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SEASONAL ANALYSIS OF WATER OF KALA TALAO, DURGADI (GANESH GHAT), GANDHARI LAKE, GAURIPADA TALAV & UMBERDAE TALAV FOR ASSESSMENT OF POLLUTION

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Abstract : The amount of pollution is increasing day by day and there may be a lot of parameters for the rise of pollution. Pollution is of various types be it air, water , noise, or environmental pollution. It is necessary to keep a check for the increasing pollution and take precautionary measure regarding the same. By assessing for the amount of pollution and the contaminants present in the water we can may a note about how fatal can the consumption could be if consumed without treating it. The main aim for taking the samples from these 5 areas was that the water for these areas is used on a daily basis by the people living in the surrounding locality for their daily chores and as well as for drinking water. It is necessary to create awareness regarding the same.

Index Terms **– Water pollution, consumption, assessment, awareness.**

I. INTRODUCTION

Pollution is the act of introducing harmful substances to the environment that results in harming the natural surroundings. Substances that cause pollution are referred to as pollutants. These polluting substances are so diverse and they include chemical products, waste material, light, heat, and noise among others. Due to the diverse nature of pollutants in the world, there are various types of pollution such as water pollution, noise pollution, air pollution, soil contamination, radioactive pollution, and plastic pollution. Pollution, even in minuscule amounts, impacts the ecological balance.

Water pollution, the release of substances into subsurface groundwater or into lakes, streams ,rivers , estuaries and oceans and oceans to the point where the substances interfere with beneficial use of the water or with the natural functioning of ecosystems. In addition to the release of substances, such as chemicals, trash, or microorganisms, water pollution may also include the release of energy, in the form of radioactivity or heat, into bodies of water.

This widespread problem of water pollution is jeopardizing our health. Unsafe water kills more people each year than war and all other forms of violence combined. Meanwhile, our drinkable water sources are finite: Less than 1 percent of the earth's freshwater is accessible to us. Without action, the challenges will only increase by 2050, when global demand for freshwater is expected to be one-third greater than it is now

➢ KALA TALAV

Bhagva Lake is commonly known as Kala talao. It is one of the top tourist attractions in Kalyan city. It is situated at Swanand Nagar, Kalyan west; district Thane, Maharashtra, 421301 Kala talao was built by Adil Shah of Bijapur and located at a distance of a kilometre and half from Kalyan railway station. It covers around 24 acres area. Earlier known as Shenale lake, it is managed and maintained by Kalyan-Dombivli Municipal Corporation (KDMC).

It is Open for all for Morning Walk, boating is also done & Balasaheb Thakre Memorial Museum Built In respect.

The water of this talav is used mainly by the people residing in nearby areas. People mainly use the water for drinking and for all the other household chores.

➢ DURGADI [GANESH GHAT]:

Currently the most popular place in town, The Ganesh Ghat is a place to chill out with friends and family on weekends or holidays. It was created by the Corporation as a recreation spot. It is referred to as the Chowpatty for the Kalyan residents.

One can visit the Ghat during evenings to enjoy the bhel puri, pani puri and other numerous food stalls. One can enjoy the local snacks and refreshments. It is a good place for children to enjoy the portable merry go round.

Earlier activity such as boat ride was available during the day up to 9:00 p.m. in the evening.

The water from this place is mainly used by the people living in nearby places for day-to-day activities.

GANDHARI:

Popular among bikers, Gandhari Nadi is perfect for an evening stroll too. Spanning the width of the river is a bridge that serves as a great hangout point if you want to catch the sunset or simply relax after a long day. After you are done with all your exploring stop by here to enjoy a few calming moments with the water. After all, all that hustle's got to end with a well-deserved reward.

➢ GAURIPADA

Gauripada Talav is well famous place in area with nice complex and lot of crowded place. It is nearby Shahad station and Kalyan station. Birla college and school, hospital, parks are well situated in area. Well Connected with roads and Markets, railway, auto stand etc. During Ganpati this talav is mainly one of the areas where "Ganpati Visarjan" takes place. This talav has a temple nearby and mostly all the used materials from the pooja are thrown in the talav thus making it polluted

➢ UMBERDAE

Umberdae talab is mainly located near the Raunak city area of Kalyan west region. It is basically a small village in the midst of Kalyan. The people in the nearby are use this water for their daily household chores and also bring their cattle near the talab for giving them a bathe. The water of this talab is used on a daily basis and is the home to many fishes too.

TESTING PARAMETERS:

- **PHYSICAL TEST**

1. Colour
2. Odour

- **CHEMICAL TEST**

1. Salinity-chlorinity test
2. Dissolved oxygen test
3. pH test
4. Alkalinity test
5. Acidity test
6. Biological oxygen demand
7. Chemical oxygen demand
8. Hardness of water
9. Sulphates test
10. Copper test
11. MPN (Most Probable Number)

PHYSICAL TESTS

COLOUR TEST FOR GIVEN WATER SAMPLES

- **PROCEDURE**

1. Take beakers for the water samples
2. Pour the collected water samples in all the 5 beakers and fill one beaker with distilled water.
3. Hold the beakers on a plain light background or keep on a plain light surface having white paper underneath it.
4. Observe the difference in the colour carefully with your eyes. Note down the result.

ODOUR TEST FOR THE GIVEN WATER SAMPLES

- **PROCEDURE**

1. Take water samples in beakers.
2. Smell the water samples properly.
3. The smell of the water may either be fishy, bleach, chemical or medicinal odour, rotten eggs (sulphurous) , decayed or sewage like odour, musty, moldy ,grassy, earthy, gasoline , petroleum, fuel-like or solvent like odour or woody or oily.
4. Note down the smell of the water samples properly.

CHEMICAL TESTS

DETERMINATION OF SALINITY AND CHLORINITY OF GIVEN WATER SAMPLES.

METHOD: ARGENTOMETRIC METHOD

FLOW CHART

Take 10ml of water sample in a conical flask

Add few drops of K_2CrO_4 indicator

Titrate against 0.02 N $AgNO_3$ solution till a buff colored ppt is obtained

Repeat the procedure and note the average constant burette reading

- **Solution in burette : 0.02N $AgNO_3$**
- **Solution in beaker : 10 ml water sample**
- **Indicator : Potassium chromate indicator**
- **End point : Yellow to buff coloured ppt.**

ESTIMATION OF DISSOLVED OXYGEN [DO] OF GIVEN WATER SAMPLE

METHOD: WINKLER'S TITRIMETRIC METHOD

FLOW CHART

Fill the oxygen bottle to overflowing with water sample

Add 1ml of Winkler's A reagent and 1ml of Winkler's B reagent in succession

Place the inverted glass stopper and keep for 15 minutes.

After 15 minutes remove the stopper

Add 1ml of conc. H_2SO_4 and replace the stopper quickly

Mix the contents of the bottle vigorously and dissolve the ppt.

If the precipitate in the bottle is not completely dissolved add more amount of conc. H_2SO_4, a few drops at a time till the ppt dissolves.

Take out 50ml of this treated water in conical flask

Add 2-3 drops of starch indicator

Titrate it against 0.0125N $Na_2S_2O_3$ [sodium thiosulphate] solution till the mixture becomes colorless

Note the burette reading

Take at least 3 readings and obtain the mean burette reading

Use this mean burette reading for calculating the amount of dissolved oxygen

- **Solution in burette : 0.0125N Na_2S_2O**
- **Solution in beaker : 50 ml water sample**
- **Indicator : Starch indicator**
- **End point : Blue to colourless**

DETERMINATION OF pH OF GIVEN WATER SAMPLE

FLOW CHART

PROCEDURE l:

Take a strip of pH paper & dip in water sample

Allow the strip to dry

Take proper count of the color by pH paper chart

PROCEDURE ll:

Take 5ml of water sample

To it add 5-10 drops of universal indicator

Shake it well to mix properly , wait for 4-5 minutes and then note the color count with the help of the indicator chart

DETERMINATION OF ALKALINITY OF GIVEN WATER SAMPLE

METHOD : TITRIMETRIC METHOD

FLOW CHART

Take 20ml of water sample and add 2-3 drops of phenolphthalein indicator

If the solution remains colorless it indicates the absence of phenolphthalein alkalinity

In such case perform titration against 0.5N HCL using methyl orange as an indicator. End point is yellow to pink

If the solution turns pink after adding phenolphthalein, titrate against 0.5N HCL till the end point is pink to colorless

Add 2-3 drops of methyl orange indicator and perform reverse titration with the same titrant till the end point is from yellow to pink

On addition of methyl orange if the solution turns pink then consider methyl orange alkalinity to be absent

Note down total burette reading and estimate total alkalinity

- **Solution in burette : 0.5N HCL**
- **Solution in flask : 20ml water sample**
- **Indicator : Methyl orange and Phenolphthalein**

DETERMINATION OF ACIDITY OF GIVEN WATER SAMPLE

METHOD : TITRIMETRIC METHOD

FLOW CHART

Take 20ml of water sample in conical flask and add 2-3 drops of methyl orange indicator

If the solution turns yellow methyl orange acidity is absent, continue the titration by using phenolphthalein

End point is yellowish pink

If the solution turns pink after addition of methyl orange, titrate against 0.5N NaOH till the color changes from pink to yellow

For reverse titration now add 2-3 drops of phenolphthalein and continue with the same titrant to obtain end point (yellow to pink)

If the solution turns pink immediately after adding phenolphthalein drops, consider phenolphthalein acidity zero

Calculate the total acidity by recording total burette reading

Phenolphthalein indicator can be used directly only when water sample shows absence of methyl orange indicator

- **Solution in burette : 0.5N NaOH**
- **Solution in flask : 20ml water sample**
- **Indicator : Methyl orange and Phenolphthalein**

DETERMINATION OF BIOLOGICAL OXYGEN DEMAND [BOD] OF GIVEN WATER SAMPLE

METHOD : WINKLER'S TITRIMETRIC METHOD

FLOW CHART

Fill 2 oxygen bottles to overflow with aerated water sample

One of these bottles [I] with its cap inverted on its mouth is kept for incubation for 1 hour at room temperature

In the other bottle [II] add 1ml of Winkler's A and 1ml of Winkler's B [zero-hour incubation]

After incubation add 1ml of Winkler's A and Winkler's B to bottle I also

Allow the ppt formation to take place for about 10 minutes

To both the bottles carry out the following treatment

Add 1 ml of conc. H_2SO_4 and replace the stopper quickly

Mix the contents of the bottle vigorously and dissolve the ppt

Take out 50ml of the treated water in the conical flask

If the precipitate in the bottle is not completely dissolved add more cons H_2SO_4 drops at a time , till the ppt dissolves

Add 2-3 drops of starch indicator

Titrate it against 0.0125N $Na_2S_2O_3$ solution till the mixture becomes colorless

Note the burette reading for both the bottles

Calculate the BOD for the given sample of water from the difference between the mean burette readings

- **Solution in burette : 0.0125N $Na_2S_2O_3$**
- **Solution in flask : 50 ml water sample**
- **Indicator : Starch indicator**
- **End point : Blue to colourless**

DETERMINATION OF CHEMICAL OXYGEN DEMAND [BOD] OF GIVEN WATER SAMPLE

METHOD : TITRIMETRIC METHOD

FLOW CHART

In flash I (blank) - Take 10 ml of distilled water

In flask II (sample) – Take 10 ml of water sample

Add 5ml H_2SO_4 and 10ml of N/80 $KMnO_4$ to each flask

Mix the contents well by gentle rotation and plug it with cotton

Place these flasks in hot water bath at 70^{o}c for 15 minutes

Cool and then add 1 gm of KI crystals in each flask and gently rotate till the content dissolves

Plug it again with cotton and keep it in dark for 10 minutes

Titrate the contents against N/80 sodium thiosulphate solution using starch as an indicator

Note the burette reading for blank as well as sample flask

Calculate COD by using the difference between the two burette readings

- **Solution in burette : N/80 $Na_2S_2O_3$**

- **Solution in flask : Flask I – 10 ml distilled water + all the reagents mentioned in the procedure**
  Flask II – 10 ml water sample + all the reagents mentioned in the procedure
- **Indicator : Starch indicator**
- **End point : Blue to colourless**

DETERMINATION OF HARDNESS OF WATER OF GIVEN WATER SAMPLE

METHOD: EDTA TITRIMETRIC METHOD

FLOW CHART

Pipette out 1 ml of standard $CaCo_3$ solution in a conical flask

Add 9 ml of distilled water and 1 ml of NH_4CL-NH_4OH buffer

Put a tiny pinch of Eriochrome black-T indicator

Stir with a glass rod till a uniform wine-red solution is obtained

Titrate with Na_2EDTA till there is a flash color change to pale blue

Repeat the procedure with 10 ml water sample

- **Solution in burette : 0.01M Na_2EDTA**
- **Solution in flask : Standard – 1 ml std + 9 ml distilled water + 1 ml buffer**
  Sample – 10 ml water sample + 1 ml buffer
- **Indicator : Pinch of Eriochrome Black T**
- **Endpoint : Wine red to light blue**

DETERMINATION OF AMOUNT OF SULPHATES IN THE GIVEN WATER SAMPLES

METHOD: TURBIDOMETRY METHOD

FLOW CHART

Prepare a series of dilution of standard sulphate solution as in the observation table

Also prepare a tube containing 5ml of water sample

To each of the test tube add 1 ml of the buffer solution and 1 ml of 1% $BaCl_2$ solution

Shake the contents of the tube vigorously and immediately read the absorbance on the colorimeter at 540nm

Plot a graph by taking concentration of sulphates on X axis and OD on Y axis and determine the amount of sulphate in terms of mg/ltr

DETERMINATION OF AMOUNT OF COPPER IN THE GIVEN WATER SAMPLES

METHOD: TURBIDOMETRY METHOD

FLOW CHART

Prepare a series of dilutions of standard working copper solution as shown in the observation table

To each tube add 1 ml of Na citrate solution, 0.2 ml of liquor ammonia and 0.5 ml of Carbamate reagent

Mix the contents of each tube and keep standing for 10 minutes

Read the optical density on the colorimeter at 440nm

Plot the standard graph of ΔOD against conc. of copper

DETERMINATION OF MOST PROBABLE NUMBER [MPN] OF THE GIVEN WATER SAMPLES

FLOW CHART

SS medium is dispensed in 10 ml quantities into 10 tubes and DS medium is dispensed in 10 ml quantities in 5 tubes. Inverted Durham's tubes are placed in the tube and medium is autoclaved

Shake the water sample vigorously immediately before inoculating the fermentation tube

Use separate standard pipettes to inoculate different aliquots of water sample. While withdrawing water sample portions, the tip of the pipette should never be submerged more than one inch below the surface of sample

Add aseptically 10 ml aliquots of the water samples in 5 tubes of 10 ml DS medium, 1 ml aliquots of the water sample in 5 tubes of 10 ml SS medium and 0.1 ml aliquots of sample in 5 tubes of 10 ml of SS medium

Mix the contents thoroughly by shaking. Incubate the tubes at 37^0c for 48 hours

Read number of tubes in each series showing positive results (formation of acid and gas). Medium changes color to pink on acid production. Presence of an air bubble in Durham's tube indicates gas production

Refer to McCrady's table, read the total number of coliforms present in 100 ml of water sample

OBSERVATIONS:

COLOUR TEST

Colour of water shows the presence of different material inside the water. For e.g., Green colour shows presence of algae, brown colour shows presence of dead and decade material in a water.

OBSERVATION TABLE NO 1

SAMPLES	COLOUR
Umberdae	Transparent white
Gandhari	Transparent white with slight brown tinch
Durgadi	Transparent white with slight brown tinch
Gauripada	Pale yellow
Kala Talab	Light yellow

PHOTOGRAPH:

ODOUR TEST

Odour is a smell, which shows the presence of materials present in the water. We did analysis of 5 areas to know the odour of water.

OBSERVATION TABLE NO 2:

SAMPLES	ODOUR
Umberdae	Grassy & little soapy
Gandhari	Chemical & decayed, sewage
Durgadi	Chemical , medicinal & decayed
Gauripada	Fishy & decayed
Kala Talav	Fishy & decayed

CHEMICAL TESTS

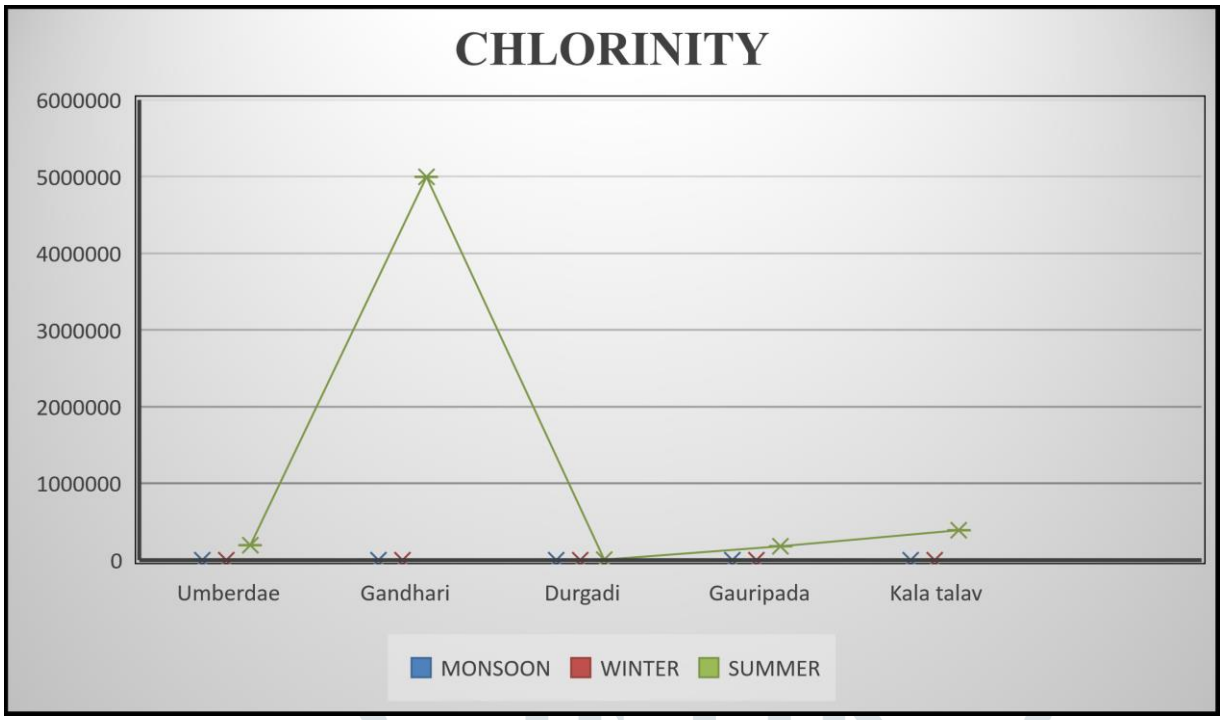
SALINITITY AND CHLORINITY OF WATER SAMPLE

Salinity maintains " Constancy of composition of sea water". Salinity of water varies with evaporation and fresh water precipitation. Chlorinity is a measure of the chloride content, by mass, of seawater (grams per kilogram of seawater, or per cubic meter

OBSERVATION TABLE NO 3

CHLORINITY

SAMPLES	SEASONAL VARIATION (gm/ltr)		
	MONSOON	WINTER	SUMMER
Umberdae	57.97	57.97	1,96,599
Gandhari	32.76	28.98	4998151.5
Durgadi	28.98	507.88	6679.32
Gauripada	54.19	54.19	180215.75
Kala Talav	16.38	16.38	385636.5

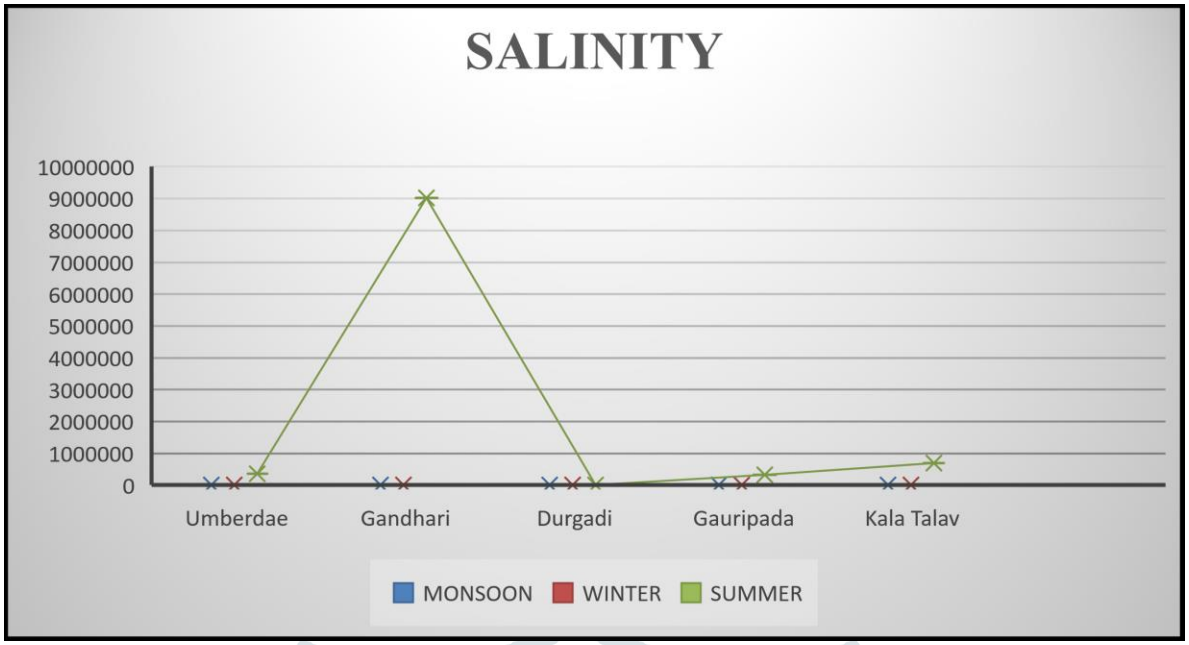


OBSERVATION TABLE NO 4:

SALINTY = CHLORINITY*1.805+0.003

SALINITY

SAMPLES	SEASONAL VARIATION (gm/ltr)		
	MONSOON	WINTER	SUMMER
Umberdae	104.63	104.63	354861.19
Gandhari	59.13	52.31	9021663.46
Durgadi	52.31	916.72	12056.17
Gauripada	97.81	97.81	325289.43
Kala Talav	29.56	29.56	696073.88


SALINITY
10000000
9000000
8000000
7000000
6000000
5000000
4000000
3000000
2000000
1000000
0
Umberdae
Gandhari
Durgadi
Gauripada
Kala Talav
MONSOON
WINTER
SUMMER

PHOTOGRAPH:

INITIAL:

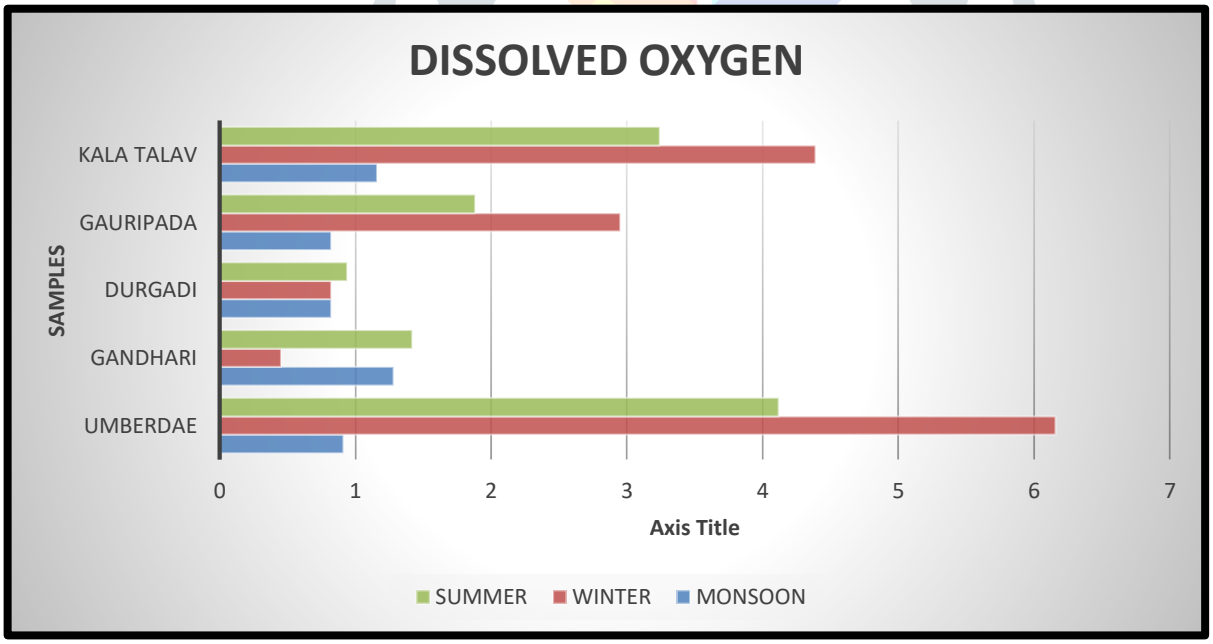
FINAL:

DISSOLVED OXYGEN OF WATER SAMPLE

Dissolved oxygen (DO) is a measure of how much oxygen is dissolved in the water - the amount of oxygen available to living aquatic organisms. The amount of dissolved oxygen in a stream or lake can tell us a lot about its water quality.

OBSERVATION TABLE NO 5:

SAMPLES	SEASONAL VARIATION (ml/l)		
	MONSOON	WINTER	SUMMER
Umberdae	0.91	6.16	4.12
Gandhari	1.28	0.45	1.42
Durgadi	0.82	0.82	0.94
Gauripada	0.82	2.95	1.88
Kala Talav	1.16	4.39	3.24



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pH OF WATER SAMPLE

pH, quantitative measure of the acidity or basicity of aqueous or other liquid solutions. The term, widely used in chemistry, biology, and agronomy, translates the values of the concentration of the hydrogen ion—which ordinarily ranges between about 1 and 10^{-14} gram-equivalents per litre—into numbers between 0 and 14.

OBSERVATION TABLE NO 6:

SAMPLES	MONSOON SEASON	
	pH VALUE	NATURE
Umberdae	8.0	ALKALINE
Gandhari	7.2	ALKALINE
Durgadi	6.5	ALKALINE
Gauripada	8.6	ALKALINE
Kala Talav	8.5	ALKALINE

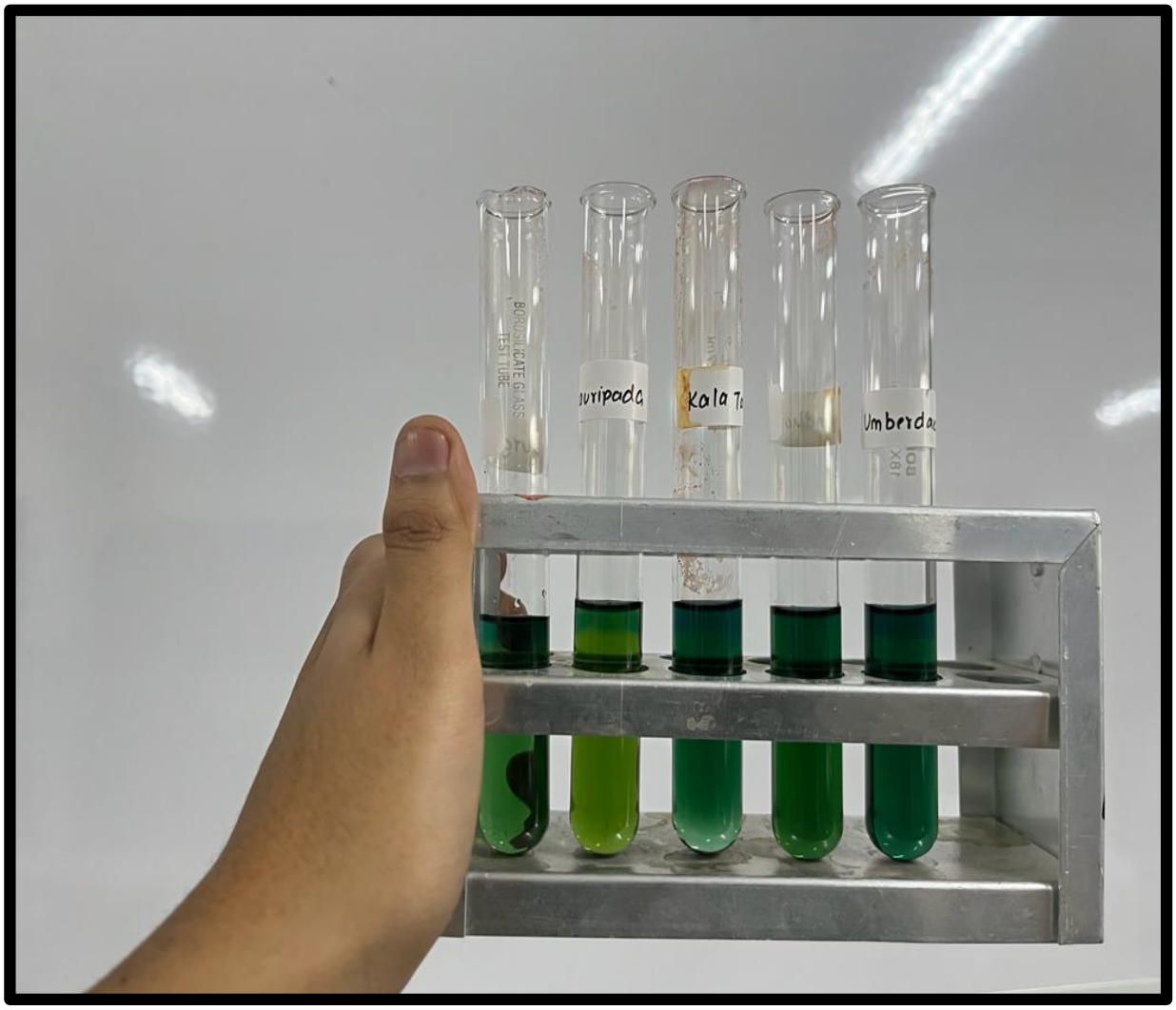
OBSERVATION TABLE NO 7:

SAMPLES	WINTER SEASON	
	pH VALUE	NATURE
Umberdae	9.0	ALKALINE
Gandhari	7.5	ALKALINE
Durgadi	8.5	ALKALINE
Gauripada	7.5	ALKALINE
Kala Talav	7.0	NEUTRAL

OBSERVATION TABLE NO 8:

SAMPLES	SUMMER SEASON	
	pH VALUE	NATURE
Umberdae	7.5	ALKALINE
Gandhari	8.5	ALKALINE
Durgadi	8.2	ALKALINE
Gauripada	8.0	ALKALINE
Kala Talav	7.5	ALKALINE

PHOTOGRAPH

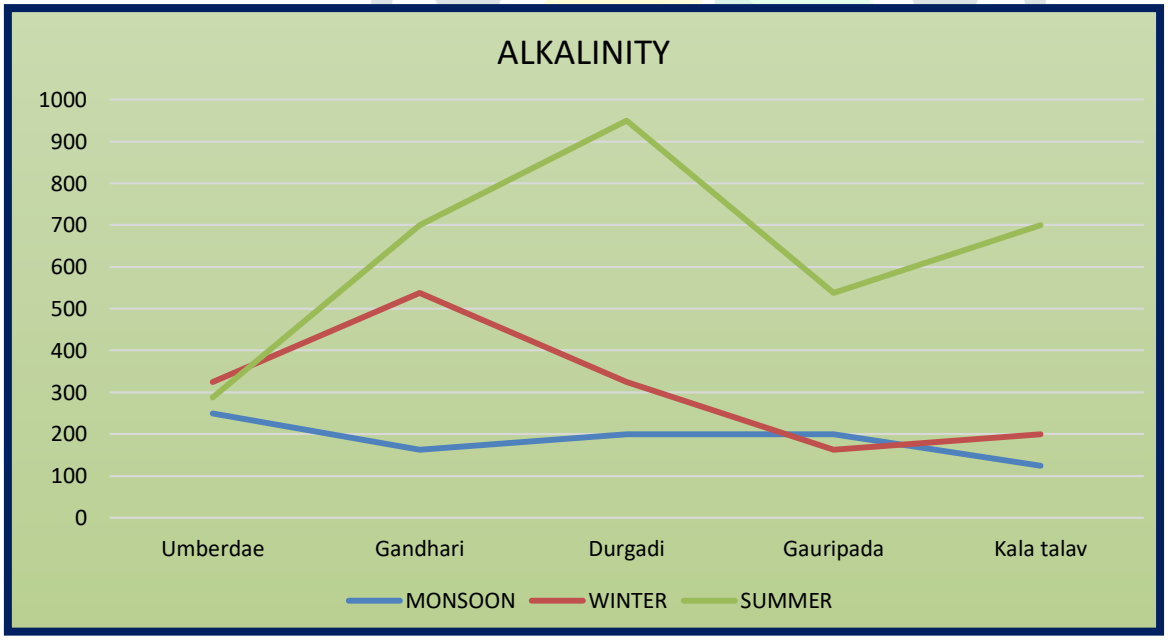


ALKALINITY TEST OF WATER SAMPLE

Alkalinity is the capacity of water to resist acidification. It should not be confused with basicity, which is an absolute measurement on the pH scale. Alkalinity is the strength of a buffer solution composed of weak acids and their conjugate bases.

OBSERVATION TABLE NO 9:

SAMPLES	SEASONAL VARIATION (mg of $CaCO_3$/lit)		
	MONSOON	WINTER	SUMMER
Umberdae	250	325	287.5
Gandhari	162.5	537.5	700
Durgadi	200	325	950
Gauripada	200	162.5	537.5
Kala Talav	125	200	700



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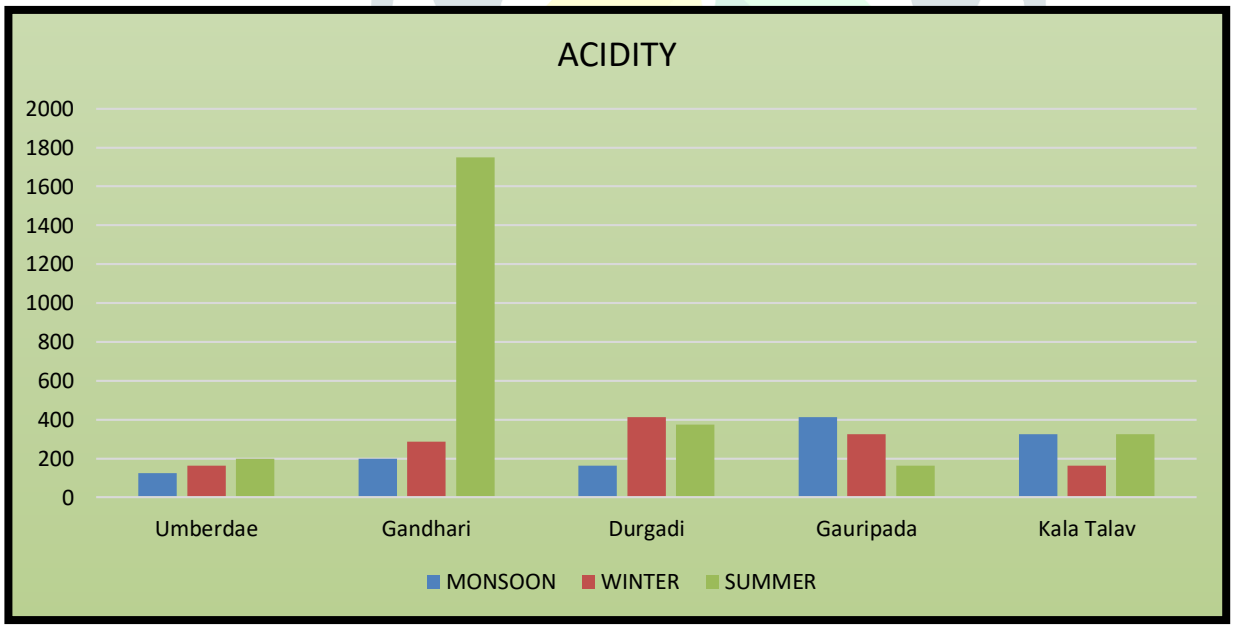
ACIDITY TEST OF WATER SAMPLE

Acidity is the sum of all titratable acid present in the water sample. Strong mineral acids, weak acids such as carbonic acid, acetic acid present in the water sample contributes to acidity of the water. Usually dissolved carbon dioxide (CO 2) is the major acidic component present in the unpolluted surface waters.

OBSERVATION TABLE NO 10:

SAMPLES	SEASONAL VARIATION (mg of $CaCO_3$/ltr)		
	MONSOON	WINTER	SUMMER
Umberdae	125	162.5	200
Gandhari	200	287.5	1750
Durgadi	162.5	412.5	375
Gauripada	412.5	325	162.5
Kala Talav	325	162.5	325



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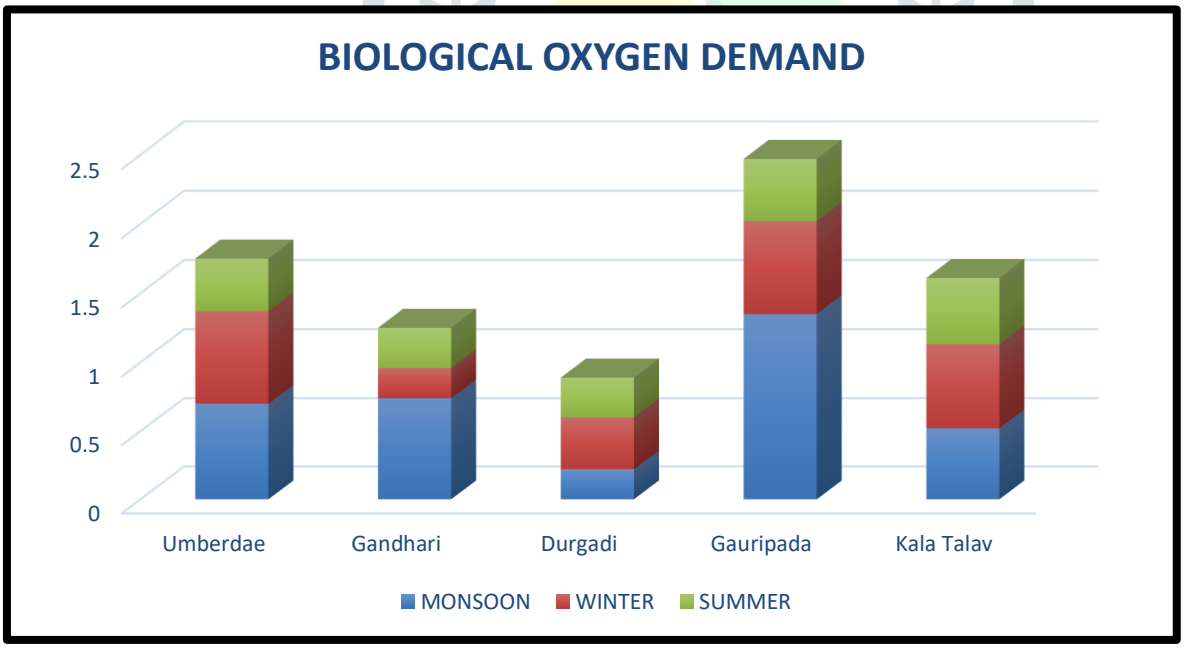
BIOLOGICAL OXYGEN DEMAND OF WATER SAMPLE

BOD, also called biological oxygen demand, is the amount of dissolved oxygen needed (i.e., demanded) by aerobic biological organisms to break down organic material present in a given water sample at certain temperature over a specific time period.

OBSERVATION TABLE NO 11:

SAMPLES	SEASONAL VARIATION (mg/ltr)		
	MONSOON	WINTER	SUMMER
Umberdae	0.70	0.67	0.38
Gandhari	0.74	0.22	0.29
Durgadi	0.22	0.38	0.29
Gauripada	1.35	0.67	0.45
Kala Talav	0.52	0.61	0.48



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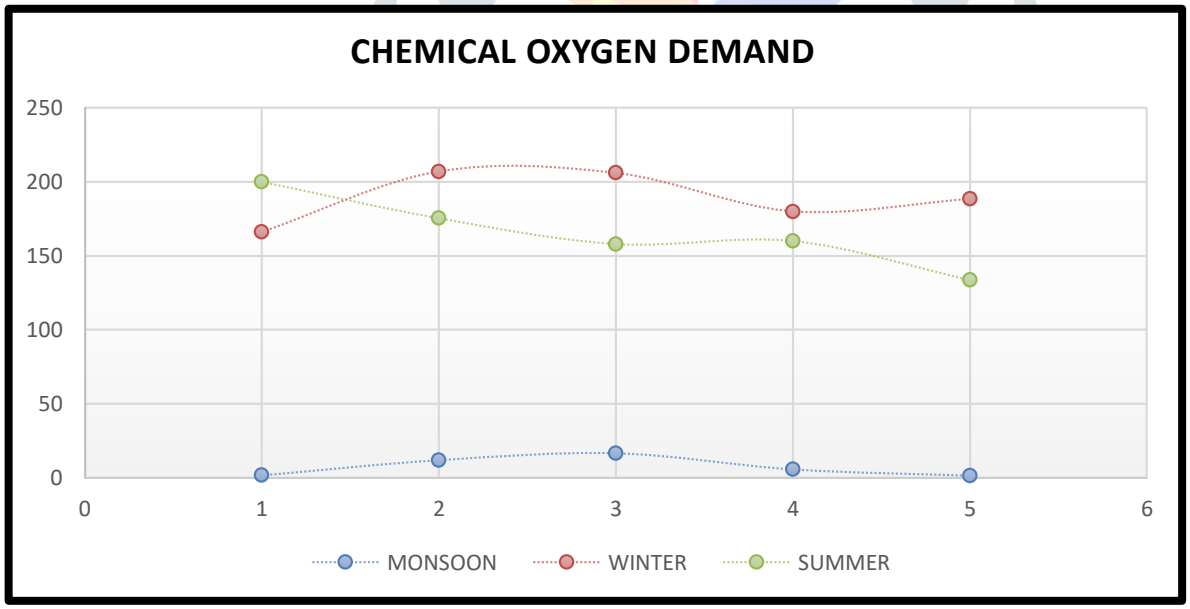
CHEMICAL OXYGEN DEMAND OF WATER SAMPLE

Chemical oxygen demand (COD) is the amount of dissolved oxygen that must be present in water to oxidize chemical organic materials, like petroleum. COD is used to gauge the short-term impact wastewater effluents will have on the oxygen levels of receiving waters.

OBSERVATION TABLE NO 12:

SAMPLES	SEASONAL VARIATION (mg/ltr)		
	MONSOON	WINTER	SUMMER
Umberdae	1.6	166	200
Gandhari	12	207	175.4
Durgadi	16.7	206	158
Gauripada	5.7	180	160
Kala Talav	1.4	188.4	133.7



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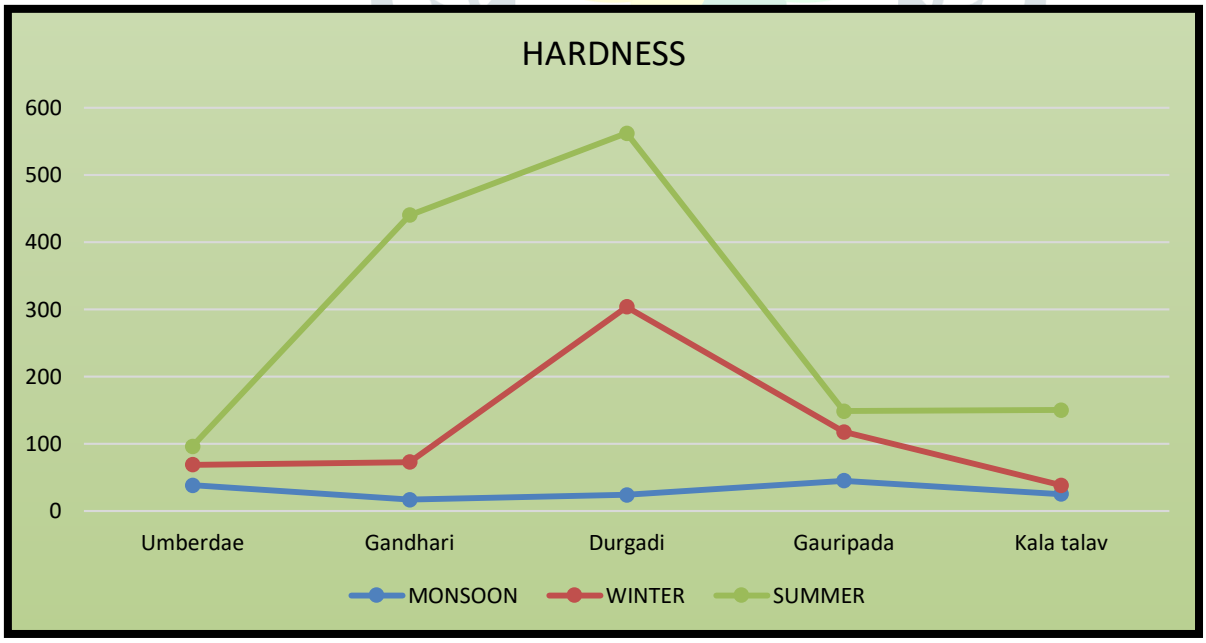
HARDNESS OF WATER SAMPLE

Hardness is the property of water which prevents the formation of lather or foam and needs large quantities of soap'. It forms scales in not water pipes, heaters, boilers where the temperature of water is increased. Definition: Hardness is the property of water which prevents the formation of lather or foam and needs large quantities of soap

OBSERVATION TABLE NO 13:

SAMPLES	SEASONAL VARIATION (mg of $CaCo_3$/lit)		
	MONSOON	WINTER	SUMMER
Umberdae	38.11	68.94	96.13
Gandhari	16.81	72.86	440.03
Durgadi	24.09	303.53	562.23
Gauripada	44.83	117.71	148.54
Kala Talav	25.22	38.11	150.20



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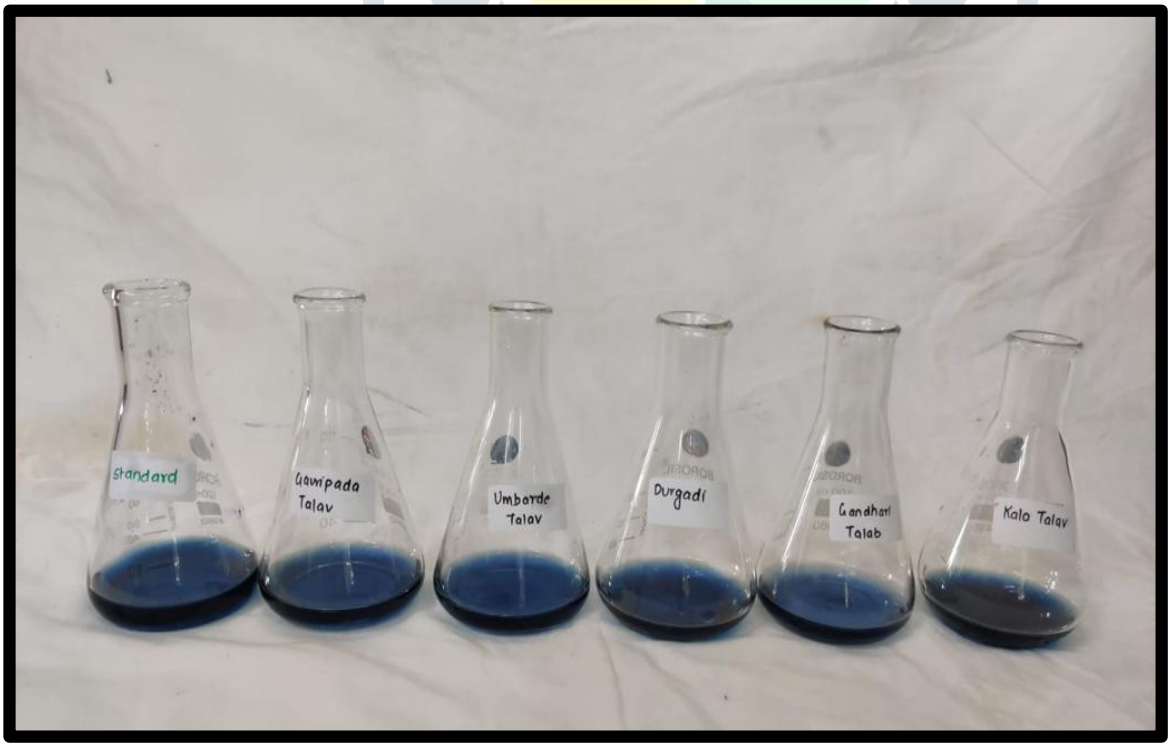


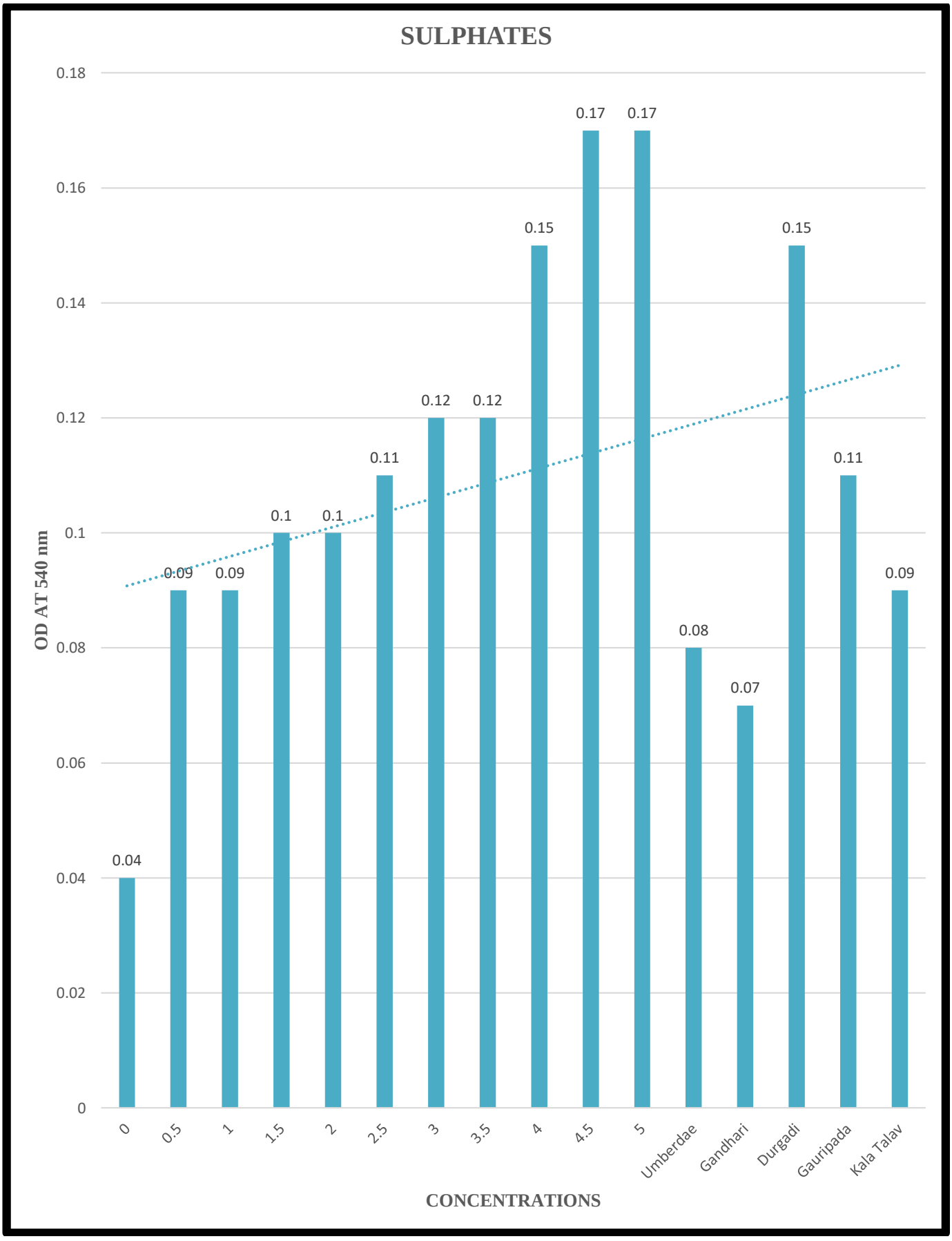
SULPHATES IN WATER SAMPLE

Sulphate minerals are used in the preparation of salts . sulphate is required for proper cell growth and development of the organisms.

OBSERVATION TABLE NO 14:

FOR MONSOON SEASON

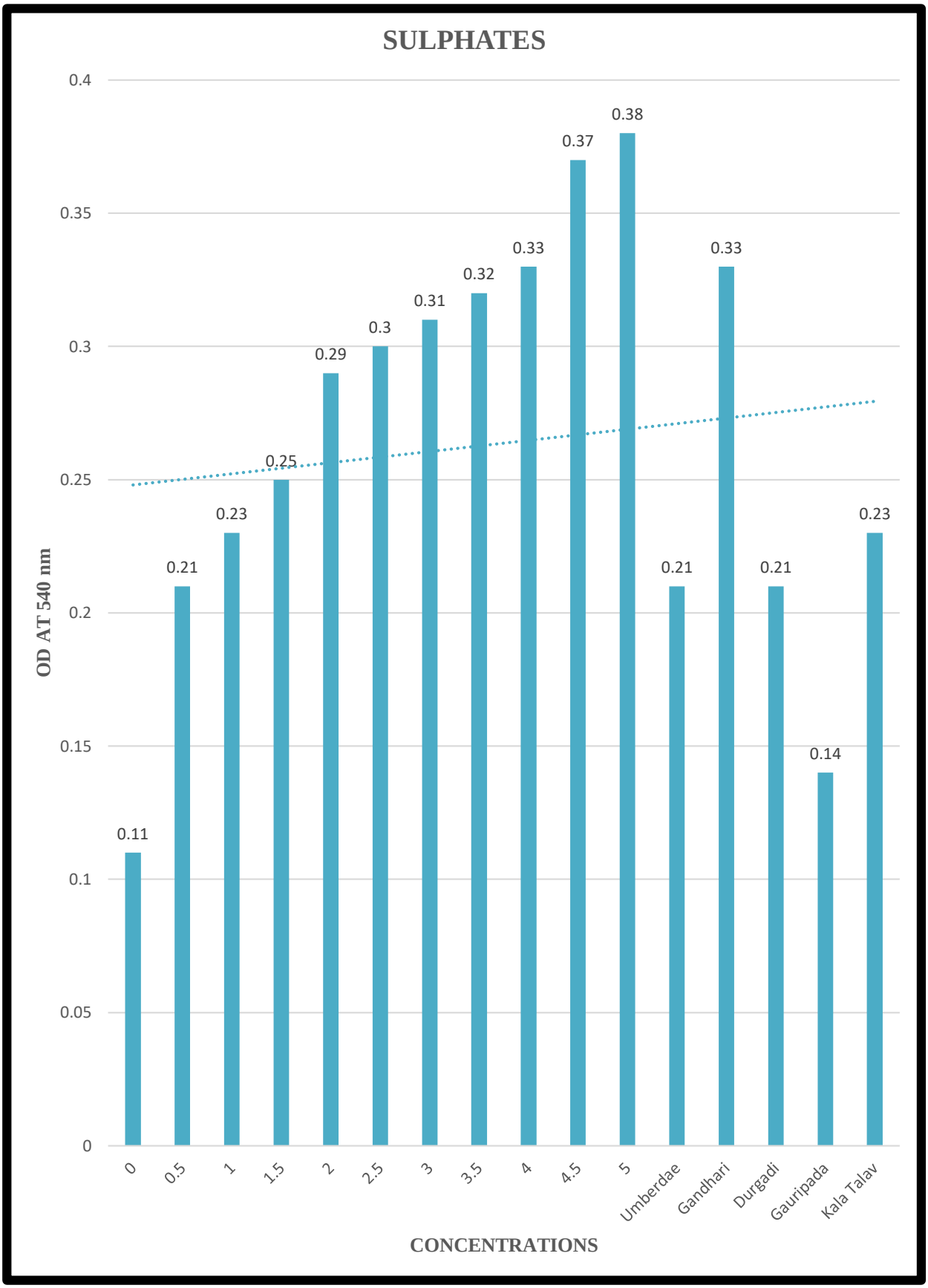
Sr. No	Std Sulphate (ml)	D/w (ml)	OD	ΔOD
1	0.0	5.0	0.04	0.04
2	0.5	4.5	0.09	0.09
3	1.0	4.0	0.09	0.09
4	1.5	3.5	0.10	0.10
5	2.0	3.0	0.10	0.10
6	2.5	2.5	0.11	0.11
7	3.0	2.0	0.12	0.12
8	3.5	1.5	0.12	0.12
9	4.0	1.0	0.15	0.15
10	4.5	0.5	0.17	0.17
11	5.0	0.0	0.17	0.17
Umberdae	5.0	0.0	0.08	0.08
Gandhari	5.0	0.0	0.07	0.07
Durgadi	5.0	0.0	0.15	0.15
Gauripada	5.0	0.0	0.11	0.11
Kala Talav	5.0	0.0	0.09	0.09


SULPHATES
OD AT 540 nm
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
0.04
0.09
0.09
0.1
0.1
0.11
0.12
0.12
0.15
0.17
0.17
0.08
0.07
0.15
0.11
0.09
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
Umberdae
Gandhari
Durgadi
Gauripada
Kala Talav
CONCENTRATIONS

OBSERVATION TABLE NO 15:

FOR WINTER SEASON

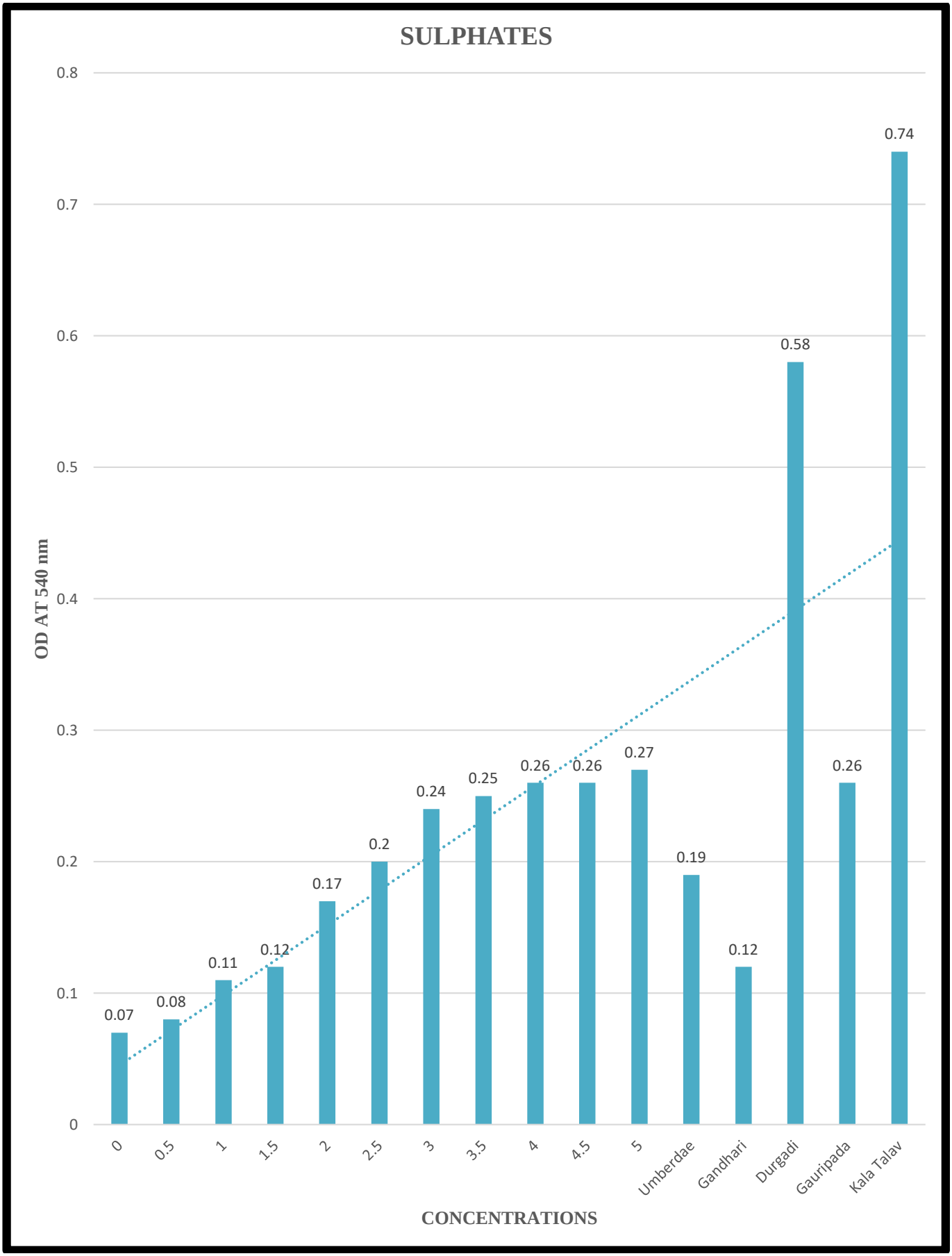
Sr. No	Std Sulphate (ml)	D/w (ml)	OD	ΔOD
1	0.0	5.0	0.11	0.11
2	0.5	4.5	0.21	0.21
3	1.0	4.0	0.23	0.23
4	1.5	3.5	0.25	0.25
5	2.0	3.0	0.29	0.29
6	2.5	2.5	0.30	0.30
7	3.0	2.0	0.31	0.31
8	3.5	1.5	0.32	0.32
9	4.0	1.0	0.33	0.33
10	4.5	0.5	0.37	0.37
11	5.0	0.0	0.38	0.38
Umberdae	5.0	0.0	0.21	0.21
Gandhari	5.0	0.0	0.33	0.33
Durgadi	5.0	0.0	0.21	0.21
Gauripada	5.0	0.0	0.14	0.14
Kala Talav	5.0	0.0	0.23	0.23


SULPHATES
OD AT 540 nm
CONCENTRATIONS
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
0.11
0.21
0.23
0.25
0.29
0.3
0.31
0.32
0.33
0.37
0.38
0.21
0.33
0.21
0.14
0.23
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
Umberdae
Gandhari
Durgadi
Gauripada
Kala Talav

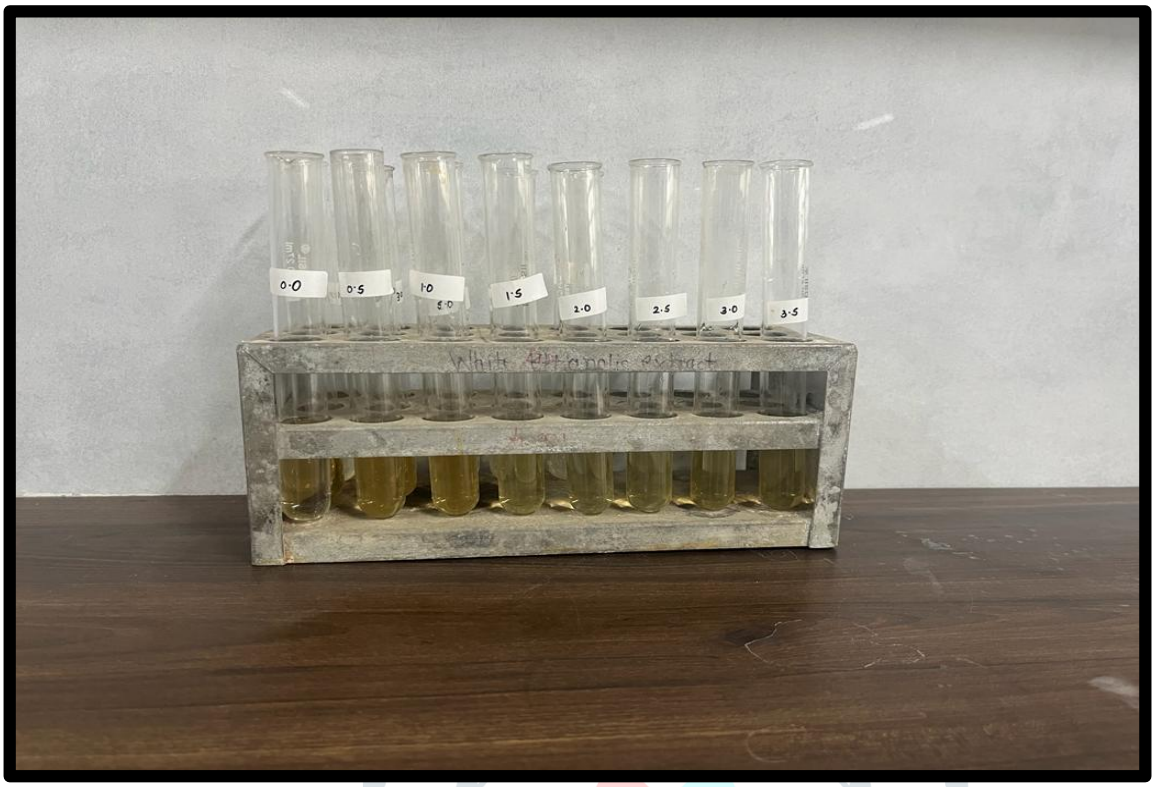
OBSERVATION TABLE NO 16:

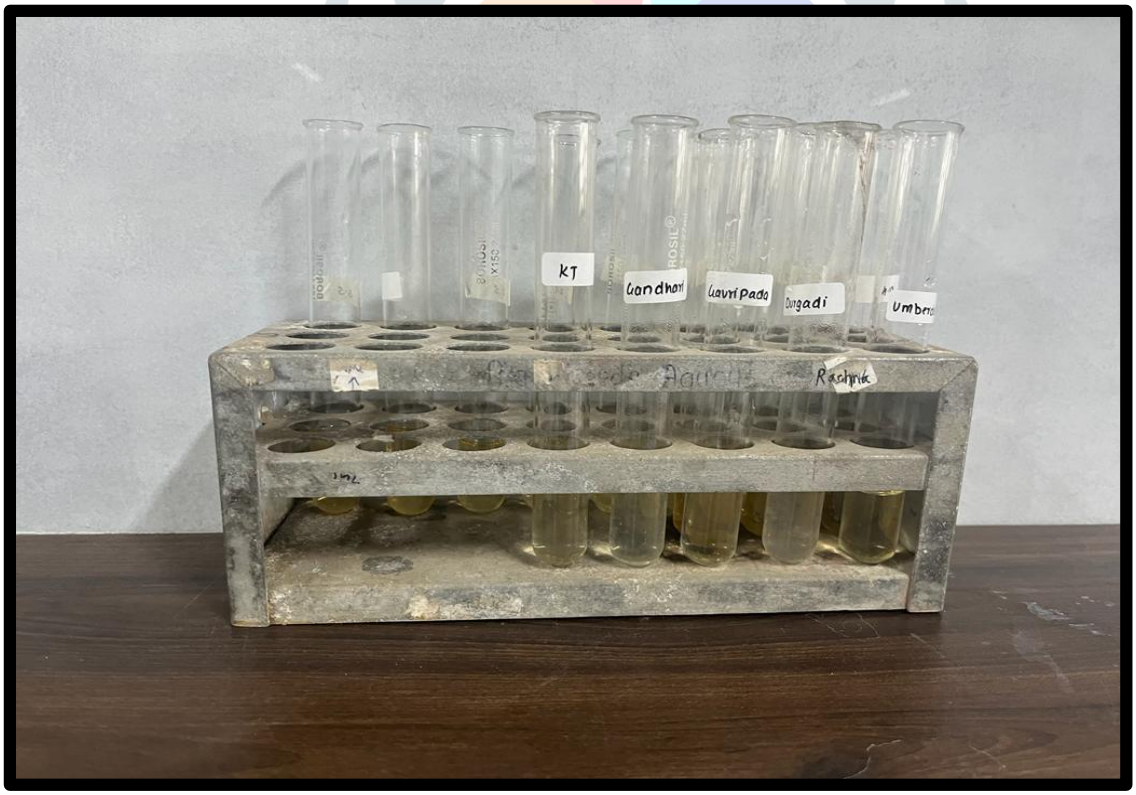
FOR SUMMER SEASON

Sr. No	Std Sulphate (ml)	D/w (ml)	OD	ΔOD
1	0.0	5.0	0.07	0.07
2	0.5	4.5	0.08	0.08
3	1.0	4.0	0.11	0.11
4	1.5	3.5	0.12	0.12
5	2.0	3.0	0.17	0.17
6	2.5	2.5	0.20	0.20
7	3.0	2.0	0.24	0.24
8	3.5	1.5	0.25	0.25
9	4.0	1.0	0.26	0.26
10	4.5	0.5	0.26	0.26
11	5.0	0.0	0.27	0.27
Umberdae	5.0	0.0	0.19	0.19
Gandhari	5.0	0.0	0.12	0.12
Durgadi	5.0	0.0	0.58	0.58
Gauripada	5.0	0.0	0.26	0.26
Kala Talav	5.0	0.0	0.74	0.74


SULPHATES
OD AT 540 nm
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0.07
0.08
0.11
0.12
0.17
0.2
0.24
0.25
0.26
0.26
0.27
0.19
0.12
0.58
0.26
0.74
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
Umberdae
Gandhari
Durgadi
Gauripada
Kala Talav
CONCENTRATIONS

PHOTOGRAPH





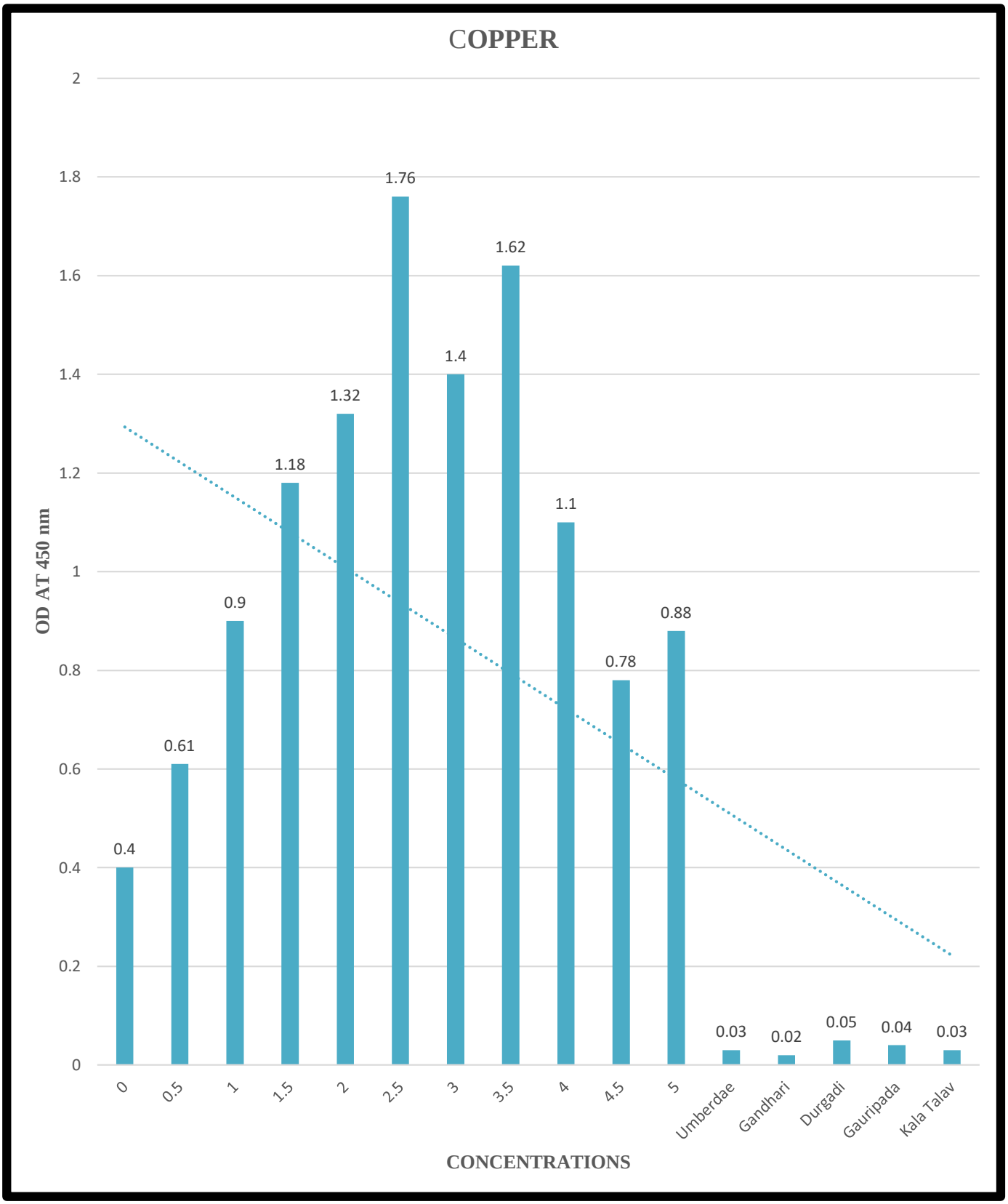
COPPER IN WATER SAMPLE

It is metal that exists in the environment as mineral in rocks and soil. It is very useful for the body to stay healthy, but it is harmful in too much amount.

OBSERVATION TABLE NO 17:

FOR MONSOON SEASON

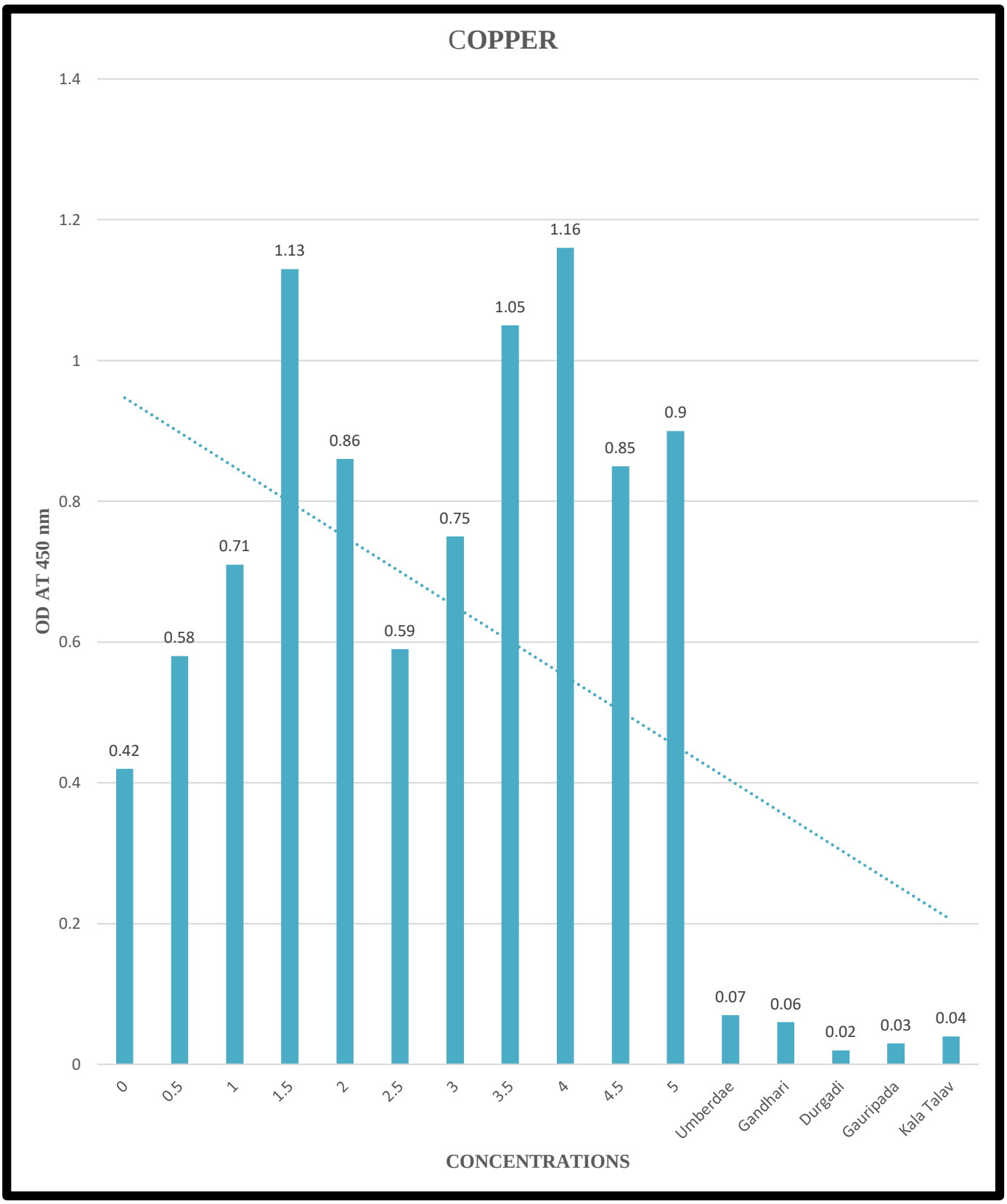
Sr. No	Std Copper (ml)	D/w (ml)	OD	ΔOD
1	0.0	5.0	0.40	0.40
2	0.5	4.5	0.61	0.61
3	1.0	4.0	0.90	0.90
4	1.5	3.5	1.18	1.18
5	2.0	3.0	1.32	1.32
6	2.5	2.5	1.76	1.76
7	3.0	2.0	1.40	1.40
8	3.5	1.5	1.62	1.62
9	4.0	1.0	1.10	1.10
10	4.5	0.5	0.78	0.78
11	5.0	0.0	0.88	0.88
Umberdae	5.0	0.0	0.03	0.03
Gandhari	5.0	0.0	0.02	0.02
Durgadi	5.0	0.0	0.05	0.05
Gauripada	5.0	0.0	0.04	0.04
Kala Talav	5.0	0.0	0.03	0.03


COPPER
OD AT 450 nm
CONCENTRATIONS
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
0.4
0.61
0.9
1.18
1.32
1.76
1.4
1.62
1.1
0.78
0.88
0.03
0.02
0.05
0.04
0.03
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
Umberdae
Gandhari
Durgadi
Gauripada
Kala Talav

OBSERVATION TABLE NO 18:

FOR WINTER SEASON

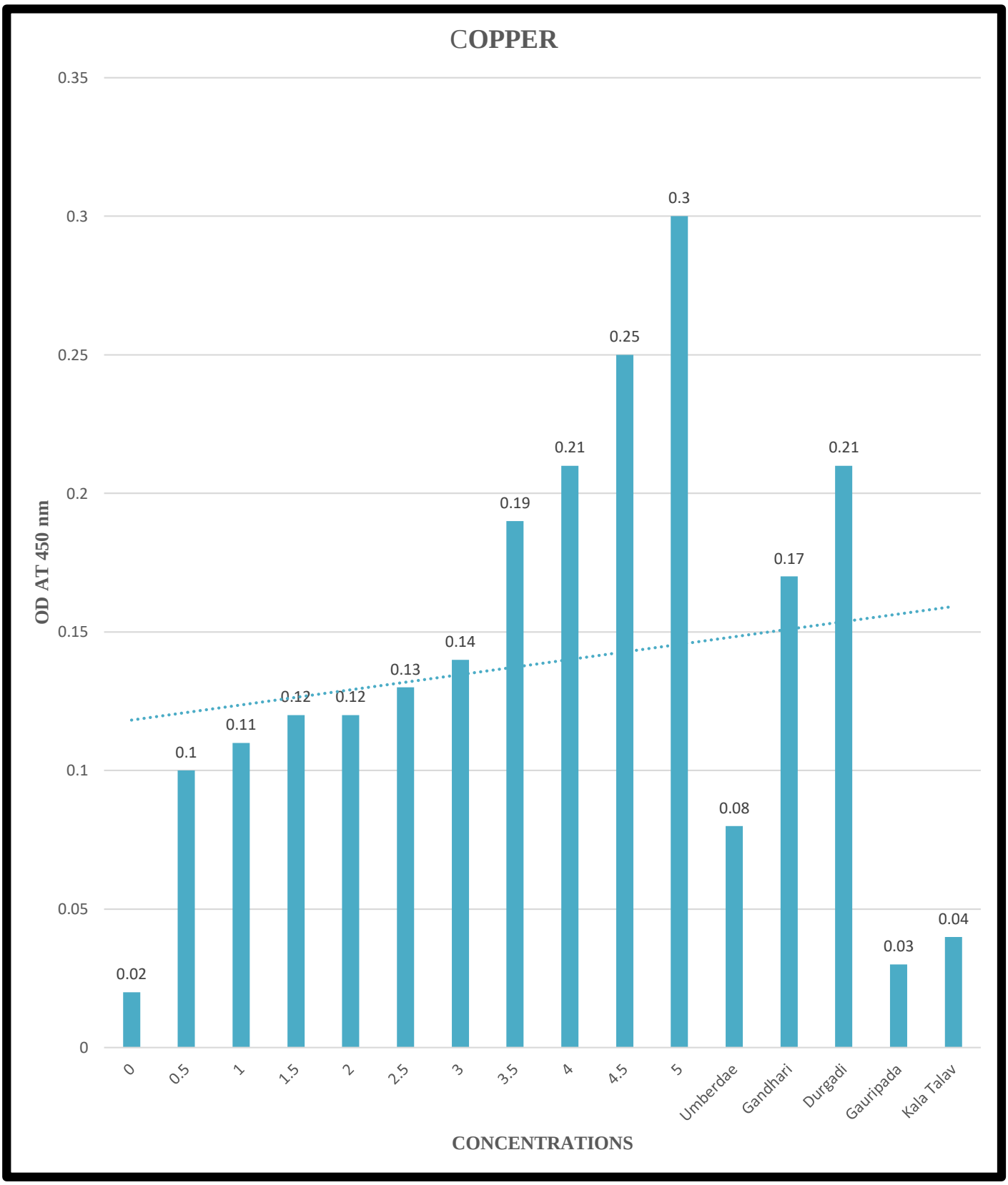
Sr. No	Std Sulphate (ml)	D/w (ml)	OD	ΔOD
1	0.0	5.0	0.42	0.42
2	0.5	4.5	0.58	0.58
3	1.0	4.0	0.71	0.71
4	1.5	3.5	1.13	1.13
5	2.0	3.0	0.86	0.86
6	2.5	2.5	0.59	0.59
7	3.0	2.0	0.75	0.75
8	3.5	1.5	1.05	1.05
9	4.0	1.0	1.16	1.16
10	4.5	0.5	0.85	0.85
11	5.0	0.0	0.90	0.90
Umberdae	5.0	0.0	0.07	0.07
Gandhari	5.0	0.0	0.06	0.06
Durgadi	5.0	0.0	0.02	0.02
Gauripada	5.0	0.0	0.03	0.03
Kala Talav	5.0	0.0	0.04	0.04


COPPER
OD AT 450 nm
1.4
1.2
1
0.8
0.6
0.4
0.2
0
0.42
0.58
0.71
1.13
0.86
0.59
0.75
1.05
1.16
0.85
0.9
0.07
0.06
0.02
0.03
0.04
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
Umberdae
Gandhari
Durgadi
Gauripada
Kala Talav
CONCENTRATIONS

OBSERVATION TABLE NO 19:

FOR SUMMER SEASON

Sr. No	Std Sulphate (ml)	D/w (ml)	OD	ΔOD
1	0.0	5.0	0.02	0.02
2	0.5	4.5	0.10	0.10
3	1.0	4.0	0.11	0.11
4	1.5	3.5	0.12	0.12
5	2.0	3.0	0.12	0.12
6	2.5	2.5	0.13	0.13
7	3.0	2.0	0.14	0.14
8	3.5	1.5	0.19	0.19
9	4.0	1.0	0.21	0.21
10	4.5	0.5	0.25	0.25
11	5.0	0.0	0.30	0.30
Umberdae	5.0	0.0	0.03	0.03
Gandhari	5.0	0.0	0.17	0.17
Durgadi	5.0	0.0	0.21	0.21
Gauripada	5.0	0.0	0.05	0.05
Kala Talav	5.0	0.0	0.08	0.08


COPPER
OD AT 450 nm
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
0.02
0.1
0.11
0.12
0.12
0.13
0.14
0.19
0.21
0.25
0.3
0.08
0.17
0.21
0.03
0.04
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
Umberdae
Gandhari
Durgadi
Gauripada
Kala Talav
CONCENTRATIONS

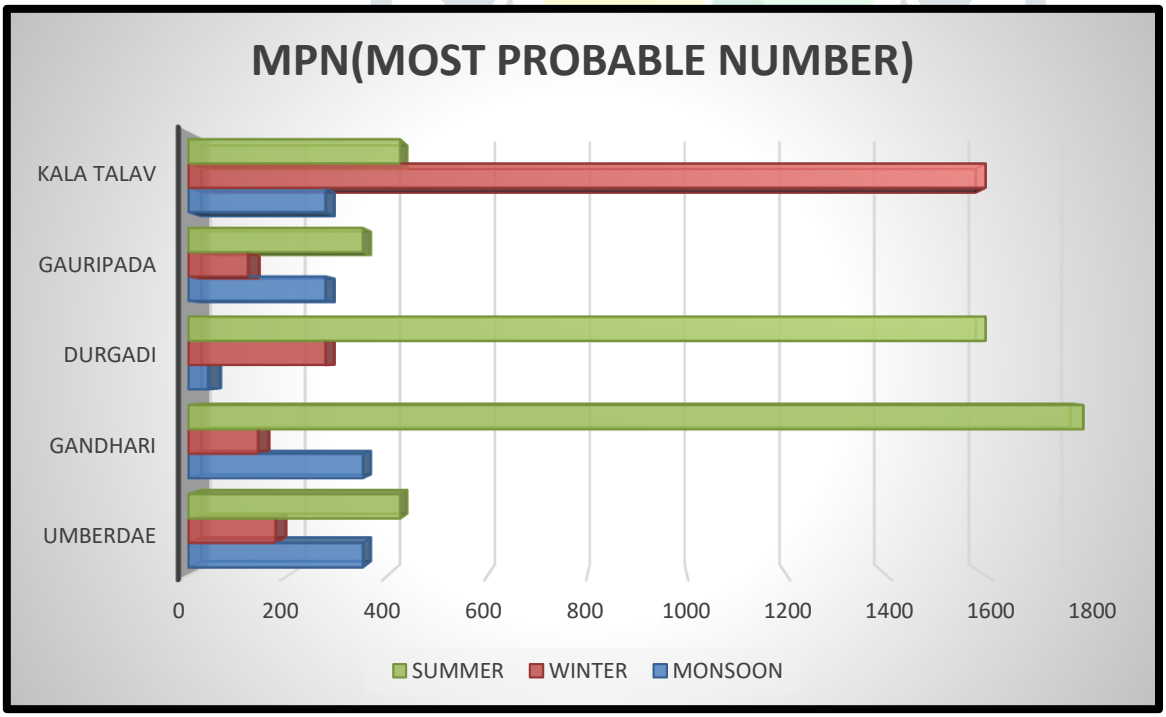
PHOTOGRAPH

MPN (MOST PROBABLE NUMBER) OF WATER SAMPLE

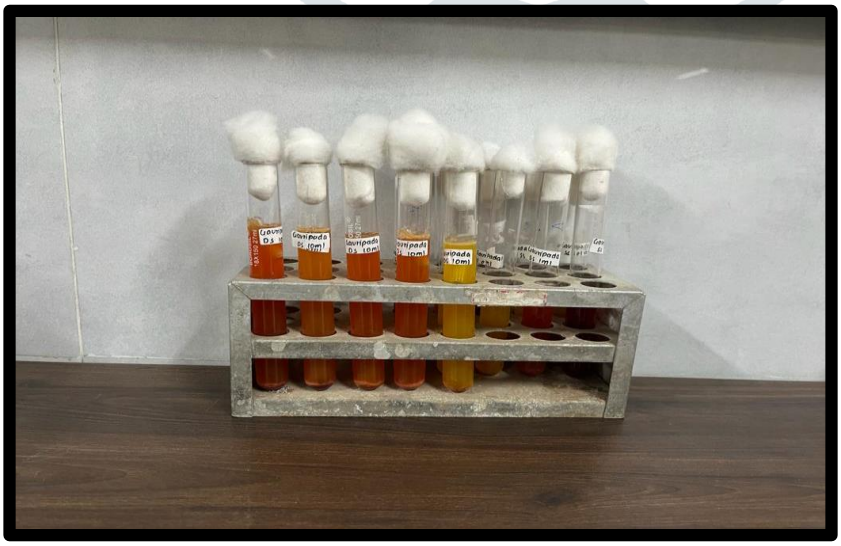
The coliform group consists all aerobics and facultatively anaerobic , gram-negative non-sporing, rod shaped bacteria that ferment lactose with gas formation, within 48 hours at 35-37°C. Since coliforms ferment lactose with formation of acid and gas, the media used for presumptive coliform count contain lactose and indicator of acidity.

OBSERVATION TABLE NO 20:

SAMPLES	SEASONAL VARIATION		
	MONSOON	WINTER	SUMMER
Umberdae	5,4,4 = 350	5,3,3 = 175	5,4,5 = 425
Gandhari	5,4,4 = 350	5,3,2 = 140	5,5,5 = 1800
Durgadi	4,3,2 = 40	5,4,3 = 275	5,5,4 = 1600
Gauripada	5,4,3 = 275	5,2,3 = 120	5,4,4 = 350
Kala Talav	5,4,3 = 275	5,5,4 = 1600	5,4,5 = 425



PHOTOGRAPH:



CONCLUSION:

From the above observations it is evident that each water sample contains impurities that need to be taken into consideration while consuming it. Proper treatment must be done or the water should be purified before consumption

ACKNOWLEDGEMENT

We wish to thank the Department of Botany for their constant help and support during the completion of the project

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- Patil et al. in 2012 said that Testing of water is very crucial and significant before it is used for drinking, domestic, agricultural, or industrial purpose. Water has to be tested with distinctive physicochemical parameters.
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- https://www.nationalgeographic.com/environment/article/freshwater-pollution