

# Inplant training report



**DEPARTMENT OF ENVIRONMENTAL SCIENCE  
DR. BABASAHEB AMBEDKAR MARATHWADA  
UNIVERSITY AURANGABAD.**

**Submitted by: DIGVIJAYSINGH BABANRAO RAUT  
M.Sc. F.Y. (2022-2023)**

**SMS CETP PVT. LTD Waluj Aurangabad**

**Under the guidance of  
Mr. Gitesh Sabane & Mr. Uddhav bansode Sir**



Certificate

This is to certify that Mr.DIGVIJAYSINGH BABANRAO RAUT a student M.Sc. (Environmental Science ) in Session 2023 -2024 from DR. BAMU UNIVERSITY AURANGABAD has undergone training at our plant.

He has completed his in plant training during the period of 12/06/2023 to 12/07/2023 in our Organization Common Effluent Treatment Plant (CETP) At Waluj, Aurangabad.  
During this training he has studied the processes followed by this plant.

For SMS Waluj CETP Pvt.Ltd.

  
Gitesh Sabane



Site Address : Plot No. Q-1 / Part - I, Part - II and Q-2, MIDC Industrial Area Waluj,  
Dist : Aurangabad - 431136 Telefax : 0240-2551448 E-mail : cetpwaluj@smsl.co.in  
Head Office : 20, IT Park, Parsodi, Nagpur - 440022, Ph.: 0712-665000  
Fax:(+91) 712-6665100, Web.: www.smsevocare.co.in

**SMS WALUJ**  
CETP PRIVATE LIMITED


Regd. Office : 267, Ganesh Phadnavis Bhavan, Near Triangular Park, Dharampeth, Nagpur - 440010 (INDIA)

Corporate Identity No.: U74999MH2006PTC166039

## INDEX

<b>Sr.no.</b>	<b>Title</b>	<b>Page no.</b>
<b>1.</b>	<b>Introduction to CETP plant</b>	<b>3-4</b>
<b>2.</b>	<b>Roadmap of Industries connected to CETP</b>	<b>5</b>
<b>3.</b>	<b>CETP Flowchart</b>	<b>9</b>
<b>4.</b>	<b>General info. CETP</b>	<b>10-12</b>
<b>5</b>	<b>Ranges of Waste Water Quality Parameters.</b>	<b>13</b>
<b>6.</b>	<b>List of Waste water quality parameters (WWQP)</b>	<b>14-31</b>
<b>7.</b>	<b>MPCB Category of companies in various zones</b>	<b>32-34</b>

## INTRODUCTION TO CETP PLANT

**SMS WALUJ CETP PVT. LTD.** 

- Date of information Upadate :
- Name : OF THE COMPANY : SMS WALUJ CETP PVT. LTD.
- Address : Plot No. Q-1, Part - I & II and Q-2, MIDC Industrial Area, Dist. Aurangabad-431 136.
- Contact person : G.C. SABANE Contact Number: 0240-2551448  
**Designation : DIRECTOR**
- Total Capacity : 10MLD PLUS 20% OVERLOAD

Weeks	Date	Raw Material	Products	Wastes
Previous Week	From : To :			
Current Week	From : To :			

- Production Flow Chart indicating points of waste (Solid, liquid & gaseous) generation :
- (a) Conditions for Effluent Discharge :  
 (i) Quantity of Effluent perday :
 

Trade Effluent	Non-Trade Effluent
10 MLD	1.2 MLD

  
 (ii) Quality of Treated Effluent (Specify the relevant pollutant):  
 (a) pH : 5.5-9.0 (b) TSS : Max 100mg/l (c) TDS : Max 2100mg/l  
 (d) BOD : Max 30mg/l  
 (iii) Mode of Disposal of Trated Effluent : Discharged to Kham River,  
 Use for garding / tree plantation and Cooling Purpose by the Industries.
- (a) Conditions for Air Emissions :  
 (i) Stack Heights) 5mtr (ii) Capacity of DG set : 250KVA  
 (iii)
 

Fuel Date	DG Set	Fumance	Boiler
Type of fuel	HSD	-	-
Quantity of fuel	50Ltr / Hr	-	-
Polutants	SO2, NOX, SPM	-	-

  
 (iv) Quality of Air Emission (Specify the relevant pollutatns for the industry).

- Authorization under Hazardous Waste (Management & Handing) Rules issued on 14/06/2011, valid upto. 31/12/2016.  
 3. (a) Authorisation granted for HW generation under the conditions:  
 (i) Category of waste generated : 34.4  
 (ii) Quantity of Wase at Storage facility :  
 (iii) Waste disposal facility : CHWTSDF, MEPL RANJANGAON

SMS Waluj CETP Private Limited is a SPV (special purpose vehicle) of SMS Infrastructure Limited, formed in the year 2006.

The steering committee of Waluj Effluent Treatment projects looks after the functioning of CETP.

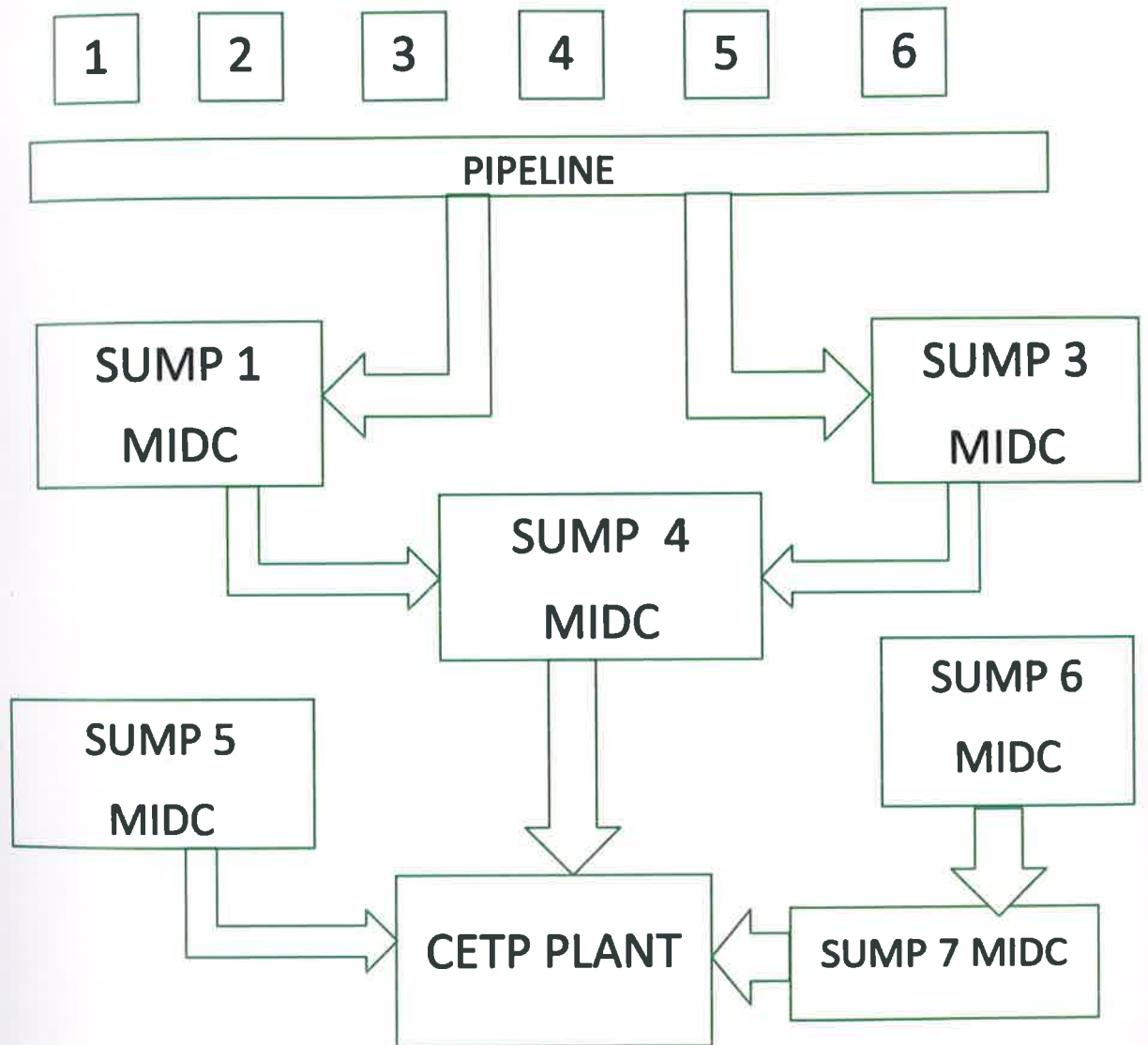
SMS Waluj CETP Private Limited Is a 10 MLD (Million liter per day) capacity. Common Effluent Treatment Plant committed to treat effluent from various industries of MIDC Waluj.

Near about 120 more industries has joined SMS WCPL for the treatment and safe disposal of their effluent. Major effluent generating industries discharge their effluent through underground pipeline Located in Waluj MIDC, while remaining 60 industries send their effluent by tankers Special Treatment SMS WCPL.

Activated sludge process with diffused Aeration system is used for the treatment industrial effluent. Treated effluent is discharged, for tree plantation, gardening & excess treated effluent disposed at designated point approved by NEERI & MPCB.

- 10 MLD Common Effluent Treatment Plant (CETP)
- Treating diverse quality of effluent from different industries.
- Well-equipped laboratory
- Special treatment scheme for heavy metals
- ISO 14001 and OHSAS 18001 Certification

**ROAD MAP OF INDUSTRIES CONNECTED TO CETP**



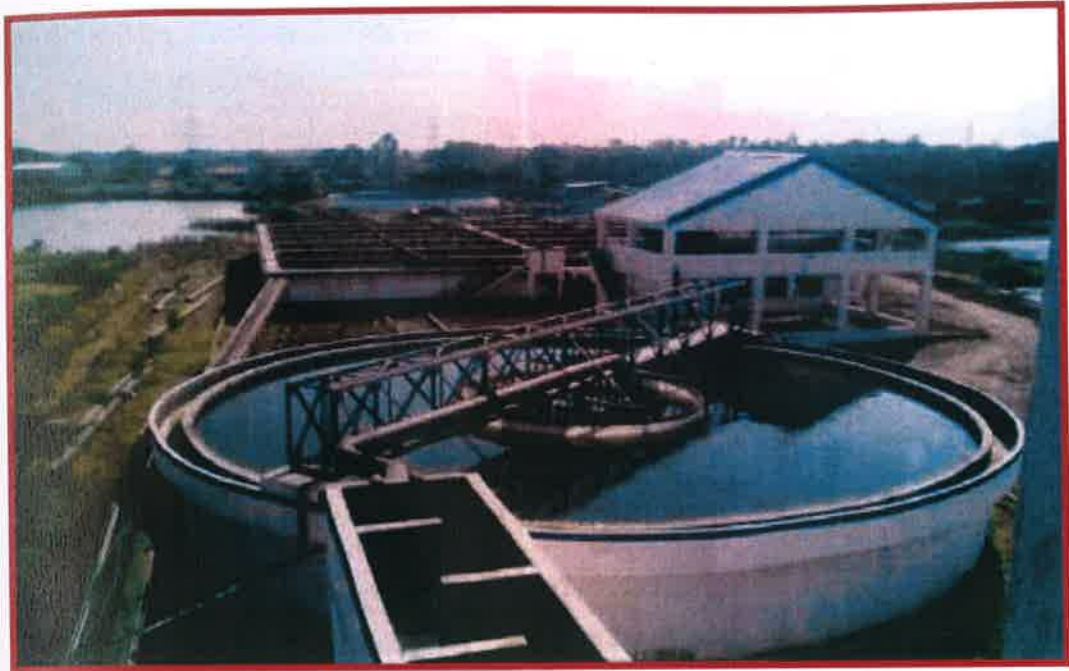
**Visited venue: SMS CETP PVT. LTD Plot no. Q-1 & Q-2  
MIDC Ranjangaon Waluj, Aurangabad.**



**WASTE WATER COLLECTION TANK:**



## ARIAL VIEW OF CETP PLANT



PRIMARY CLARIFIER

## AERATION TANK





## SLUDGE DRYING BEDS



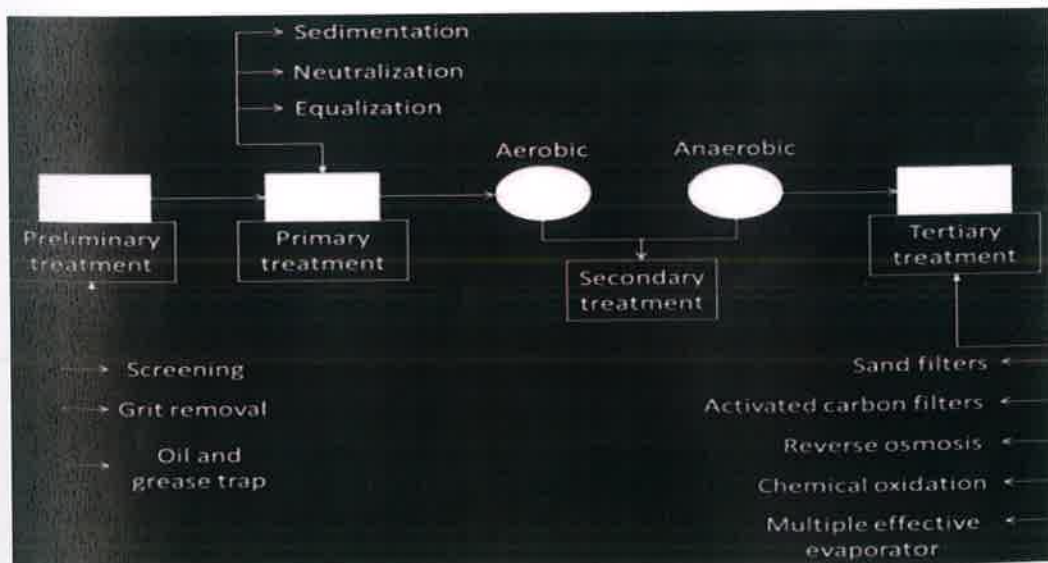
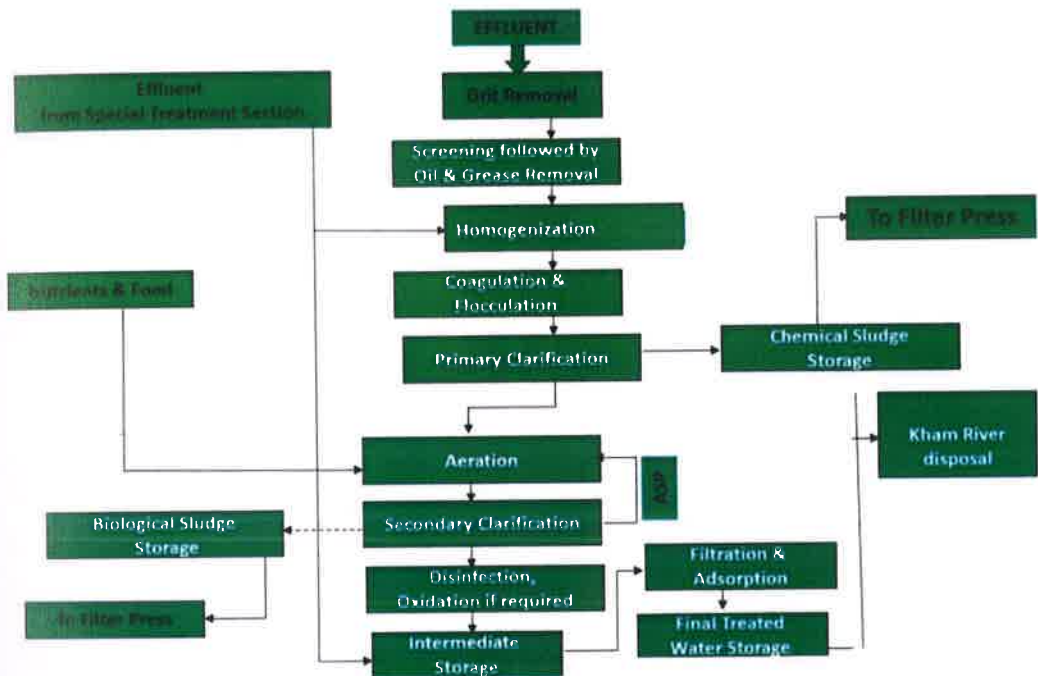
## ACF (ACTIVATED CARBON FILTER) & PSF (PRESSURE SAND FILTER)



## FINAL TANK



## FLOWCHART OF CETP (COMMON EFFLUENT TREATMENT PLANT)



**What is ETP?**

**ETP (effluent treatment plant) is a process designed for treating the industrial waste water for its reuse or safe disposal.**

**CETP – common effluent treatment plant**

**CETP is designed on the basis of:**

- **Quality & flow rate of waste water.**
- **Provide better collective treatment**
- **Reduce effluent treatment cost**
- **Reduce land cost for small scale industrial facilities which they cannot afford individual treatment plants.**

**In this CETP plant, four types of industrial effluent are treated, following is the list of 4 industries**

- 1. Pharmaceutical industries**
- 2. Chemical industries**
- 3. Automobile industries**
- 4. Beverage's industries**

**STS – Special treatment section it is only for treatment of effluent from automobile company**

**In STS there is removal of Heavy metals, at pH 12. Heavy metals are removed from effluent**

### **Advantages of CETP:**

- 1. Rids Potential Diseases. Wastewater treatment systems eliminate disease-causing bacteria and kill harmful organisms.**
- 2. Low-Cost.**
- 3. Minimal Odour Emissions.**
- 4. No Water Bills.**
- 5. Little Maintenance.**
- 6. Break Down Solids Faster.**
- 7. Less Wasteful.**

### **Disadvantages of CETP:**

- 1. Constant Power Supply.**
- 2. Environmental footprint**
- 3. Maintenance.**
- 4. Inaccessibility to capital investments.**
- 5. Inadequate management.**
- 6. Insufficient planning.**
- 7. No individual treatment facilities.**

**Various water quality parameters are determined in CETP plant.**

- 1. Determination of COD (chemical oxygen demand)**
- 2. Determination of BOD (biological oxygen demand)**
- 3. Determination of TDS (total dissolved solids)**
- 4. Determination of TSS (total suspended solids)**
- 5. Determination of TH (total hardness)**
- 6. Determination of Oil & Grease**
- 7. Determination of MLSS  
(Mixed liquor/liquid Suspended Solids)**
- 8. Determination of MLVSS  
(Mixed liquor/liquid volatile suspended solids)**
- 9. Determination of SV (sludge volume)**
- 10. Determination of SVI (sludge volume index)**
- 11. Determination of chlorides (Cl).**
- 12. Determination of acidity**
- 13. Determination of DO (Dissolved oxygen)**
- 14. Determination of moisture content of sample**
- 15. Detection of heavy metals analysis from AAS (Atomic  
absorption spectrophotometer)**

- Ranges of parameters:
- Outlet sample of COD – 250 mg/lit.
- Outlet sample of BOD – 30 mg/lit.
- Outlet sample of TDS – 2100 mg/lit.
- Outlet sample of TSS – 100 mg/lit.
- Oil & grease – 10 mg/lit.
- pH – 5.5 -9.5 pH
- Hardness –
- MLSS – 3500 mg/lit. (54% of sample)
- DO – 1-3 mg/lit. (Tap water DO - 7mg/lit.)
- Outlet sample of Chloride content – 600 mg/lit.
- Acidity – At pH 8.4 acidity is NIL.
- Temperature – 45 C
- Phenolic compounds- 5.0 mg/lit
- Cyanide-2.0 mg/lit
- Hexavalent chromium (Cr+6) – 2.0mg/lit
- Total chromium (Cr+2) – 2.0
- Copper – 3.0 mg/lit
- Lead – 1.0 mg/lit
- Nickel – 3.0 mg/lit
- Zinc - 15 mg/lit
- Arsenic – 0.2 mg/lit
- Mercury – 0.01 mg/lit
- Cadmium – 1.0 mg/lit
- Selenium – 0.05 mg/lit
- Fluoride - 15 mg/lit
- Boron – 2.0 mg/lit
- Colour – 150 platinum cobalt unit

Procedures of each parameter is given below:

1. COD;

Apparatus – conical flask, beaker, measuring cylinder, pipette, burette with stand, air condenser, magnetic stirrer etc.

Chemicals – mercuric sulphate, FAS (ferrous ammonium sulphate) 0.1 N, Ferroin indicator, sulphuric acid (98%), potassium dichromate (0.25 N)

Procedure –

1. Take 20 ml sample in COD Bottle
2. Add 1 pinch mercuric sulphate in it.
3. Add 10 ml potassium dichromate of 0.25 N
4. Add 30 ml sulphuric acid in it.
5. Keep the sample in COD digester for 2 hrs. at 154° Celsius.
6. After that add 80 ml distilled water per COD bottle
7. Wait for 10-20 min titrate the sample with FAS (ferrous ammonium sulphate) of 0.1 N
8. Add 2-4 drops of ferroin indicator in it and note the burette reading while the endpoint is wine red color

End point – Yellow- greenish- Wine red.

Calculations –

$COD = \text{Blank} - \text{burette reading} * 0.1 N * 8000 / \text{sample taken}$

For ex. Sample taken = 5,10,20 ml

5 ml sample + 15 ml d/w = total volume of sample

where, B.R = 9.6

blank reading = 25

$8000 = 8 \text{ (atomic wt. of Oxygen)} * 1000$

$25 - 9.6 * 0.1 * 8000 / 10 = 1232 \text{ mg/lit.}$

2. TDS (Total dissolved solids)

Apparatus - water bath, beaker, crucible, desiccator

Procedure -

1. Take the initial wt. of crucible and add 50 ml sample in it.
2. Keep the crucible with sample in water bath for complete drying.
3. Keep the crucible for complete drying up to 180° Celsius.
4. After that remove the sample from water bath & keep it in desiccator.
5. Note the final wt. of crucible

Calculations -

Mg of TDS =  $(A-B) * 100 / \text{sample volume}$

Where, A = Weight of dried residue + crucible (final wt.)

B = weight of empty crucible i.e. (initial wt.)



### 3. TSS (Total suspended solids)

Apparatus - Whatman filter paper, beaker, funnel, desiccator, Hot air oven,

#### Procedure -

1. Take the initial wt. of Whatman filter paper 41
2. Add 100 ml of waste water sample and pass through Whatman filter paper.
3. Keep the sample for drying in hot air oven at 104° C
4. Remove the sample from oven & keep it in desiccator for cooling for 15 minutes
5. Take the final weight of filter paper after cooling

#### Calculations -

TSS (mg/lit.) = final wt. - initial wt \* 10<sup>6</sup> / sample taken

For ex. 100 ml ,50 ml

Initial wt. = 1.0210

Final wt. = 1.0598

1.0598 - 1.0210 \* 10<sup>6</sup> /100 = 388 mg/lit.

Note: final wt. of filter paper is always greater than initial wt. because suspended solids are present on filter paper

#### Difference between TSS & MLSS:

-TSS is determined from primary tank, sec. tank, final tank. TSS depends upon the quality of effluent

Range of TSS = 400-500 mg/lit.

-MLSS is determined from only aeration tank.

Aeration tank is the heart of CETP in which we get reduction up to 75-80%.

Range of MLSS is 3000-4000 mg/lit

#### **4. Sludge volume (SV)**

**Apparatus** - measuring cylinder

**Procedure** -

1. Take the sample from aeration tank.
2. Add the 1000 ml sample in measuring cylinder
3. Wait for 30 min, as the sludge settles down
4. After 30 min note the reading

#### **5. Sludge volume Index (SVI)**

Sr. no.	Range of SVI	Quality of Sludge volume index (SVI)
1.	50-100	Excellent
2.	100-150	Good
3.	150-200	Satisfy
4.	200-Above	Poor

Calculations:

$$\text{SVI} = \text{Sludge settling} * 1000 / \text{MLSS}$$

$$\text{For ex. Settling of sludge} = 350$$

$$\text{Total volume} = 1000$$

$$\text{MLSS} = 3200$$

$$\text{SVI} = 350 * 1000 / 3200 = 109, \text{ Hence the quality of sludge is Good.}$$

## 6. MLSS (MIXED LIQUOR SUSPENDED SOLIDS)

Note: Both the procedure for TSS & MLSS are same there is NO change in it.

**MLSS is determined from only Aeration tank.**

### Procedure

- Take the initial wt. of Whatman filter paper 41
- Add 100 ml of sample from Aeration tank and pass through Whatman filter paper.
- Keep the sample for drying in hot air oven at 104° C
- Remove the sample from oven & keep it in desiccator for cooling for 15 minutes
- Take the final weight of filter paper after cooling

### Calculations:

MLSS (mg/lit.) = final wt. - initial wt. \* 10<sup>6</sup> / sample taken

For ex. 100 ml

## 7. MLVSS (MIXED LIQUOR/ LIQUID VOLATILE SUSPENDED SOLIDS)

Procedure -

1. Take the initial wt. of crucible on weighing balance
2. Put the paper of MLSS in Crucible
3. Keep the crucible with MLSS filter paper in muffle furnace at 550°C.
4. There is formation of ash in muffle furnace after the formation of ash, take the crucible with ash and keep it in desiccator
5. After cooling in desiccator take the final wt. of crucible with ash content i.e., MLVSS.

### Calculations

MLVSS = Final wt. - initial wt. \* 10<sup>6</sup> /sample taken

For ex. 50 ml, 100 ml

Temperature required for MLSS & MLVSS

MLSS temp - 104 °C. (temp. of Hot air oven)

MLSS is determined in Hot air Oven.

MLVSS temp - 550°C. (temp of Muffle furnace)

MLVSS is determined in Muffle furnace.

OCEMS – Online Central Environment Monitoring System

It is the system used for monitoring parameters in industry such as pH, BOD, COD, TH, TDS , TSS , Chlorides, Chromium content etc.

#### 8. TOTAL HARDNESS (TH)

2-40 ppm, 25-500 ppm

Procedure –

Directions to use (A) 2-40 ppm:

1. Take 25 ml of water sample to be tested in test jar.
2. Add one spoonful (provided here with) of TH1
3. Mix contents well to dissolve.
4. Add 10-12 drops of TH2 & mix the contents well.
5. If the colour turns blue, it indicates there is “NO HARDNESS” in the water.
6. If the colour turns red it indicates there is hardness.
7. Now dropwise add TH3+, counting the number of drops while mixing, until the colour changes from red to blue

If colour does not changes to blue after adding 20 drops the hardness of the sample is more than 40 ppm

Now use direction to use (B)

Direction to use B: 25-500 ppm

1. Take 10 ml water sample to be tested in test jar.
2. Add one more spoonful (provided here with) of TH1.
3. Mix contents well to dissolve.
4. Then add 10-12 drops of TH2 & mix contents well.
5. Now dropwise add TH5, counting the number of drops while mixing, until the colour changes from red to blue.

Calculations:

Total hardness as ppm  $\text{CaCO}_3 = 2 * (\text{Number of drops of TH3})$

Total hardness as ppm  $\text{CaCO}_3 = 25 * (\text{Number of drops of TH5})$

### 9. Determination of chlorides

Chemicals - potassium chromate ( $K_2CrO_4$ ), Silver nitrate ( $AgNO_3$ )

Procedure -

1. Take 20 ml sample.
2. Add 2-4 drops of potassium chromate indicator
3. Titrate with Silver nitrate solution ( $AgNO_3$ ) and note the reading.
4. Endpoint is yellow to brick red

Calculations -

Chlorides as Cl (mg/lit) =

burette reading - blank \* 0.0141N \* 35.45 \* 1000 / sample taken

for ex. Sample taken = 10 ml 20 ml

where burette reading = 38.5

blank reading = 2

N of  $AgNO_3$  = 0.0141 N

Equivalent wt. of chloride = 35.45

$38.5 - 2 * 0.0141 * 35.45 * 1000 / 20 = 912.21$  mg/lit

## 10. Detection of heavy metals analysis by AAS (Atomic absorption spectrophotometer)

### ATOMIC ABSORPTION SPECTROPHOTOMETER

#### Principle

Atoms absorb light over very narrow range of Wavelengths or gives the lines which are characteristics of atoms or molecules in gases. In liquids the molecules are very close to each other. Thus, they influence each other's energy levels randomly. The resulting absorption spectrum consists of broad bands- hundreds of angstroms units wide. In gases, molecular distance is more and energy levels are well defined. Hence, the narrow absorption bands, necessitates that light source also must give very narrow bands, emitting exactly the same wavelengths that are absorbed by the flame. The hollow-cathode lamp, consists of a cathode, which is made of the same element which is to be determined flame. in the Thus it gives out light in a spectrum of sharp lines which are characteristic of the element, and with the correct wavelengths to be absorbed.

#### Equipment

Atomic absorption spectrophotometer consists of

- (a) hollow-cathode lamp.
- (b) chopper to give pulsating current in the photocell, with a super-imposed steady current caused by the light from the flame. only pulsating current is amplified and recorded.
- (c) burner to produce & flame to be sufficiently hot to produce necessary atoms. Acetylene and compressed air is used to get better sensitivity. Nitrous oxide and acetylene, gives a hotter flame. Acetylene is "fuel" & nitrous oxide or air, is the support gas. Oxygen should not be used as support gas. Lamellar flow burners are generally provided. Special burners are available-called total consumption burner. In these lamellar flow burners, sample is aspirated through capillaries-and is sprayed with the help of supporting gas. The air and fuel are fed into the flame. Only fine droplets enter the flame, bigger are drained out.

Preheating the air- fuel mixture to evaporate the solvent before mixture reaches the flame increases the sensitivity. It is important to adjust the height at which the light beam passes through the flame, with the adjustable burner which moves up and down.

(d) The monochromator is a must for any spectrophotometer. It has entrance and exit slits and a grating as a disperser. The wavelength can be selected. Slit width can be adjusted which is important along with the wavelength to resolve two lines close together.

(e) Recording and reading; set the meter needle to read zero absorbance without sample in the flame; or with distilled water then put the cup 'with sample to allow it to aspirate into the flame. Read the absorbance. The readings will always be fluctuating. Eliminate if this is random or there is a steady drift, by putting photocell output in a recorder. If there is decrease in the absorbance as the sample is aspirated, the capillary needs cleaning.

(f) Formation of stable complexes like those of magnesium or calcium Phosphates, makes the absorption weaker. Addition of those elements which have preference for  $PO_4$  will reduce the interference.

(g) Atomic absorption spectroscopy should be performed for dilute solutions (0.01 molar or less) to avoid clogging of burner.

(h) Non-aqueous atomic absorption spectroscopy can be used for measurement of a metal in a liquid like gasoline or alcohol. Secondly, it is possible to separate metal ions from one another by extracting it with organic solvents like ammonium pyrolidine dithi carbamate or methyl isobutyl ketone. Choice of solvent should be such that they should not burn with a smoky flame. Compounds of these metals should be soluble in these organic solvents. Such compounds are salts or organic acids.

(i) Standards with known solutions should be run to check the calibration,

(j) Atomic absorption can be effectively applied when small -No. of elements have to be determined in large No. of sample with only



moderate accuracy. If high accuracy is required at low concentrations, then ordinary colorimetric methods are better.' It is not good for multi-element analysis since separate lamps have to be used for every element.

Procedure -

1. Lamp selection.

Select the lamp suitable for element.

Note the current at which' it is to be operated. If it is 20 mA operate at 15 mA.

Turn on the filament and increase the D, C. as instructed by the instrument operation manual.

Align the lamp properly so that, the visible beam falls on the slit of monochromator.

2. Wave length selection & slit adjustment

2. 1 Select the appropriate wavelengths for e. go Barium 553.5 nm.

Open the slit and set the wavelength setting of the monochromator to the desired wavelength, the needle will show the deflection due to photocell activation. It may be necessary to move the wavelength control clockwise and anticlockwise slowly to get maximum per cent transmittance as seen from the galvanometer reading. Keep it between 20-80%.

Cut down the slit and adjust wavelength so that the desired width is obtained close to the wavelength.

Adjust the balance control or gain to 100% transmittance.

Switch over to the •absorbance switch.

Slit has to be properly adjusted to •avoid excess stray light.

3. Sample preparation:

keep the samples ready before the flame is lit.

prepare a std. solution of the metal which may be slightly acidic (HCl) in the range 10-100 mg/lit.

Make standard solutions to obtain absorbances of about 0.1, 0.2, 0.5, 0.8

Take samples in 5 ml cups and aspirate solution one after the other without delay between them. Aspirate distilled water frequently in between standard Solutions.

#### 4. Flame

4.1 Light the flame after the lamp is warmed up and wavelength selected.

4.2 Start the support gas at a pressure so that the fuel valve will open (15-20 lbs. (sq. inch)

Start the acetylene at a recommended pressure (3-4 lbs./ sq. inch)

light the burner.

Adjust the burner level so that the beam from the cathode lamp crosses it at correct height, i.e., one centimeter from the top of the burner.

Let the beam be stabilized.

5 Preheater. Some instruments are provided with preheating so that the droplets of solutions are vaporized to fine powder before it enters the flame. Preheating increases the sensitivity by 10 times. mixing chamber to heat up for half an hour. Start coolant water.

6. Place, the standards and samples for aspiration when the solutions are sucked into the flame. Note the steady galvanometer reading (1/2 minute). Allow air to be sucked in after each cup is placed for aspiration. Avoid blocking of the capillary.

Turning off the equipment.

7. 1 Wash the capillary with distilled water.

7. 2 Shut off the fuel valve and allow the air to pass for a minute or two.

7.3 turn off the air and ensure tightness of valves.

### 11. Determination of Acidity

**Apparatus** - Conical flask, burette, pipette, beaker, dropper etc.

**Procedure** -

1. Take 20 ml sample
2. Add 2-3 drops of phenolphthalein indicator
3. Titrate the sample with sodium hydroxide (NaOH) 0.1 N and note the reading.
4. Endpoint of titration is pink color.

### Calculations

Acidity (mg/lit.) = burette reading (B.R) \*1000/ sample taken

For ex. 20 ml, 50 ml

Ex. B.R =1.6

$1.6 * 1000 / 20 = 80 \text{ mg/lit.}$

**Note** -If the pH is 8.4 of sample the acidity is nil

pH is inversely proportional to acidity i.e. The lower the pH, higher is the acidity

## 12. Oil & Grease

Apparatus - Beaker, separatory funnel, measuring cylinder (100 ml), tripod stand

Chemicals - petroleum ether, 2 propanol, sodium sulphate

1. Take 100 ml sample in separatory funnel
2. Add 25 ml petroleum ether in it.
3. Shake well for 1 minute. (While shaking gas is generated)
4. Remove the gas generated, after that two layers are formed in separatory funnel
5. Discard the lower layer from separatory funnel
6. Add 5 ml 2 propanol again shake the separatory funnel & remove the gas
7. Take the Whatman filter paper & add sodium sulphate about 2 pinch
8. Take the initial wt. of crucible & pass the sample through filter paper
9. Keep the sample in water bath & sample gets dried.
10. Remove the sample from water bath & keep the sample with crucible in desiccator for cooling
11. After that take the final wt. of crucible (dried sample is observed)

Note: we can only determine the

Oil & grease from Inlet & outlet sample of CETP.

While the COD is determined from any sample.

### Calculations

Oil & grease (mg/lit.) = final wt. - initial wt. \*  $10^6$  / sample taken

For ex. Sample taken = 100 ml

Where, initial wt. = 16.2224

Final wt. = 16.2230

=  $16.2230 - 16.2224 * 10^6 / 100$

=  $0.0006 * 10^6 / 100 = 6 \text{ mg/lit.}$

### 13. Moisture content

Apparatus – weighing balance, crucible, oven

Procedure –

1. Take the initial wt. of crucible.
2. Add wt. of sludge (for Ex. 10 gm, 20gm.)
3. Keep the crucible with sludge in oven at 104° C. for complete drying.
4. After drying remove from the oven & keep in desiccator for 15-20 min.
5. After cooling take the final wt.

Calculations –

Moisture content (%) =  $\frac{\text{final wt.} - \text{initial wt.}}{\text{sludge wt.}} \times 100$

For ex. Where

Wt. of empty crucible = 19.2225 gm

Wt. of sludge = 10.112 gm

Wt. of crucible with sludge (i.e., initial wt.)  $19.2225 + 10.112 = 29.3345$

Wt. of crucible after drying (i.e., final wt.) = 36.8454

$36.8454 - 29.3345 / 10.112 \times 100$

$= 7.5109 / 10.112 \times 100$

$= 0.74 \times 100$

$= 74\%$  i.e., moisture present in sludge

% of sludge =  $100 - \text{moisture present}$

$= 100 - 74$

$= 26\%$  i.e., sludge remained in sample

#### 14. BOD (Biological oxygen demand)

Apparatus - BOD bottles, BOD incubator, beaker , burette , pipette, conical flask, sucker etc.

#### Chemicals -

1. Calcium chloride
2. Phosphate buffer
3. Magnesium sulphate i.e., Winkler A
4. Aluminium chloride
5. Sodium azide
6. Starch indicator
7. Sulphuric acid
8. Sodium thiosulphate

#### Procedure -

1. Take 2 lit. distilled water. Add 4 chemicals in it. i.e., (CaCl<sub>2</sub>, phosphate buffer, magnesium sulphate, AlCl<sub>3</sub>). Add 5 ml seed in all 6 BOD bottles (Note: these chemicals are food for bacteria.)
2. Keep the sample for aeration up to 2 hrs.
3. Remove the aerator from the sample.
4. Now take the 6 BOD bottles mark them as initial & final BOD bottle.
5. Add the chemicals in initial 3 BOD bottles such sodium azide (2ml), magnesium sulphate (2ml).
6. After addition of magnesium sulphate precipitate is generated
7. Shake it well & let the precipitate settle down.
8. After settling add (2ml) sulphuric acid & starch indicator (2ml) in it and titrate with sodium thiosulphate 0.025 N
9. End point is colourless
10. After that keep 3 final BOD bottles in BOD incubator maintain temperature of BOD incubator at 27° C for 3 days
11. Follow the same procedure for Final BOD & note the readings

For ex.

Observation table -

Sr. no	Name of sample	Volume of sample / sample taken	Initial bottle no.	Final bottle no.	Initial burette reading	Final burette Reading	Diff.	BOD
1.	Blank sample	-	152	160	7.0	6.4	0.6	
2.	Collection Tank	2 ml	444	193	6.6	5.4	0.6	90
3.	Final Tank	10 ml	578	555	6.5	5.3	0.6	18

Calculations -

1. blank >> Burette reading = initial B.R- final B.R

$$= 7.0 - 6.4$$

$$= 0.6 \text{ i.e., diff.}$$

2. collection >> B.R = Initial B.R - final B.R

$$= 6.6 - 5.4 = 1.2 - \text{Blank B.R i.e.,} = 1.2 - 0.6 =$$

0.6

$$0.6 * 300 \text{ (volume of bottle) / 2 ml i.e., (sample taken) = 90 BOD}$$

Note; DO is determined from the sample of aeration tank or any clear sample.

& BOD is determined from any sample i.e., primary tank, sec. tank, final , aeration tank .

Note; 1 litre = 1ml ratio

1 litre = 1 ml seed ratio

**15. DO (Dissolved oxygen)**

Same procedure as BOD

**EXCEPTION** is 4 chemicals which are used in BOD i.e., calcium chloride, magnesium sulphate, phosphate buffer, aluminium chloride are **not** to be used while determining DO

**>> MPCB Category of companies**

- Industrial Sectors having Pollution Index score of 60 and above - red category
- Industrial Sectors having Pollution Index score of 41 to 59 - Orange category
- Industrial Sectors having Pollution Index score of 21 to 40 - Green category
- Industrial Sectors having Pollution Index score incl. & up to 20 - White category



## **List of industries in Red categories;**

- **Distillery including Fermentation industry.**
- **Sugar (excluding Khandsari)**
- **Fertilizer (Basic) (excluding formulation)**
- **Pulp and Paper (Paper manufacturing with or without pulping).**
- **Basic Drugs.**
- **Pharmaceuticals (excluding formulation).**
- **Dyes and dye- intermediates**
- **Pesticides (technical) (excluding formulation)**
- **Oil refinery (mineral oil or Petro refineries)**
- **Tanneries**
- **Petrochemicals**
- **Cement**
- **Thermal power plants**
- **Zinc smelter**
- **Copper smelter**
- **Aluminium smelter**

## **List of industries in Orange categories**

- **Manufacture of mirror from sheet glass and photo framing**
- **Cotton spinning and weaving**
- **Automobile servicing and repairs stations**
- **Hotels and restaurants**
- **Flour mills (excluding Domestic Atta Chakki)**
- **Food including fruits and vegetable processing**
- **Pulping and fermenting of coffee beans.**
- **Instant tea/coffee, coffee processing**
- **Non-alcoholic beverages (soft drinks)**
- **Surgical and medical products not involving effluent/emission generating processes**
- **Laboratory-wares**
- **Wire drawing (cold process) and bailing straps**
- **Laboratory chemicals involving distillation, purification process**
- **Tyres and tubes vulcanisation, vulcanisation, re-treading moulding**
- **Pesticides/Insecticides/Fungicides/Herbicides/Agrochemical formulation**
- **NPK Fertilizers/Granulation**

### **List of industries under green category**

- Wasting of used sand by hydraulic discharge
- Steeping and processing of grains
- Mineralised water
- Bakery products, biscuits, confectionery
- Groundnut decorticating (dry)
- Supari (Betelnut) and masala grinding
- Chilling plants and cold storages
- Ice cream or Ice-making
- Tailoring and garmenting
- Cotton and woollen hosiery
- Apparel making
- Handloom weaving
- Shoelace manufacturing
- Cardboard or corrugated box and paper products (Paper or pulp manufacturing excluded.)
- Insulation and other coated papers (paper or pulp manufacturing)
- Scientific and mathematical instruments.

**Conclusion – from the CETP (common effluent treatment plant) waluj. I have learned the waste water quality parameters & I have practically worked in the laboratory which built the confidence in me which will be helpful in my career as an experience.**