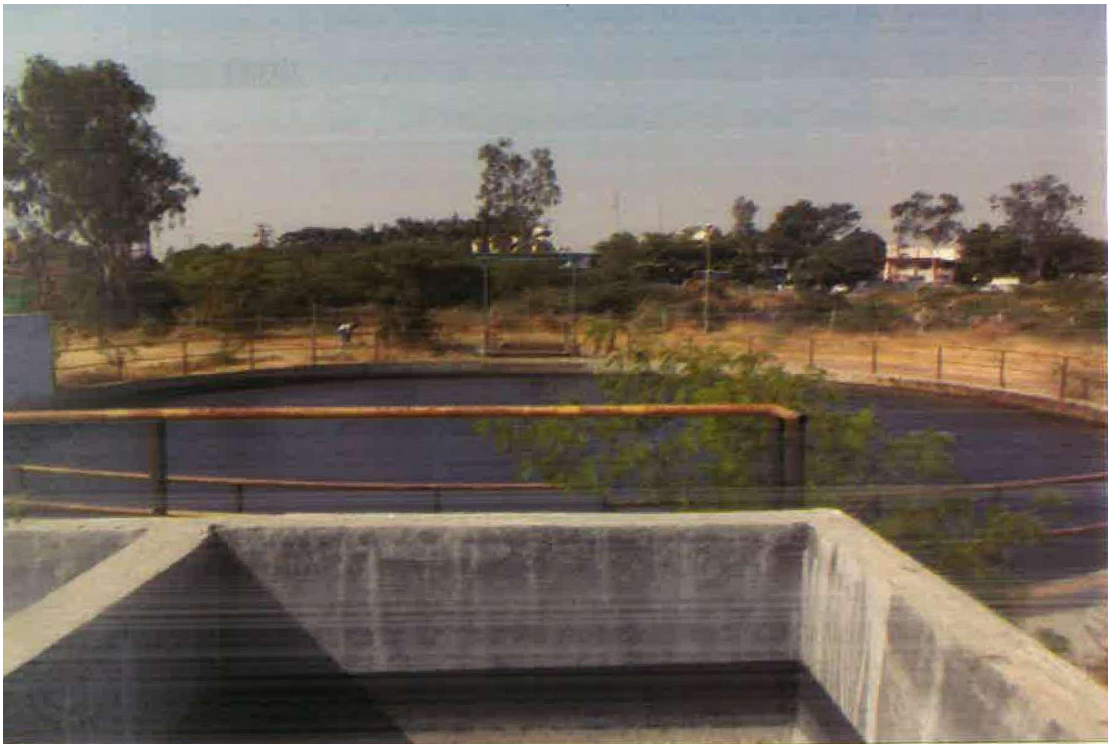
Entrance of M/s SMS WALUJ CETP PVT LTD.

Design Units

Waluj CETP Pvt. Ltd plant consist many major units for processing of treatment in series. The Effluent water passed through one by one chamber or treatment technology mentioned as below.

1) Effluent collection tank
2) Equalization tank
3) Chemical dosing tank
4) Treatment platform
5) Primary clarifier
6) Primary sludge sump
7) Aeration tank
8) Secondary clarifier
9) Secondary clarifier sump
10) Filter Press
11) Intermediate storage tank
12) Pressure Sand Filter (PSF)
13) Activated Carbon Filter (ACF)
14) Final tank or Treated Effluent storage tank

Effluent Collection Tank



The Incoming effluent or waste water from different types of industries received in this collection tank.

It is having arrangement of screen chamber as well as grit chamber.

Provision of screen chamber is to remove floating solid waste like as paper, Poly bag, wooden chips…….Etc

Provision of Grit Chamber is to remove coarse grit or small particles of stone, other floating foreign impurities as well as any suspended larger particles which can damage internal parts of pump and other rotating equipment.

Equalization tank

For the successful plant operation, it is very essential to have uniform or even or homogenized quality effluent available to feed for treatment facility.

Equalization tank is provided to take care of variation in effluent quality and quantity. Equalization tank is provided with minimum 8 hours hydraulic retention time.

Equalization tank will also be provided with floating type submerged mixer for complete mixing of Effluent. Complete mixing will also help to avoid settlement of suspended particles in equalization tank bottom which in long turn reduces tank operating condition and develop septic condition at the bottom of equalization tank.

Chemical Dosing tanks

In these tanks the required solutions are prepared & stock for dosing purpose.

With the help of Dosing pump set optimum level dose & maintain pH Level 8.5 — 9.5 as well as solid separation.

The three different solutions prepared, which are as follows-

- **A)** Fecl3 (ferric chloride)
- **B)** Lime
- **C)** Poly (7SF & 4SF)

Effluent from feed sump transfer to Flash mixers two no in series namely Flash mixer 01 & Flash mixer 02, required neutralization is provided in flash mixer by lime dosing. The pH of neutralized effluent in the range of 8.5 - 9.5. After pH adjustment the effluent is transfer from flash mixer to Flocculator along with ferric chloride dosing for coagulation/flocculation & observed the solid separation or flocks' formation.

3) Treatment platform

The effluent coming from equalization tank is treated here by dosing them this platform consists of four chambers & automatic pH meters.

A) Inlet

Through the inlet the effluent is brought to the platform.

B) Lime dosing chamber

In this chamber lime solution mixed with the effluent & with the help of mixer slurry or solution homogenized also mixed with effluent.

C) Fecl3 Dosing chamber

In this chamber the FeCI3 solution is mixed with effluent & homogenized with the help of mixer.

D) Poly dosing chamber

Poly dosing provided in this chamber, which is role as coagulation flocculation, with the help of Poly dosing the solid separation or sludge generation occurred.

Primary Clarifier

Primary Clarifier is the conical shape at bottom to settle down the sludge & even lauder is provided for supernent overflow of effluent.

The size of Clarifier is as below :

DIA: 22 meters

Depth: 03 meter

Capacity: 1140 m3

Equalized or homogenized effluent from Equalization tank is transferred with the help of effluent feed pump for physico Chemical treatment. physico chemical treatment plant will consist to treatment of raw effluent using chemical and flocculants.

With the help of Chemicals or coagulant Flocculant the precipitation occurred & separation of solid as well as liquid observed, separated solids are settled down by gravity to the bottom of clarifier known as sludge & this is drained out by pump and transfer to sludge collection sump for further treatment. The overflow of Clarifier is superenent form & is transfer to feed sump for further treatment.

5) Primary sludge sump

The size of Sump is as be-low

5m X 5m X 2.5m + 0.5 Feet board.

Capacity: 62 m3

The sludge is collected from Clarifier bottom & sent to Filter press for further treatment.

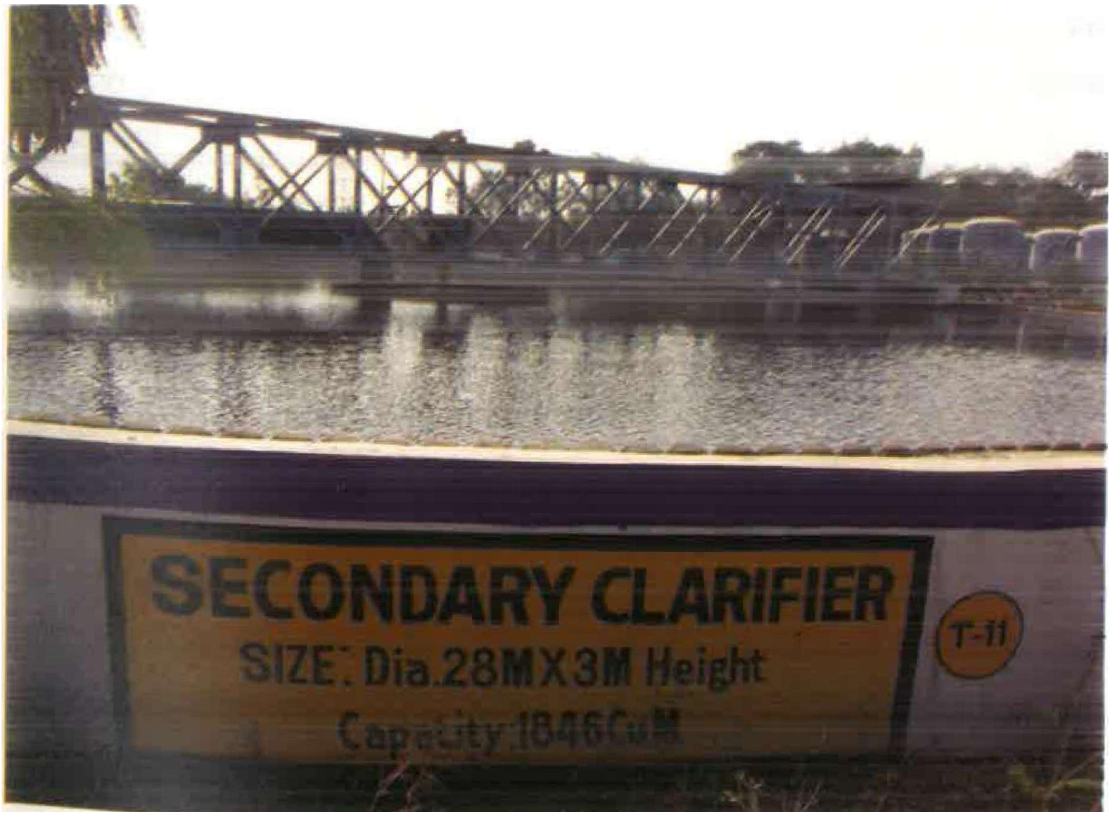
Aeration tank

After the removal of sludge, the effluent, water is brought in aeration tank. Here only, the biological treatment happed in this tank.

In this aeration tank compressed air continuously provided to the survival of bacteria or maintains DO levels of Aeration tank, Also the Nutrients are provided in this tank like as DAP & Urea as well as Folic acids. The Bacteria degrade the organic load which is present in Effluent known as COD & BOD values. This process also known as Activated sludge process i.e. Organic load reduced by bacterial colonies in presence dissolved oxygen, DO shall be maintain in 1.0 to 3.0 ppm range.

For maintaining DO the Air blower are used viz (BL-1 A/B/C) Air blower air passed through non —clog type membrane diffuser in tank to achieve higher rate of oxygen transfer efficiency. The MLSS (Mixed liquor suspended solids) are maintain is 3500 ppm (+- 1000 ppm)The MLSS are called as Bacterial colonies & it have microorganism which consumed the organic load. The outlet or overflow of aeration tank is taken into secondary clarifier(T-11) for the separation of microorganism / sludge's from effluent.

Secondary clarifier tank



The secondary clarifier design & shape is similar as primary clarifier , size of secondary clarifier is as below.

Dia: 28 meter

Depth : 03 meter Capacity: 1846 m3

In this Clarifier the incoming microorganism or sludge settled down to bottom of clarifier, the same procedure takes place as in primary clarifier tank. The sludge is drained out in sludge collection sump & recycle in same aeration tank to maintain MLSS level in aeration tank i.e. 3500 ppm (+-1000 ppm) The excess sludge is transfer to Filter press for further treatment.

8) <u>Secondary sludge sump</u>

The secondary Sludge sump size given as below.

3m X 3m X 5.3 height + 0.4 m free board.

Capacity : 48 m3

In this sump the sludge of secondary clarifier is collected & recycle to aeration tank to maintain MLSS level which is mentioned in aeration tank description & excess sludge drained out & transfer to Filter press for further treatment.

9) Filter Press / Filter press shed

The sludge coming the primary & secondary sludge sump with the help of sludge pump is compressed here with the help of compressed machine.

To avoid chocking the pump air is provided for homogenization of sludge at a regular time interval & the sludge is released from compressor. The compressor machine is opened once in 24 hrs the compressed sludge is then collected & sent to Common Hazardous Waste Treatment Storage and Disposal Facility (The name of CHWTSDF is MEPL i.e. Maharashtra Enviro Power Ltd. Shirur) for disposal.

10) <u>Intermediate storage tank</u>

The effluent water coming from the secondary clarifier tank is only stored here .

Size and capacity of this tank is- Size <u>Dia21 m X 2.3m height + 0.5 m</u>

Capacity-796 m

11) Pump house

The water is pumped upside from the intermediate storage tank with the help, of pump house, sent to PSF & ACF.

12) PSF & ACF

PSF (Pressure sand filter)-

It consists of six tanks. The effluent water tank is filtered here. If the effluent contains solid particles like sand, pebble or etc. it gets filtered here then the effluent is sent to ACF.

ACF (Activated carbon filter)-

The ACF also contains of six tanks, they are activated carbon present in these tank, which filter the effluent. Then the effluent water from this on it, is sent to final tank**.**

Treated Effluent Storage Tank

The treated effluent storage tank consists of a mechanism at its center & an auto pH meter.

The treated effluent water coming from PSF & ACF is stored 7 rotated in this tank, with the help of mixer to remove the odour & colour of effluent. then, finally, the water is completely treated & released to Kham River from effluent storage tank for reuse purpose.

Laboratory Analysis

- pH –

pH is measured by pH meter using a glass electrode which generates a potential varying linearly with the pH of the solution in which it is immersed. It is a Nernstain concentration cell with potential controlled by the activities of H+ on either side of a very thin glass membrane. The latter is the bottom part of a bulb at the end of a glass tube containing a reference solution of a+H

$$E = \text{Constant} + RT/nF\ \text{In}\ a+H\ (\text{sample})/a+H\ (\text{standard})$$

$$= \text{constant} + 0.058\ \text{pH at } 200C$$

A calomel or Ag/AgCl/KCI reference electrode is habitually located around the glass electrode stop for sample operation.

Interfering factors:

At pH values above 10, so-called alkali errors may occur. In such cases, the use of an alkali resistant electrode is recommended. Changes in glass structure can occur in older electrodes, so that errors may appear when measuring in weakly buffered waters. In such cases, the electrode should be renewed.

The sensitivity can be reduced by the presence of oil in the samples. Measurement errors in oil-containing waters may be prevented by washing the electrode before each measurement using soap or detergent followed by water, dilute hydrochloric acid and finally with more water.

- **Procedure:**

Calibrate the electrodes with two standard buffer solutions of pH 4.0 and 9.2.(A buffer solution is a solution offering resistance to change in pH and whose pH value is known)

The sample temperature is determined at the same time and is entered into the meter to allow for a temperature correction

Rinse the electrodes thoroughly with demonized water and carefully wipe with tissue paper.

Dip the electrode in to the sample solution, swirl the solution and wait upto one minute for steady reading. A pH meter reading within ± 0.1 pH until will be adequate for such work.

The reading is taken after the indicated value remains constant for about a minute.

- **Environmental Significance:**

pH (6.5 to 8.5) has no direct adverse effect on health however a lower value below 4 will produce sour taste and higher value above 8.5 a bitter taste.

Upper values of pH accelerate the scale formation in water heating apparatus and also reduce the germicidal potential of chlorine. High pH induces the formation of trithalomethanes, which are causing cancer in human beings.

pH below 6.0 - 6.5 start corrosion in pipes, thereby releasing toxic metals such as Zn, Pb, Cd and Cu etc. According to BIS, water for domestic consumption should have a pH between 6.5 to 8.5.

- **Total Solids**

Principle

Total solids are determined as the residue after evaporation and drying of the unfiltered sample.

Apparatus

1) Evaporating dishes (Pyrex, porcelain or platinum)
2) Oven
3) Desiccator
4) Water bath

Procedure

A clean porcelain dish is ignited in muffle furnace and after partial cooing in the air; it is cooled in a desiccator and weighed.

A 100 ml of well-mixed sample (graduated cylinder is rinsed to ensure transfer of all suspend matter) is placed in the dish and evaporated at 1000C on water bath, followed by drying in oven at 2030C for 1 hour. Dry to a constant weight at 1030C, cool in a desiccator and weigh.

Calculations

Total solids (mg/lit) = (A — B) X 1000 / V

A = Final or last weight of the dish in mg

B = Initial or First weight of the dish in mg

V = Volume of sample taken in ml

Application of total solids data in Environmental Engineering Practice:

Total solids determination is used to evaluate the suitability of potential supply of water for various purpose.

In cases, in which water softening is needed, the type of softening procedure used may be dictated by the total solids content.

Corrosion control is periodically accomplished by the production of stabilized water molecules through pH adjustment.

The present as well as the alkalinity and temperature.

- Total Dissolved Solids

Principle

Total dissolved solids are determined as the residue left after evaporation and drying of the filtered sample.

Apparatus

1) Evaporating dishes
2) Oven
3) Desiccator
4) Whatman filter paper
5) Water bath

Procedure:

A clean porcelain dish is ignited in a muffle furnace and after partial cooing in the air, it is cooled in a desiccator and weighed.

A 100-m1 of filtered sample is paced in the dish and evaporated at 1000C on water bath , followed by drying in oven at 1030 C for one hour.

Dry to a constant weight at 1030C, cool in a desiccator and weigh

Calculations:

TDS mg/lit. = (A — B) X 1000 / V

A = Final or Last weight of the dish in mg.

B = Initial or First weight of the dish in mg.

V = Volume of sample taken in ml.

Environmental significance of dissolved solids determination:

Many dissolved substances are undesirable in water. Dissolved minerals, gases and organic constituents may generate aesthetically displeasing colour, taste and odour.

Some dissolved organic chemicals or compound may deplete the dissolved oxygen in the receiving waters and some may be inert in biological oxidation, yet others have been identified as carcinogens.

Water with higher solids content often has a laxative and sometimes the reverse effect upon people whose bodies are not adjusted to them.

High concentration of dissolved solids about 3000mg/lit may also produce distress in livestock

In industries, utilization of water with higher concentration of dissolved solids may load to scaling in boilers, Corrosion and reduced quality of the product.

- Total Suspended Solids or Mixed Liquor Suspended Solids

Principle:

Total Suspended Solids are determined as the residue left on gooch crucible or a glass fibre filter after drying in oven.

Apparatus:

1) Gooch crucible / glass fibre filter
2) High Vacuum pump
3) Desiccator

Procedure:

A clean gooch crucible is ignited in a muffle furnace and after partial cooling in the air, cool in a desiccator and weigh (WI)

Pour 100m1 of well mix sample on gooch crucible or glass fibber filter, which is kept on filter flask, and apply vacuum.

Wash the gooch crucible with 100 ml of distilled water to remove all soluble salts.

Carefully remove the glass fibre filter paper or gooch crucible and dry in an oven at 1050C for one hour.

Cool in a desiccator and weigh (W2)

Ignite gooch crucible in a muffle furnace at 6000C for 15 — 20 minutes.

Cool the crucible partially in air until most of heat has been dissipated and then in a desiccator and record final weigh (W3).

Calculation.

Total Suspended Solids (mg/lit.) = (W2 — W3) X 1000 / ml of sample taken

Total volatile Solids (mg/lit.) = (W2 — W3) X 1000 / ml of sample taken.

W1, W2, W3 are recorded weights in mg.

Environmental significance of suspended solids determination:

Suspended material may be unpleasant in water for several reasons. It is aesthetically poor & provides adsorption sites for chemical as well as biological agents.

Suspended organic biomass or solid, which are degraded an aerobically & it may release obnoxious odors.

Biological sludge or active biomass solids may include disease causing organisms as well as organisms such as toxin producing strains of algae.

Application of total suspended solids data in Environmental Engineering Practice:

The suspended solids parameter is used to measure the quality of the wastewater influent and effluent.

The suspended solids determination is extremey valuable in the analysis of polluted waters.

It is used to evaluate strength of domestic wastewater.

It is used to determine the efficiency of treatment units.

- **ACIDITY**

Principle:

The mineral acids present in the sample which are contributing mineral acidity can be calculated by titrating or neutralizing samples with strong base NaOH to pH 4.3.

The CO2 and bicarbonates (Carbonic acid) present and contribute CO2 acidity in the sample can be neutralized completely by continuing the titration to pH 8.2.

Interference:

Colour, turbidity, iron, aluminum or manganese and residual chlorine are prime sources of interference. Colour and turbidity can be avoided using potentiometric titrations.

Residual chlorine can be removed by adding sodium thiosuiphate. from, aluminum and manganese are prevented by the addition of Na-K tartrate.

Apparatus:

1) Burette

2) Conical flask

3) pH — meter

4) Pipettes.

Reagents:

1) Standard sodium hydroxide 90.02N)
2) Phenolphthalein indicator
3) Methyl orange indicator
4) Sodium thiosulphate (0.1N)
5) Carbon dioxide free distilled water.

Procedure:

Take 100m1 of the given sample in an Erlenmeyer flask.

Add 1 drop of 0.1 N sodium thiosulphate solution to remove the residual chlorine if present.

Add 2 drops of Methyl orange.

The sample turns pink

Proceed with titration until the colour changes to yellow

Note down the volume of the NaOH added (V1)

Take another conical flask containing 100m1 of water sample, add 2 or 3 drops of phenolphthalein.

Proceed with titration until the sample turns pink.

Note down the total volume of NaOH added (V2).

Calculation:

Mineral acidity due to mineral acids (as $CaCO_3$) mg/lit

= V1 X 1000 / ml of sample taken

CO_2 acidity due to CO_2 (as $CaCO_3$) mg/lit

=V2 X 1000 / ml of sample taken

Mineral acidity 9mg/lit) = CO_2 acidity =

Total Acidity as ($CaCO_3$) = Mineral acidity + CO_2 acidity.

Environmental significance of Carbon dioxide and mineral acidity:

Acidity interferes in the treatment of water (as in softening).

It corrodes pipes (zinc coating of G.I. pipes get dissolved).

Aquatic life will be affected.

pH is critical factor for biochemical reaction. The favorable pH is 6.8 to 7.5

Waters contain mineral acidity are so unpalatable.

Waters having acidity more than 50 mg/lit. Cannot be used in R.C.C. works.

Application of acidity data in Environmental Engineering practice:

The amount of CO_2 present is an important factor in determining whether removal by aeration of simple neutralization with lime or sodium hydroxide will be chosen as the treatment method.

The size of equipment, chemical requirement, storage space and cost of treatment depend upon amount CO_2 present.

CO_2 is an important consideration in estimating chemical requirements for lime or lime soda-ash softening processes.

Most industrial wastes containing mineral acidity must be neutralized before they are subjected to biological treatment or direct discharge into water courses or sewers.

Quantities of chemicals, size of chemical feeders, storage space and costs are determined from the laboratory data of acidity.

- Alkalinity Principle:

Alkalinity can be obtained by neutralizing OH-, 003- and HCO3- with standard H2SO4.

Titration to pH 8.3 or de-colorization of phenolphthalein indicator will show complete neutralization of H- and 112 of CO3--, while to pH 4.4 or sharp change from yellow to pink of methyl orange indicator will indicate total alkalinity i.e. OH-, CO3-- and HCO3-.

Interference factors

Interference caused by color, turbidity or free chlorine have already been discussed in acidity test.

In addition absorption or loss of carbon dioxide during or after sample collection can falsify the results.

Apparatus:

1) Burette
2) Conical Flask
3) Pipettes

Reagents:

1) Standard sulphuric acid (0.02N)
2) Phenolphthalein indicator
3) Methyl orange
4) Carbondioxide free distilled water
5) Sodium thiosulphate (0.1N)

Procedure:

Take 100m1 or 0.1 L of the given sample in a conical flask.

Add one drop of 0.1N sodium thiosulphate solution to, remove the free residual chlorine if present.

Add 2 drops of phenolphthalein indicator. The sample turns pink.

Run down 0.02N standard sulphuric acid till the solution turns to color less.

Note down the volume of sulphuric acid added (V1).

Add 2 drops of methyl orange indicator the sample turns to yellow.

Resume titration till the color of the solution turns to pink

Note down the total volume of Sulphuric acid added (V2)

Calculations:

Phenolphthalein alkalinity (P) (mg\lit) as calcium carbonate

= V1 X Normality of H_2SO_4 X 1000 X 50/ Volume of sample taken

Total alkalinity (T) as $CaCO_3$ mg/lit.

= V2 X Normality of H_2SO_4 X 1000 X 50 / Volume of sample taken

Value of P and T	**Alkalinity due to OH^-**	**Alkalinity due to CO_3^{--}**	**Alkalinity due to HCO_3^-**
P=0	**0**	**0**	**T**
P < 1/2T	**0**	**2P**	**T — 2P**
P = 1/2T	**0**	**2P**	**0**
P > 1/2T	**2P — T**	**2T — 2P**	**0**
P = T	**T**	**0**	**0**

Public Health Significance:

Highly alkaline waters are usually unpalatable, and consumers tend to seek other supplies.

Chemically treated waters sometimes may have rather high pH vaiues, which have met with some objection on the part of consumers.

Large concentration of alkalinity imparts a bitter taste to water.

The principle objection of alkaline water is the reactions that can occur between alkalinity and certain other appurtenances, of water distribution systems.

Application of alkalinity data in Environmental practice: Chemical coagulation of water and wastewater:

To neutralize acids produced during flocculation. The sample should be alkaline as otherwise further flock formation slowly ceases.

Water Softening:

To find out the quantity of lime and soda ash required for the removal of hardness, alkalinity should be found out.

Corrosion control:
To control the corrosion due to acids, natural waters are rendered to alkaline.

Effluents of Waste Water:
Wastewaters containing excess caustic (hydroxide) alkalinity are not to be discharged into natural water bodies or sewers

Excess alkalinity in water is harmful for irrigation, which leads to soil damage and reduces crop yields. Water having an alkalinity content of less than 250mg/lit are desirable for domestic consumption.

- **Chlorides**

Chloride ion is determined by Mohr's method, titration with standard silver nitrate solution in which silver chloride is precipitated at first.

The end point of titration is red silver chromate from excess AgNO3 and potassium chromate used as an indicator in neutral to slightly alkaline solution.

Interference:

Bromide, iodide, cyanide, sulfide, thiosulphate, sulphate, iron and phosphates are prime sources of interference.

Apparatus:

1) Burette
2) Pipettes
3) Conical flask

Reagents:

1) Chloride free distilled water
2) Potassium chromate indicator
3) Standard silver nitrates (0.014N)
4) Standard sodium chloride (0.014 N)

Procedure.

Take 100m1 of the sample in conical flask.

Adjust its pH in between 7.0 and 8.0 by addition of sulphuric acid or sodium hydroxide solution. Otherwise, AgOH is formed at high pH level or Cr04-2 is converted Cr207-2 at low pH levels.

Add 1 ml of potassium chromate to get light yellow colour.

Titrate with standard silver nitrate solution till colour change from yellow to brick red.

Note the volume of silver nitrate added (A)
If more quantity of potassium chromate is added, Ag2CrO4 may form too soon or not soon enough.

For better result, titrate the distilled water in the same manner.

Note the Burette Reading or volume of titrant or silver nitrate added for distilled water (B)

Calculations:

Chloride in mg/lit = (A — B) X Normality of AgNO3 X 35.46 X 1000 / Volume of sample taken

Environmental significance of Chlorides:

Chlorides associated with sodium exert salty taste, when its concentration is more than 250mg/lit.

There is no known indication that chlorides constitute any human health hazard.

For this reason, chlorides are generally limited to 250mg/lit in supplies intended for public use.

In many locations of the world where water supplies are limited, sources containing as much as 2000mg/lit used for domestic purposes without the development of adverse effect, once the human system becomes adopted to the water.

It can also corrode concrete by exerting calcium in the form of calcite. Magnesium chloride in water generates hydrochloric acid after heating, which is also highly corrosive and create problems in boilers.

Application of chlorides data in Environmental practice:

Chlorides determination in natural waters is useful in the selection of water supplies for human use.

Chlorides determination is used to determining the type of desalting apparatus to be used.

The chloride determination is used to control pumping of ground water from locations where intrusion of sea water is a problem.

Chlorides also interfere in the determination of COD (chemical oxygen demand. A correction must be made on the basis of the amount of chlorides present.

- Dissolved Oxygen

Principle:

Oxygen present in sample oxidizes the divalent manganous due to its higher valency and it precipitates as a brown hydrated oxide after addition of NaOH and KI. Upon acidification, manganese reverts to divalent state and liberates iodine from KI equivalent to D.O. content in the sample.
The liberated iodine is titrated against $Na_2S_2O_3$ (0.25 N), using starch as an indicator.
If oxygen absent in sample, the $MnSO_4$ react with the alkali to form white precipitate $Mn(OH)_2$.

Interference:

Ferrous ion, ferric ion, nitrate, microbial mass and high-suspended solids constitute the main sources of interference.

Apparatus

1) BOD bottles (capacity 300m1)

2) Sampling device for collection of samples

3) Burette

4) Pipettes

Reagents:

1) Manganous sulphate
2) Alkali iodide-azide reagent
3) Starch indicator
4) Standard sodium thiosulphate (0.025 N)
5) Concentrated Sulphuric Acid

Procedure:

Take the BOD bottle and collect 300 ml of water sample into it.

Add 2 ml of manganous sulphate and 2 ml of alkali iodide azide solution to the BOD Bottle.

The pipette drain point should be below the liquid level, while adding these reagents.

Restopper with care to exclude air bubbles and mixes by repeatedly inventing the bottle 2 to 3 times.

If no oxygen is present, the manganous ion reacts with hydroxide ion to form white precipitate of Mn(OH)2. If oxygen is present, some Mn++ is oxidized to M++++ and precipitates as a brown coloured manganic oxide.

Mn++ + 2(OH) ---------------- Mn(OH)2 White

Mn++ + 2 (OH)- ----------------- Mn02 (brown) + H2O

After shaking and allowing sufficient time for a oxygen to react the chemical precepts are allowed to settle leaving clear liquid within the upper portion

2 ml of concentrated sulphuric acid is added

A volume of 203m1 is taken into the conical flask and titrated with 0.025N sodiumthiosulphate solution until yellow coloured liquid with in the upper portion.

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Restopper with care to exclude air bubbles and mixes by repeatedly inverting the bottle 2 to 3 times.

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2 ml of concentrated sulphuric acid is added

A volume of 203m1 is taken into the conical flask and titrated with 0.025N sodiumthiosulphate solution until yellow coloured iodine turns to a pale straw colour. (200 X 300 / (300 — 4) = 203 ml)

Since it is impossible to accurately titrate the sample to colourless liquid, 1 to 2 ml of starch solution is added.

Continue titration to the first disappearance of the blue colour.

Calculations:

1m1 of 0.025N Na2S2O3 is equivalent to 0.2 mg of 02, since the volume of the sample is 200 ml.

1 ml of sodium thiosulphate is equivalent to (0.2 X 1000 /2000) mg/lit. = 1 mg/lit.

Environmental significance:

Oxygen is poorly soluble in water.

Its solubility is about 14.6 mg/lit for pure water at 00C under normal atmospheric pressure and it drops to 7 mg/lit at 35oC:

Aerobic bacteria thrive when free oxygen is available in plenty. Aerobic conditions to prevail when sufficient D.O. is available within water. End products of aerobics are stable and are not foul smelling.

While a minimum D.O. of 4 to 5 mg/lit is desirable for the survival of aquatic life, higher values of D.O. may cause corrosion of iron and steel.

Higher temperature, biological impurities, ammonia, nitrates, ferrous ion, chemicals such as hydrogen sulfide and organic matter reduce D.O. values.

Algae growth in water may release oxygen during its photosynthesis and D.O. may even shoot upto 30mg/lit.

Drinking water should be rich in D.O. for good taste.

Application of dissolved oxygen data in Environmental Engineering practice:

It is necessary to know D.O. levels to assess quality of raw water and to keep a check on stream pollution.

D.O. test is the basis for BOD test which is an important parameter to evaluate organic pollution potential of a waste.

D.O. test is necessary for all aerobic biological waste water treatment processes to control the rate of aeration.

Oxygen is an important factor in the corrosion of iron and steel S.O. test is used to control oxygen in boiler feed waters.

D.O. test is used to evaluate the pollution strength of domestic and industrial wastes.

Determination of D.O. in waste waters is useful to identify the nature of biochemical reactions. Whether aerobic which give out stable end products (Water and Carbon dioxide) and do not produce any foul smells or anaerobic whose end products are unstable; and produce foul smells (Hydrogen sulfide)

- BIOCHEMICAL OXYGEN DEMAND

Principle:

The BOD is an empirical biological test.

This BOD test may be considered as wet oxidation procedure in which the living organisms serve as the medium for oxidation of the organic matter to carbon-dioxide and water.

$C_nH_aO_bN_c + (n + a/4 - b/2 - 3/c)\ 0_2\ \text{Bacteria}\ nCO_2 + (a/2 - 3/2c) + H_2O + cNH_3$

On the basis of the above relationship it is possible to interpret BOD data in terms of organic matter as well as the amount of oxygen used during its oxidation.

Interference:

Undesirable oxygen consumption via nitrification can be prevented by addition of lm of an N-allyl thiourea solution.

Free chlorine present in some waste waters after chlorination reacts with organic components within about 2 hours and does not interfere.

Compounds which use oxygen without the presence of micro-organisms (e.g Iron (II), sulphite or sulphide ions) are oxidized by leaving the original sample for 2 hours with occasional shaking, lack of an acclimated seed organism and the presence of toxic substance can result in very low BOD values despite the presence of sufficient degradable organic materials.

In such cases, as series of measurements should be carried out at greater dilutions

Reagents:

1. Distilled water
2. Phosphate buffer solution
3. Magnesium sulphate solution
4. Calcium chloride solution
5. Ferric chloride solution
6. Sodium thiosulphate solution

Procedure:

Place the desired volume of distilled water in a 5 litre flask. Aeration is done by bubbling compressed air through water.

Add 1ml of phosphate buffer, lml of magnesium sulphate solution, lml of calcium chloride solution and lml of ferric chloride solution for every litre of distilled water (dilution water).

In the case of the waste waters which are not expected to have sufficient bacterial population, add seed to the dilution water. Generally, 2m of settled sewage is sufficient for 1000m1 of dilution water.

Highly acidic or alkaline samples are to be neutralized to a pH of 7,

Add 2 or 3 ml of Sodiumthiosulphate solution to destroy residual chlorine if any.

Take the sample as follows:

Strong wastes. 0.1, 0.5 of 1%

Settle domestic sewage: 1, 2.5 or 5%

Treated effluents: 5, 12.5 or 25%

River water 25% to 100%

Dilute the sample with the distilled water and mix the contents well

Take diluted sample into 2 BOD bottles.

Fill another two BOD bottles with diluted water alone

Immediately find D.O. of a diluted waste water and diluted water

Incubate the other two BOD bottles at 270C for 3 days. They are to be tightly Stoppered to prevent any air entry into the bottles.

Determine D.O. content in the incubated bottles at the end of 3days (72 hours)

Calculations:

Let initial D.O. of diluted sample = DO

D.O. at the end of 3 days for the diluted sample = D3

Initial D.O. of distilled water (bank) = CO

D.O. at the end of bdays for the blank =C3

D.O. depletion of dilution water (blank) = CO — C3

D.O. depletion of the diluted sample = DO D3

D.O. depletion due to microbes = (DO — D3) — (CO — C3)

BOD at 270C of the sample = [(DO-D3) X vol. of bottle/m1 sample] — (CO — C3)

Environmental significance:

BOD is the principle test to give an idea of the biodegradability of any sample and strength of the waste.

Hence the amount or concentration of pollution can be easily measured by it.

It is the basic criteria for the control of stream pollution.

Efficiency of any treatment plant can be judged by considering influent BOD and effluent BOD and so also the organic loading on the unit.

If any industrial waste is to be let off into a public sewer, Municipal cess depends on volume and BOD of the waste water.

Ordinary domestic sewage may have a BOD of 200mg/lit. Any effluent to be discharged into natural bodies of water should have BOD less than 30mg/lit.

This is important parameter to assess the pollution of surface waters and ground waters where contamination occurred due to disposal of domestic and industrial effluents.

Drinking water usually has a BOD of less than 1 mg/lit and water is considered fairly upto 3mg/lit of BOD but, when BOD value reaches 5 mg/lit, the water is doubtful in purity.

Application of BOD data Environmental Engineering practice:

To determine strength of domestic and industrial sewage.

The determination of Biological (BOD) is used in studies to measure the self purification capacity of streams and serves regulatory authorities as a means of checking on the quality of effluents discharged to such waters.

BOD of waters is useful in the design of treatment facilities.

it is a factor in the choice of treatment method and is used to determine the size of certain units, particularly trickling filters and activated sludge units.

It is used to evaluate the efficiency of various treatment units.

It is useful to estimate population equivalent of any industrial wastes which is useful to collect cess from industrialist for purification industrial wastes in municipal sewage treatment plant.

It is only the parameter to give an idea of the biodegradability of any sample and self purification capacity of rivers and streams.

- **CHEMICAL OXYGEN DEMAND**

Principle:

The organic matter present in sample gets oxidized completely by K2Cr2O7 in the presence of H2SO4 to produce 02 and H2O.

The excess K2Cr2O7 remaining after the reaction is titrated with Fe(NH4)2(SO4)2.

The dichromate consumed gives the 02 required to oxidation of the organic matter.

Addition of Ag2SO4 to conc. H2SO4 as a catalyst stimulates the oxidation of straight chain aliphatic and aromatic compounds.

NO2 exerts a COD of 1.14 mg/mg NO2. Sulphamic acid in the amount 10 mg/mg NO2 may be added to K2Cr207 solution to avoid interference caused by NO2.

For complete oxidation of organic matter it is necessary to see that equal volume of sulphuric acid and sample plus dichromate are taken.

Apparatus:

1) Reflux apparatus consisting of a flat bottom 250 ml to 500 ml capacity flask with ground glass joint and a condenser with 24/40 joint.

2) Burner of hot plate

Reagents:

1) Standard potassium dichromate 0.25N: Dissolve 12.259 g of K2Cr207 dried at 1030C for 24 hours in distilled water and dilute to 1000m1.

2) Add about 120 mg of sulphamic acid to take care of 6mg/lit of NO2.

3) Sulphuric acid reagent: Add 22 gm of Ag2SO4 to 9Ib of conc. H2SO4 and keep overnight for dissolution.

4) Standard Ferrous Ammonium Sulfate 0.1N: dissolve 39 gm of Ferrous Ammonium Sulfate in about 400 ml of distilled water. Add 20 ml conc. H_2SO_4 and dilute to 1000 ml

5) Ferroin indicator: Dissolve 1.485 gm of 1-10 phenanthroline monohydrate and 695mg of ferrous sulfate and dilute to 100m1 with distilled water.

6) $HgSO_4$: Analytical grade

Procedure:

Place 0.4 gm of $HgSO_4$ in a reflux flask.

Add 20 ml sample or an aliquot of sample diluted to 20 ml with diluted to 20 ml with distilled water and mix well.

Add pumice stone of glass beads followed by 10 ml of Standard potassium dichromate.

Add slowly 30 ml of sulfuric acid containing silver sulfate mixing thoroughly.

This type slow addition along with swirling resulted to prevents fatty acids & escape out due to high temperature.

Mix well. If colour turns green either take fresh sample with lesser aliquot or add more dichromate and acid.

Connect the flask to condenser with distilled water. Mix the contents before heating because improper mixing will result in bumping and sample may be blown out.

Reflux for a minimum of 2 hours. Cool and then wash down the condenser with distilled water.

Dilute to about 150m1 & cool it and titrate excess potassium dichromate with 0.1N Ferrous Ammonium Sulphate using ferroin indicator. Sharp colour change from blue green to wine red indicates end-point or completion of the titration.

Reflux the blank by following same procedure by using distilled water instead of sample

Calculation

$$\text{COD mg/lit} = [(A - B) \text{ X } N \text{ X } 8000]/\text{m1 Sample}$$

A = ml of Fe(NH4)2 for blank

B = ml of Fe(NH4)2 for sample.

N = Normality of Ferrous Ammonium Sulphate

TERMINOLOGY of CHEMICAL OXYGEN DEMAND:

The oxygen required to the chemical oxidation of organic matter with the help of strong chemical oxidant. It is the amount of oxygen required for oxidation.

The amount of the organic and inorganic matter in water, which can be oxidized by boiling with a strong oxidizing agent or acid under test conditions and expressed as the equivalent amount of oxygen.

This is often used as the measure of strength of the wastewater. This includes the material, which is not oxidized in the BOD test and thus does not correlate with BOD.

TERMINOLOGY of BIOLOGICAL OXYGEN DEMAND:

BOD is defined as the amount of the oxygen required by microorganisms while stabilizing biologically decomposable organic matter in wastewater under aerobic conditions.

The quantity of oxygen required by microorganism in the biochemical oxidation of organic matter in a specified time at a specified temperature under aerobic conditions.

It is expressed in milligrams per liter. It is measure of the amount of biochemically degradable organic matter present in wastewater. This data is useful in design of wastewater treatment plant and its operation.

TERMINOLOGY of pH:

pH is a term used universally to express the intensity of acidity or alkalinity of a solution. It is a measure of hydrogen ion concentration in a solution.

TERMINOLOGY of OIL AND GREASE:

These are fatty acids. They have lower density then water.

TERMINOLOGY of TURBIDITY.

The term turbid is applied to water containing suspended matter that interferes with passage of light through the water or in which visual depth is restricted.

TERMINOLOGY OF DISSOLVED OXYGEN:

The oxygen dissolved in wastewater, usually expressed in milligrams per liter or percent of saturation.

The D.0 determination indicates the biological degradation of waste water by aerobes or anaerobes, the former require free oxygen and produce innocuous end products (CO_2, H_2O, NO_3, SO_4, PO_4) while the latter can extract the chemically bound oxygen from nitrates, sulfates etc. and produce obnoxious end products (H_2S, CH_4 etc.,) D.O. determinations are useful in BOD tests for controlling aeration tank, waste water treatment operations and for arresting corrosion in distribution pipes and steam boilers. More deficiency of D.O. occur at high temperature.

TERMINOLOGY of TOTAL SUSPENDED SOLIDS:

It is settable content in the wastewater and which is valuable in the analysis of wastewater.

Insoluble solids that either float on the surface or are in suspension in wastewater.

TERMINOLOGY of TOTAL DISSOLVED SOLIDS-

Total dissolved solids are the solids dissolved in the wastewater. The sum of all solids (Volatile and nonvolatile) in a solution that cannot be removed by filtration.

TERMINOLOGY of ALKLINITY:

The capacity of a solution (imparted by carbonates, bicarbonates, hydroxides, and occasionally borates, silicates and phosphates) to neutralize acids.

It is measured in milligrams of equivalent calcium carbonate per liter. Alkalinity determinations are used in chemical coagulation, softening and corrosion control.

TERMINOLOGY of PARTS PER MILLION:

Parts per million is a measure of proportion by weight, equivalent to a unit weight of solute per million unit weights of solution.

Part per million is generally considered equivalent to mg per liter, but this is not precise. Part per million is equivalent to mg solute per kg of solution.

TERMINOLOGY of EQUIVALENT PER MILLION:

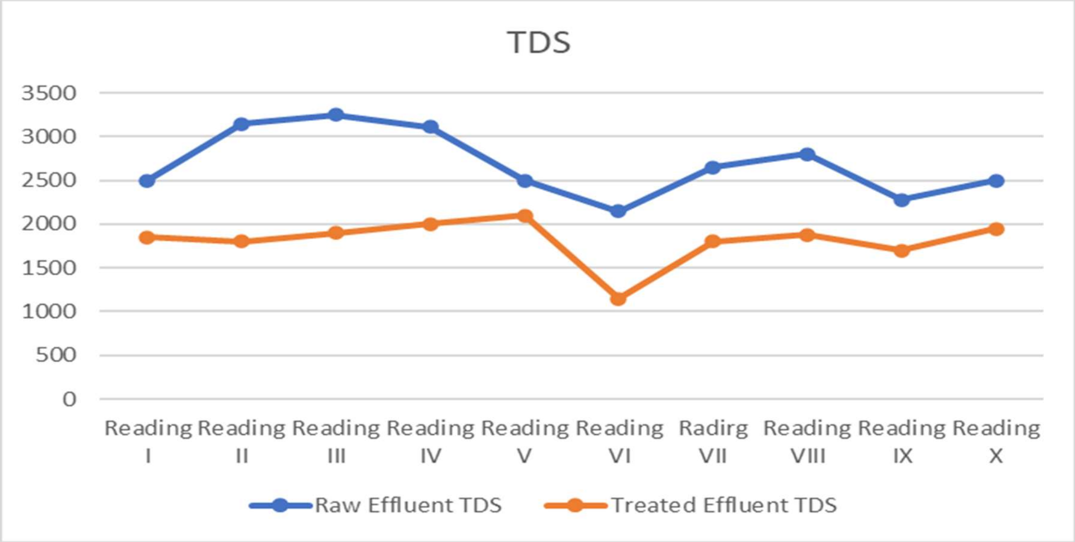
This is a unit chemical equivalent weight of solute per million unit weight of solution.

Concentration in equivalents per million is calculated by dividing concentration in parts per million by the chemical combining concentration in parts per million by the chemical combining weight of the substances or ion.

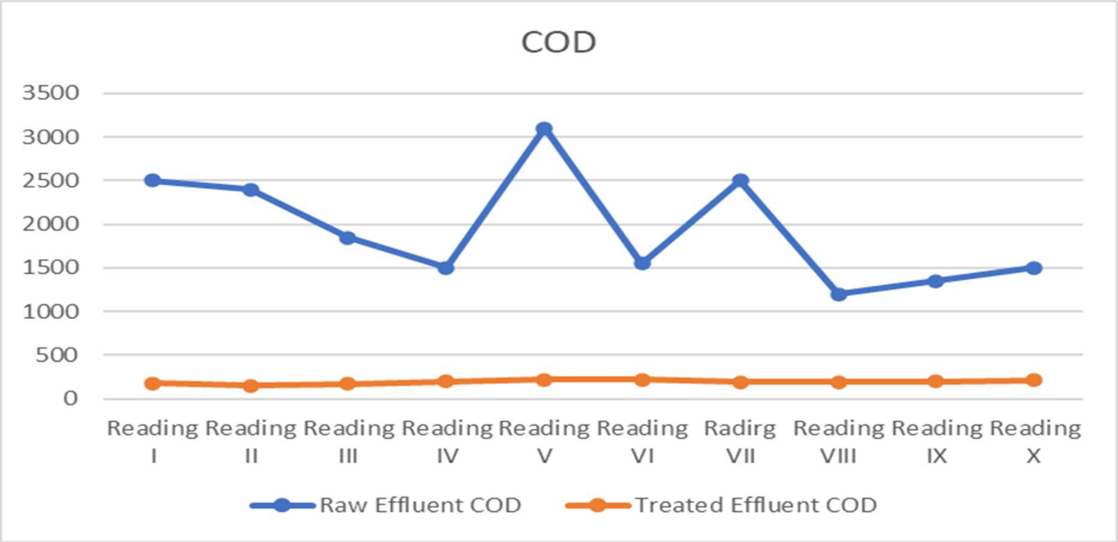
This unit is also called milli equivalent per liter and milligram equivalent per kg. The latter term is precise and the former will be in error if the specific gravity of the solution is not exactly 1.0

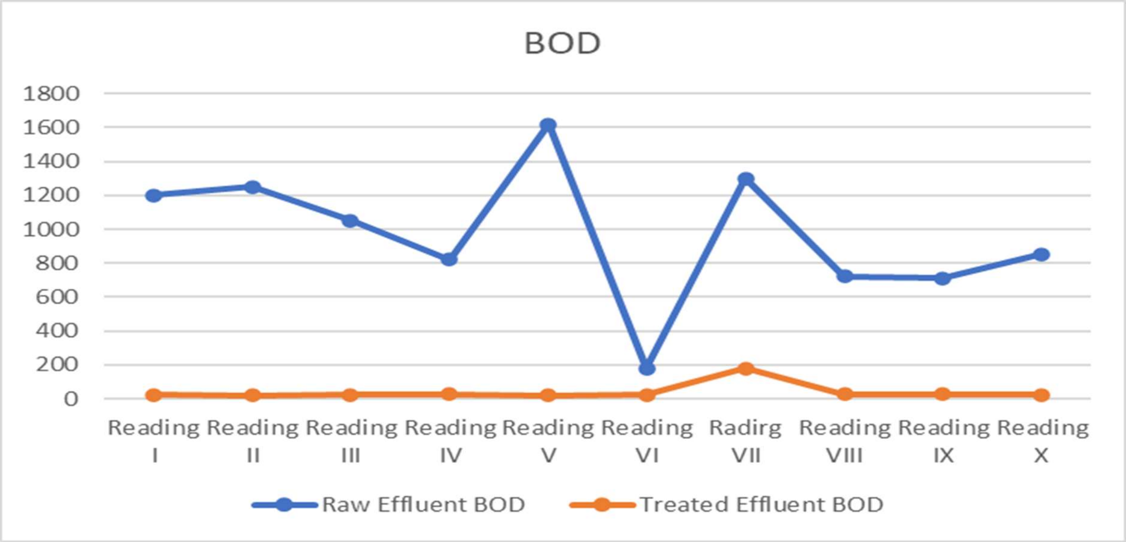
Results

Particular	Equikation Tank							Aeration Tank		Treated Effluent					Overall	Overall
Parameter	pH	TSS	TDS	Acidity	Aikaianity	BOD	COD	MLSS	DO	pH	TDS	TSS	BOD	COD	BOD Red	COD Red.
UOM		mg/lit	mdlit	mg/lit		mg/lit	mg/lit	mg/lit	mg/lit	mg/lit	mg/lit	mg/lit	mg/lit	mg/lit	%	%
Reading I	7 5	2700	2500	320	1400	1200	2500	3500	3.2	7.5	1850	90	22	180	98.17	92.8
Reading II	1.7	3200	3150	252	1350	1250	2400	2995	3.1	7.6	1800	88	21	150	98.32	93.75
Reading III	7.8	2700	3252	258	1300	1050	1850	3100	2.8	7,6	1900	80	22	170	97.9	90.81
Reading IV	7 9	3250	3112	310	1250	820	1500	3250	3.2	15	2000	85	28	200	96.59	86.67
Reading V	77	3200	2500	350	1300	1620	3100	3100	29	7.3	2100	95	21	220	98.1	92.9
Reading VI	7.6	2952	2150	252	1050	180	1550	2950	31	7.8	1150	96	23	218	87.22	85.94
Radirg VII	7.5	2627	2650	288	1000	1300	2500	2850	2.9	7.6	1800	84	180	195	97.85	92.8
Reading VIII	7.4	2780	2800	300	980	720	1200	3100	2.8	7,5	1880	95	25	195	96.53	92.8
Reading IX	7 3	2642	2280	242	1020	710	1350	3250	3.0	7.4	1700	85	28	200	96.06	85.19
Reading X	7.9	2250	2500	268	1250	852	1500	3500	3.3	7.6	1950	98	22	210	97.42	86
AVE	7.6	2830.1	2689.4	284	1190	970.2	19451	3159.5	3.0	7.5	1873	89.6	24	192.3	96.5	89.1
MIN	7.3	2250	2150	242	980	180	12001	2850	2.8	7.3	1700	80	21	150	87.2	83.8
MAX	1.9	3250	3252	350	1400	1620	3100	3500	3.3	7.8	2100	98	28	220	98.7	93.8


TDS
3500
3000
2500
2000
1500
1000
500
0
Reading I
Reading II
Reading III
Reading IV
Reading V
Reading VI
Radirg VII
Reading VIII
Reading IX
Reading X
Raw Effluent TDS
Treated Effluent TDS


TSS
3500
3000
2500
2000
1500
1000
500
0
Reading I
Reading II
Reading III
Reading IV
Reading V
Reading VI
Radirg VII
Reading VIII
Reading IX
Reading X
Raw Effluent TSS
Treated Effluent TSS


COD
3500
3000
2500
2000
1500
1000
500
0
Reading I
Reading II
Reading III
Reading IV
Reading V
Reading VI
Radirg VII
Reading VIII
Reading IX
Reading X
Raw Effluent COD
Treated Effluent COD


BOD
1800
1600
1400
1200
1000
800
600
400
200
0
Reading I
Reading II
Reading III
Reading IV
Reading V
Reading VI
Radirg VII
Reading VIII
Reading IX
Reading X
Raw Effluent BOD
Treated Effluent BOD

OBSERVATIONS

As per analysis data it is observed that the Overall COD reduction in this project is 89.1 % & the BOD Reduction is 95.5 % Also the COD & BOD value get reduced upto <250 & 30 mg/lit respectively.

The TSS & TDS value also resulted within MPCB norms i.e. TSS reduced up to 89.6 mg/lit that is < 100 mg/lit (MPCB Norm) & TDS are reduced up to 1873 mg/lit i.e. < 2100 mg/lit(MPCB norms)

Overall the treated Effluent quality achieved as per Maharashtra Pollution Control Board Limits or criteria.

CONCLUSIONS

The CETP Project achieved following Objectives.

1. With the help of this project we can reduce the treatment cost for individual units while protecting the environment.
2. It helps to achieve 'Economics of scale' in waste treatment, by reducing the cost of pollution abatement for individual factory.
3. The CETP staff are expert in Effluent treatment & those staff assist to small scale or big scale effluent treatment facilities people.
4. CETP Project required space is less than total Individual Industries Space that mean we can utilized the land for other purposes
5. Also it helps to reduce the problems of monitoring for the pollution control boards at every small scale & big scale Industries.
6. CETP project help to recycle or reuse sludge as a fuel & Treated effluent as a Gardening water

SUGGEESTIONS

1. CETP Filter press or Decanter cake dry powder have calorific values its near about 2500 kcal/mole after analysis of sludge we have suggested to CETP to installed dryer equipment to reduced moisture of cake.

2. After reducing moisture we can utilized the dry powder as a fuel to boiler or we can incinerate it in in-house, instead of sending to MEPL

3. The transportation cost as well as disposal or treatment charges we can save by these techniques.

4. Treated Effluent can be treated by installing Reverse Osmosis Technology & reuse the Treated effluent as a Raw water to MIDC Industries, the Reverse Osmosis treated water shall be as good as Raw water or soft water.

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