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## PHYSICOCHEMICAL ANALYSIS OF UNDERGROUND WATER AROUND DIFFRENT STATIONS IN OMERGA TALUKA DIST.OSMANABAD

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### ABSTRACT

The sample of ground water were collected from different stations in omerga .The quality of ground water has been determined by testing various physicochemical parameters. The parameters studied were temperature,  $P^H$ , TDS, Conductivity and dissolved oxygen, Hardness, Chlorides and MPN.

**KEY WORDS:** Physicochemical Analysis, Ground Water

### INTRODUCTION

The groundwater is clear and colourless but when water seeps down the ground, it dissolves inorganic salts. Thus this water is harmful than the surface water. Generally ground water is free from bacteria and other living organism because they are filtered out while percolating through the sub soil. Most usable groundwater is shallow groundwater that occurs at less than 750 m dept and constitutes the largest freshwater reservoir for humans. The deeper groundwater reservoir from 750 to 4000 m, but a large part of this is saline water with a high concentration of dissolved salts. Ground water pollution causes damage to soil, plants and animals.

**Experimental:-** The composition of the sample should be identical to that of the water body from which it is collected. Water samples were collected in a thoroughly cleaned and high-density polyethylene bottle (1 Lit) from the different stations of selected areas of Omerga. For microbiological examination the bottles used were sterilized.

Parameters like pH, dissolved oxygen, TDS, electrical conductivity are recorded or estimated immediately after collecting the samples. The temperature is recorded on the spot. pH and electrical conductivity were determined using pH meter and conductivity meter respectively. Dissolved oxygen by Mohr's method The other parameter like TDS, hardness and MPN were determined by standard methods.

### RESULT AND DISCUSSION:

#### TEMPERATURE:

Temperature of ground water has been determined on the spot. For the present work the maximum temperature recorded was 32.6<sup>0</sup>c at station S1 in summer season and the minimum temperature was 23<sup>0</sup>c at station S2 in the winter season. The average temperature of this region was 26.34<sup>0</sup>c. The general trend was in winter < Rain < summer. It was observed that at station S1, S2, S3 in summer the temperature for the S3 was more compared to other two stations.

Syed A. Untoo reported temperature of river Ganga near Rajghat 31.5<sup>0</sup>c. A.C. Das and Others reported temperature of different water bodies in Gohati city, they observed temperature variation from 27-33.5<sup>0</sup>c

**pH:**

The pH is one of the important parameter of the water quality. Decrease or increase in pH of water indicates the pollution of water. At a given temperature the intensity of the acidic or basic character of water indicated by pH or hydrogen ion activity.

In the present study pH varies from 7.30-7.97. It is highest at station S1 in summer season and lowest at station S3 in winter. The average value of the pH is 7.42. It was observed that the pH of station S1 in summer, S3 in winter was found highest and at station S1 and S3 in winter was found lowest value of pH. The high pH of water bodies may be due to the algal blooms that prevented the formation of carbon dioxide linked acid radicals. For the present study pH showed marginal changes and remain around normal values. The low value of pH may be due to decay of organic matter which gives off carbon dioxide and ultimately reduced the pH.

K.C. Pandey reported the pH of ground water in the river basin of Ramganga at Muradabad. He observed that pH was in the range 7.35-8.76. S.Das and co-workers<sup>18</sup> reported acidic ground water with low pH ranges 6.40-6.45 in region of Bhuneswar city. They reported that this may be due to the presence of considerable amount of carbon dioxide and subsequent leaching action of laterites.

Jeyakuma and others reported that though the pH has no direct effect on the human health, all biochemical reactions are sensitive to the variation of pH. The limit of pH value for drinking water is specified at 6.5 to 8.5. The maximum permissible value prescribed by (WHO) is 6.5 – 9.2 and highest desirable value is 7.0 – 8.5.

**TOTAL DISSOLVED SOLIDS (TDS):**

Solids content in water constitute the total dissolved solids and suspended solids. Higher value of TDS indicates the dissolution of large number of salts in water. In the present work TDS lies in the range of .360-1.44 gms/lit. The maximum value of TDS was observed at sample site S2 in winter and the minimum value was observed at sample site S2 in summer. The value of total dissolved solids was found highest at stations S2 in winter season. S2 and S3 in rainy season. The general trends was in winter > Rain > summer. In some station fluctuation are observed The average TDS of this region was 0.980.

The TDS among the various stations of Omerga shows maximum value in the winter season at the station S2. At S1 also similar trends was observed. This may be due to evaporation of water & increase in the concentration of particles etc. It is common observation that relatively TDS is high in rainy season. This may be due to more dissolution of soil particles in the water runoff. According to WHO, UPSH, the permissible value of TDS is 500 mg./lit.

Manvir Singh and K.C. Gupta reported TDS in the range 808-945 mg/lit. for the river of Yamuna of Mathura. The water containing more than 500 mg/lit of TDS is not desirable for drinking water supplies, though more highly mineralized water is also used where better water is not available. For this reason 500 mg/lit it as desirable limit and 1500 mg/lit as the maximum permissible limit has been suggested for drinking water.

**CONDUCTIVITY:**

Conductivity measures the conducting capacity of electricity. High conductivity of ground water is due to the presence of electrolytes; electrolytes in water dissociate in to positive and negative ions and impart conductivity. Conductivity measurement is an excellent indicator of TDS, which is a measure of salinity that affects the taste of potable water. The variations in electrical conductivity are based on sedimentary structure and composition of rock.

In the present work it was observed that the average value of conductivity was 0.551 milimhos/cm and was ranges from .342-0.898 milimhos/cm. It was found that the conductivity value is very high at sample site S2 in winter season, whereas conductivity was found low at sample site S3 in the rainy season.

For Station S1 and S2 shows high conductivity value in winter season, whereas remaining shows high conductivity in summer season. As per UPSSH standard permissible value of conductance is 0.300 milimhos/cm

Er. Motiram Sharma and Er. P.S. Varma reported 0.280-1.427 milimhos  $\text{cm}^{-1}$  with average value of 594 mhos  $\text{cm}^{-1}$ . They reported this may be due to the presence of calcium which are leached to ground water. They also observed that magnesium concentration in ground water was lower than calcium.

#### **DISSOLVED OXYGEN:**

Dissolved oxygen is one of the important parameter in the analysis of water. The hot water and oxidizing materials reduces the dissolved oxygen content. As the temperature increases, the organic matter degrades fast and activity of biological life is more, as a result there will be more demand to dissolved oxygen.

In the present work we found the average value of dissolved oxygen was 4.32 mg/lit. It varies in the range of 3.88 to 5.11 mg/lit. The minimum value of dissolved oxygen content in ground water was at station S1 in winter and the maximum dissolved oxygen content was at station S2 in the rainy season. It is also observed that at various sample sites the D.O. is below 4 mg/lit. It may be due to the presence of degradable organic matter.

R.E. Raja and co-workers observed that well water has very high Dissolved Oxygen and low BOD and low alkalinity. They also reported 100% saturation for well water and residential area of Tiruchirappalli. The water in the open well is in direct contact with air, where direct diffusion across the air water interface is possible. In addition the water receives sunlight and is capable of supporting photosynthetic activity of phyton plankton which helps in maintaining dissolved oxygen.

Dissolved oxygen is one of the important pollution parameter, which measure the extent of organic as well as biological pollution load to a water body. The recommended dissolved oxygen limit for all domestic purposes is 4-5 ppm. Usually very high DO indicates the pollution load to the water body. Depletion in DO level lead to an increase consumer's complaint especially regarding taste, odour and colour of the water.

#### **HARDNESS (as $\text{CaCO}_3$ ):**

Though the hardness of water is not the indicator of water pollution but indicates the quality of water. The use of water for domestic, agriculture or industrial purposes depends on the hardness of water.

In our study it was observed that the average hardness recorded was 195.88 mg/lit. It ranges from 156-224 mg/lit. The minimum total hardness was found at station S3 in the rainy and maximum at station S2 in the winter season. As prescribed by WHO highest desirable value of hardness as calcium carbonate is 100 ppm. and maximum permissible value is 500 ppm.

Saxena and Kaur reported that Hardness of water as calcium carbonate is an important measure of pollution. They found four sites have hardness beyond the permissible limit (500 ppm) given by WHO. Increase in hardness is due to the presence of the salts of calcium, magnesium and iron.

#### **CHLORIDES:**

Chloride is one of the major inorganic anions in water and wastewater in the form of chlorides. Higher concentration of the chloride may harm metallic pipes and structures, and also to the growing plant. In natural water chloride anions are commonly found to be very low. Industrial effluents may increase the chloride content in natural water.

The average concentration of chloride was found to be 102.73 mg/lit. It was in the range of minimum 52 at station S2 in summer and maximum 144.12 mg/lit. at station S1 in the summer. Highest desirable value of chlorides is 200 ppm. and maximum permissible value is 600 ppm. (WHO)

Ground waters get its chloride from the solubility of Cl<sup>-</sup> when water percolates through the topsoil and deeper formation. Chloride is the best indicator of pollution. Nirmal Kumar observed that high concentration of chlorides at some sample sites. It could be due to location of sample site near by industrial zone and area might be under water table region having a slope towards Bay of Combay.

#### MPN (Most Probable Number):

The degree of contamination of the quality of water samples containing coliform is expressed in terms of MPN. *Escherichia Coli* (E.Coli) is the most common bacteria in the coliform group. These bacteria are harmless but their presence indicates the presence of pathogenic bacteria may also be present. E.Coli germs are discharged in very large numbers with the faeces. The bacterial density which may be regarded as the bacteria content that most likely to be present in water is called as most probable number. MPN test is simple and widely used method of measuring coliforms.

We observed that the minimum value of MPN was 41 at station S1 in the rainy season and the maximum value of 78 was recorded at station S2 in winter. The average MPN was 51.11. E.coli count in 100 ml of any water sample should be zero.

Joshi and other reported that sample including some ground water samples show the presence of faecal coliform and faecal streptococci at Rammathpuram district Talganga. Royee and Prakasam<sup>38</sup> reported high value of MPN. At one of the site, contained the highest number of fecal coliforms. It is notable that this well has no circular protective wall and in its proximity there are waste dumps and nonsanitary latrine.

**Table:- Main Station- Omerga Year-2017**

Parameter	Season	S1	S2	S3	Avg
Temperature °C	S	32.60	29.00	31.50	31.03
	R	26.00	26.00	23.00	25.00
	W	24.00	23.00	22.00	23.00
p <sup>H</sup>	S	7.97	7.67	7.47	7.70
	R	7.40	7.30	6.90	7.25
	W	7.40	7.30	7.24	7.31
TDS gms/Lit.	S	0.360	0.950	1.44	0.916
	R	1.10	0.880	0.890	0.956
	W	0.760	0.560	1.15	0.820
Conductivity milimhos/cm	S	0.342	0.764	0.647	0.584
	R	0.684	0.898	0.689	0.757
	W	0.312	0.316	0.312	0.313
D.O. mg/lit	S	4.12	4.46	4.18	4.253
	R	4.09	5.11	3.88	4.360
	W	4.17	4.42	4.50	4.360
Hardness (as CaCO <sub>3</sub> ) mg/Lit.	S	199.00	200.00	201.00	200.00
	R	218.00	187.00	156.00	187.00
	W	215.00	223.00	224.00	200.66
Chlorides mg/Lit.	S	144.00	52.15	65.40	87.22
	R	97.14	111.17	60.19	89.50
	W	166.21	150.06	78.15	131.47
MPN Per 100 ml	S	45.00	43.00	59.00	49.00
	R	41.00	64.00	43.00	49.00
	W	52.00	78.00	35.00	55.00

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**CONCLUSION:-**

It is concluded from the study of underground water at various stations season wise, there is no objectionable value of various parameter some excess value are due to seasonable variations.

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