



Physicochemical Analysis of Drinking Water and Agricultural Water in village Deulgaon mahi, Tahasil: Deulgaon raja, district: Buldana.

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Water covers about three fourth area of the earth's surface with volume of about one billion cubic kilometers of total surface water reserves, ocean constitutes 97%, permanent glaciers and ice-caps 2.1%, and remaining only 0.9% water is available as fresh water in the form of rivers, lakes, ponds, streams (Dugan, 1972 and Behura, 1981)^[2]. Water and life are intricately linked, and water is the main constituent of the human body making up about 80% of total body weight and is the medium for all metabolic activities. More than half of the world's species of plants and animals live in water, and even our terrestrial-derived food is totally dependent on water and often largely composed of water. Water is needed not only for drinking purpose, but also for production of food. Water is also used to generate electricity (hydropower and cooling for thermal power), for navigation, and also for leisure. For this reason, most ancient civilizations grew near the bank of rivers and other perennial sources of water.

Key words: Water analysis, parameters for the analysis water sample

Introduction

Water plays an essential role in human life. Approximately, 71 per cent of the earth's surface is covered with it but fresh water constitutes only about 3 per cent of the total water. There are four major sources of surface water. These are rivers, lakes, ponds, and tanks. In the country, there are about 10,360 rivers and their tributaries longer than 1.6 km each. The mean annual flow in all the river basins in India is estimated to be 1,869 cubic km^[3]. inadequate water supply is still one of the major challenges in developing countries. The joint monitoring programme (jmp) for water supply and sanitation, implemented by the world health organization (who) and unicef, reports that 783 million people in the world (11% of the total population) have no access to safe water,

84% of whom live in rural areas. The WHO reports that approximately 36% of urban and 65% of rural Indian were without access to safe drinking water^[4].

COLLECTION & SELECTION OF SAMPLE

Sample Collection

Total 5 water sample were collected, in Deulgaon mahi, from 5 different locations. Water samples were collected in pre- cleaned, sterilized, polyethylene bottles of one liter capacity. **Materials and Methods:-**

i) Color^[5]: - Procedure: -

1. Label the test tubes; Control, and Local community sample.
2. Pour the 50ml of Limit Sample into the test tube.
3. Fill the Control test tube with the deionized water to the same level as the test tube.
4. Fill the Sample test tube with Local community water to the same level as the test tube.
5. Hold the Local community test tube side by side with the Control and test tubes over a white piece of paper
6. View the test tubes from above: Is the color of the Sample lighter or darker than the color of the test tube⁵.

ii) Taste and odor^[5]: - The taste is carried out by inhaling through two tubes of an osmoscope. One is kept in a flask containing diluted water and the other one to be tested. The taste and odor of water may also be tested by threshold number. In this method, the water to be tested is diluted with odor-free and the mixture at which odor becomes detectable is determined. It indicates threshold number and other intensities of odor are then worked out. The result of test is greatly affected by the sensitiveness of the observer. For the public water supply, the threshold number should not more than 3. If the taste and odor are suspected to be due to growth of any kind, the cause may be found out by conducting microscopically and biological examinations.

iii) Turbidity^[5]: - The measurement of turbidity can be done with the help of Nephelometric turbidimeter⁵.

iv) Temperature^[5]:- The desirable temperature of portable water is 25 °C The measurement of temperature is done with the help of ordinary thermometers. Chemical Analysis

iii) pH^[5]: pH may be measured accurately using a pH meter. The pH meter must be calibrated before making pH measurements. For calibration standard buffers of pH 4.00, 7.00 and 10.00 are used. pH of water indicates the hydrogen ion concentration in water.

iv) Electrical conductivity^[5]: thoroughly rinse cell with one or more portions of sample. Adjust temperature of a final portion to about 25°C. Measure sample resistance of conductivity and note temperature to $\pm 0.1^\circ\text{C}$.

iv) Alkalinity^[5]:

- 1) Mix 100 ml of the sample with two or three drops of phenolphthalein indicator in the porcelain basin.
- 2). Add a few drops of methyl orange indicator. If the sample is orange without the addition of acid, the total alkalinity is zero. If the sample turns yellow, titrate with standard acid until the first perceptible color change towards orange is observed.

3). The determination by means of mixed indicator is done in the same way as with methyl orange.

Formula-

$$\text{Total alkalinity} = \frac{\text{Vol.of titrant} \times N \times 50 \times 1000}{\text{ml.of sample}}$$

Where, N = Normality of H₂SO₄

v) Determination ORP (Oxidation-Reduction Product):-

The ORP of the water sample was measured with the help of Water analysis kit according to standard protocol.

vi) Biochemical Oxygen Demand ^[5]:-

Procedure:-

1. Pretreatment of dilution water by seeding is sometimes necessary. Pretreatment of sample is needed if the sample is supersaturated with oxygen or if the sample contains residual chlorine. If the pH of the sample is not between 6.5 and 8.5, it should be brought within this range.
2. In some wastes, suspended matter may cause difficulty because the distribution of the solids may be uneven when the sample is made up into dilutions. This may cause discrepancies in the results from different dilutions or duplicate dilutions. In such cases, shake the sample vigorously immediately before the dilutions are made. Artificial homogenizing procedures may cause an increased oxygen demand, and cannot be recommended.
3. Sometimes, the BOD determination in settled or filtered samples is needed. In such cases a settling time of 30 minutes is usually applied. For the BOD test of filterable substances, membrane filter, glass-fiber filter or paper filter may be used. The type of filter should be indicated in reporting the result. If determinations other than the BOD test are carried out on the filtered sample, it is recommended that filters of the same type and porosity be used for all of those procedures.

vii) Dissolved Oxygen ^[5]: - Procedure

- ❖ Collect sample in BOD bottle
- ❖ Add 2 ml MnSO₄ with 2 ml Alkali iodide-azide and close the stopper
- ❖ Mix well and allow the ppt. to settle
- ❖ Add 2 ml concentrated H₂SO₄ and mix well till ppt. dissolves
- ❖ Take 203 ml (Correspond to 200 ml) sample in a conical flask, titrate it against Sodium thiosulphate (0.025 N) till pale yellow color add starch indicator titrate till blue to colorless

viii) Chemical oxygen demand ^[5]:-

Procedure

1. Place in an Erlenmeyer flask 20 ml of the sample or an aliquot diluted to 20 ml with distilled water.
2. Add 10 ml of standard potassium dichromate solution, 0.0417mole, and a few antidumping granules. Mix well.

3. Add slowly, with caution, 30 ml of concentrated H₂SO₄ containing silver sulphate, mixing thoroughly by swirling while adding the acid. If H₂SO₄ containing silver sulphate is not used, add 0.15 g of dry silver sulphate and then, slowly, 30 ml of concentrated H₂SO₄
4. Attach the condenser to the flask and reflux the mixture for 2 hours. Allow to cool and then wash the condenser with distilled water.
5. Dilute the mixture to about 150 ml with distilled water, cool to room temperature, and titrate the excess dichromate with standard ammonium ferrous sulphate using 2-3 drops of ferroin indicator.
6. Reflux in the same manner a blank consisting of 20 ml of distilled water together with the reagents and titrate as in step 5, above.

ix) Test for Hardness:- Pipette 10 ml hard water sample into a 250 ml conical flask. Add 2 ml of buffer solution add 3 drops of EBT indicator. Titrate the solution with standard EDTA solution from the burette until the color changes from wine red to clear blue at the end point. Repeat the titration at least two times for the confirm titration value. Note the titration value which corresponds to the total hardness.

Chloride Methodology: An Argentometric Method

i) Chloride is determined in a natural or slightly alkaline solution by titration with standard silver nitrate, using potassium chromate as an indicator. Silver chloride is quantitatively precipitated before red silver chromate is formed.

$$\text{Chloride mg/L} = (A-B) \times N \times 35.45 \times 1000 \text{ml sample}$$

Where

A = ml AgNO₃ required for sample

B = ml AgNO₃ required for blank

N = Normality of AgNO₃

ii) Sulphate (Titrimetric method)

Procedure

1. Place 50 ml of sample in a porcelain dish. Add 1 to 2 ml of buffer solution. The pH should be 10.0 ± 0.1. Adjust as necessary.
2. Add 2 drops of indicator solution .
3. Titrate slowly with EDTA standard titrant, stirring continuously, until the last reddish tinge disappears and the sample becomes blue. The titration should be completed within 5 minutes of the addition of buffer. Record the amount of EDTA titrant used.
4. If more than 15 ml of titrant are used, repeat steps 1 to 3 using 25 ml of sample diluted to 50 ml with distilled water. If less than 1 ml is used, repeat using 100 ml of sample, or more if necessary.
5. Calculate hardness as CaCO₃ mg
6. Measure 100 ml of sample and pour into a beaker. Neutralize the alkalinity to pH 4.5 with 1 mol. HCl or HNO₃ Add 1 ml more of the acid.

7. Bring the sample to the boil to expel carbon dioxide. Add 10 ml of barium chloride standard solution to the boiling sample. After the volume has been reduced to less than 100 ml, remove from heat and allow cooling.
8. Transfer with rinsing to a 100-ml graduated cylinder and make up to the 100-ml mark with distilled water. Allow any precipitate to settle.
9. Pour 50 ml of the clear supernatant into a porcelain dish. Add 2 ml of buffer solution; the pH should be 10.0 ± 0.1 . Adjust as necessary.
10. Add 2 drops of the indicator solution (or a small portion of the dry powder indicator mixture).
11. Titrate slowly with EDTA standard titrant, stirring continuously, until the last reddish tinge disappears and the sample becomes blue. The titration should be completed within 5 minutes of the addition of buffer. Record the amount of EDTA titrant used.
12. If more than 15 ml of titrant are used, repeat steps 9 to 11 using 25 ml of sample diluted to 50 ml with distilled water. If less than 1 ml is used, repeat using 100 ml of sample, or more if necessary.

Calculation: $SO_4^- \text{ mg/lit} = [A + B + C] = X \times 0.98 \times 4$

Where, A = Titrate value in hardness estimation

B = Value equivalent to volume

C = Titrate value in Sulphate determine

Result and Discussion: - Readings of Water Quality parameters of Different samples of Deulgaon mahi, Tahasil: Deulgaon raja, district: Buldana

Parameters	S1	S2	S3	S4	S5
Temperature	25 ⁰ C	25 ⁰ C	25 ⁰ C	25 ⁰ C	25 ⁰ C
Color	Colorless	Colorless	Colorless	Colorless	Colorless
Taste	Sweetish	Sweetish	Sweetish	Sweetish	Sweetish
Odor	Odorless	Odorless	Odorless	Odorless	Odorless
pH	7.88	7.89	7.88	7.89	7.89
Chlorides	152	157	154	150	157
Conductivity	0.402	0.407	0.410	0.409	0.408
Alkalinity	285	293	250	290	278
Hardness	322	341	334	349	329
Sulphate	160	172	150	197	169
ORP	280	246	268	279	290
TDS	449	429	394	387	429

Dissolved Oxygen	9.1	9.5	9.3	9.5	9.5
BOD	32	34	34	33	37
COD	141	137	138	139	134

Discussion: - Monitoring of Dam water samples from five different samples were analyzed by following parameter.

Color, Taste, Odor and temperature are found to be unobjectionable. .

p^H : - The p^H serves as an index to denote the extent of pollution by alkaline waste. These values are in between 7.88 to 7.89

Chlorides: - The amount of chlorides ions present in water samples are found to be in between 152 to 157 gm/lit

Alkalinity: - The Alkalinity of water samples are found to be in between 285 to 293 ppm.

Dissolved Oxygen: - All the samples are analyzed for D.O. and the values are found to be in the range 9.1 to 9.5 mg/lit

Hardness :-Hardness of water is due to calcium, magnesium, silicates, carbonate, bicarbonate and sulphates. Total hardness of water samples found to be in between 322 to 349 mg/lit.

TDS: - The TDS of water samples are found to be in between 387 to 449 ppm

Conductivity: - The Conductivity of water samples are found to be in between 0.402 to 0.410 ms/cm

BOD: - The BOD of water samples are found to be in between 32 to 37 ppm.

COD: - The COD of water samples are found to be in between 134 to 141 ppm.

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