Analysis of Water Used for Drinking and Irrigation Purposes of Village Pokhari, Tehsil & District Buldana”

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Abstract:

Water is the driver of life”, said Leonardo da Vinci. Water is one of the most abundant substances on our planet. Our planet is a complex system of land, air and water. It is the only substances on the earth that exists in all the three states (solid, liquid and gas) of matter. Nobel laureate A.Szent- Gyogri has called "The Matrix of life" Water which maintains biologically active structure and it is now universally agreed that all life will perish without water. A few years prior, a specialist Thomson King exemplified the Water issue in the accompanying statements: "of all the aggravates that are needed indispensible to life as we know it on earth, water is unquestionably the most paramount, the most well known, and the most glorious, yet generally individuals know next to know about it ". Water is a basic human need and limited natural resource and precious national asset. In recent decades human demand and misuse of water resource have continued to grow. Therefore, water securing for human life, has become a matter of principal concern for sustainable development in the 21st century. Out of total 13,575 million cubic kilometers (km) of water on earth, only 3 per cent, i.e. 37.5 million cubic kilometers is fresh water. As population increases and water use per person increases, so demand of fresh water has also been increasing. Hence fresh water is emerging as one of the most critical natural resource issue for humanity. India has 2.4 per cent area of the earth and has 2.45 per cent of world’s fresh water resources with 16.93 per cent of global population to support within its limited resources. Out of total fresh water, more than 50 per cent is consumed for industrial activity and only small portion is used for drinking purpose.

Key words: Water quality, TDS, Hardness, COD, BOD etc.

Introduction:

Water, a substance composed of the chemical elements hydrogen and oxygen and existing in gaseous, liquid, and solid states. It is one of the most plentiful and essential of compounds. A tasteless and odorless liquid at room temperature, it has the important ability to dissolve many other substances. Indeed, the versatility of water as a solvent is essential to living organisms. Life is believed to have originated in the aqueous solutions of the world’s oceans, and living organisms depend on aqueous solutions, such as blood and digestive juices, for biological processes. Water also exists on other planets and moons both within and beyond the solar

system. In small quantities water appears colorless, but water actually has an intrinsic blue color caused by slight absorption of light at red wavelengths.

Physicochemical parameter study is very important to get exact idea about the quality of water and we can compare results of different physico chemical parameter values with standard values .Some past work carried out by researchers are briefly summarized here. According to Tripathi et al. [1] pulp and paper industry effluents are highly polluted industries in India. Small and large scale pulp and paper mills which have different production capacity as well as different raw materials, adopt different processes that lead to radical differences in the physico-chemical properties of effluents. Such polluted effluents must be treated properly before being discharged into the drainage channel, to minimize the effect of various pollutants on the environment. On the basis of results reported herein it can be concluded that the effluent discharged from both the paper industries is highly polluted and has exceeding values as prescribed by the standards of regulatory agency of India. It is further stated that the pollutants generated during different stages from paper industries can be minimized either by replacing some existing pulping and bleaching techniques like bio-pulping, biobleaching, TCF (Total Chlorine Free bleaching), ECF (Elemental Chlorine Free bleaching) and ozone bleaching or by treatment of the effluent by physico-chemical or biological methods. The data bank generated herein by this monitoring study of pulp and paper mill effluent are collected from Agro-based and one from wood based could successfully be used in prediction of their toxicity and effective management. Agarwal et al., [2] studied to provide an informative data and helps to understand water characteristics and indicate that the water of Bihar River can serve as a good habitat. The pH value indicates the alkaline water of in the month of May might be due to high temperature that indicates the solubility of CO2. The analysis of the quality parameters of water from Baba Ghat of Bihar River shows that pH, alkalinity, chloride ion, total hardness, BOD and COD etc. are well within the permissible limit. Hence proper strategies should be designed to counter. Vyas et al. [3] studied that the most of the fresh water bodies all over the world are getting polluted due to domestic waste, sewage, and industrial waste, agricultural and religious activities like idol immersion. Central Pollution Control Board [4] has formulated a comprehensive set of guidelines on the practice of idol immersion in lakes, rivers and seas (CPCB, Guidelines for Idol Immersion, 2006). These guidelines delineate and specify the role of the state pollution control boards in conducting water quality assessments of water bodies and classifying them on the basis of certain physiochemical parameters. These guidelines if followed and acted upon can help in bringing tremendous International Journal of Engineering Science Invention Research & Development; Vol. I Issue IX March 2015 www.ijesird.com e-ISSN: 2349-6185 Dr.Seema Tiwari ijesird, Vol. I (IX) March 2015/ 323 change in the water quality of river post idol immersion. According to Tamot et al.,[5] DO is the most important parameter to study the quality of water and is required for the metabolism of all aquatic organisms was found to be Nil at seven sites. Ganai and Parveen [6] concluded that the most important factors affecting the phytoplankton distribution are water temperature, CO2, chloride, transparency, TDS, alkalinity and dissolved oxygen.

Selection and collection of sample

The objective of sampling is to collect representative sample. Representative sample by means a sample in which relative proportions or concentration of all pertinent components will be the same as in the material being sampled. Moreover, the same sample will be handled in such a way that no significant changes in composition occur before the tests are made. The sample volume shall optimal small enough that it can be transported and large enough for analytical purposes.

The water sample is collected from different field areas well & bore sample, lakes, damp, local hand pump, water dank, open well collected separately from area. Which color or past management the water sample which are collected and denoted by 1, 2, 3, 4, 5 and 10. Total 10 samples are collected for different area around the Pokhari, Tehsil & District Buldana.

Name of farmers in Pokhari, Tehsil & District Buldana.

Sr. No.	Name of farmer	Type of source
1.	Mr. Ramdas Rajput	Well Water
2.	Mr. Dayram Brahmne	Bore well
3.	Mr. Ramesh kulkarni	Well Water
4.	Mr. Prakash Shelke	R.O. water
5.	Mr. Ramdas Wayal	Bore well
6.	Mr. Dadarav Ambekar	Bore well
7.	Mr. Sureshrav Deshmukh	Well Water
8.	Mr. Aasaram More	R.O.Water
9.	Mr. Rajesh Lahane	Bore well
10.	Mr. Nitin Pawar	Well Water

Materials and methods of analysis

1) Color: - Principle

The method is useful in the field by comparing the color of sample with a comparator. When viewed by transmitted light through a depth of several feet, pure water exhibits a light blue color which may be altered by the presence of organic matter to greenish blue, green, greenish yellow, yellow or brown.

2) Temperature: - Temperature was measured at the time of sample collection with a good mercury filled Celsius thermometer, having a scale marked for every 0.1°C.

3) pH: The pH of a solution is measured as negative logarithm of hydrogen ion concentration. At a given temperature, the intensity of the acidic or basic character of a solution is indicated by pH or hydrogen ion concentration. pH values from 0 to 7 are diminishing acidic, 7 to 14 increasingly alkaline and 7 is neutral.

4) Chloride:- Chloride was determined by argentometric method. 1.0ml of 5% potassium chromate solution was added to 20.0ml of the sample and titrated with standard 0.014N $AgNO_3$ solution till the color changed to reddish brown. mg Cl/l = (A-B) x N x 35450/vol. of sample Where A = vol. of $AgNO_3$ consumed for sample B = vol. of $AgNO_3$consumed for blank N = normality of $AgNO_3$.

5) Alkalinity: - Procedure

a. Take 25 ml sample in a conical flask and add 2-3 drops of phenolphthalein indicator.

b. If pink color develops titrate with 0.02N H_2SO_4 till disappears or pH is 8.3. Note the volume of H_2SO_4 required.

c. Add 2-3 drops of methyl orange to the same flask, and continue titration till yellow color changes to orange. Note the volumes of H_2SO_4 required.

d. Alternatively, perform potentiometric titration to preselected pH using appropriate volume of sample and titration assembly. Titrate to the end point pH without recording intermediate pH.

Alkalinity was determined by acid – base titration method. 20.0 ml of the sample was taken in a 250.0 ml conical flask and titrated with standard 0.1N sulphuric acid by using phenolphthalein and methyl orange 10 indicators. Phenolphthalein alkalinity registered total hydroxide and one half of the carbonate present in the sample. Methyl orange was used to determine total alkalinity.

Total alkalinity, mg C_aCO_3/ l = AxBx50,000 /vol. of sample

Where A = Volume of acid consumed (ml) with methyl orange as indicator B = Normality of standard acid solution Carbonate as

CO_3 -(mg /l) = Phenolphthalein alkalinity(as mg CaCO3) x 1.2

Bicarbonate as HCO_3^- (mg/l) = (Total alkalinity - 2 x phenolp. alk.) x 1.22

6) Hardness In the total hardness determination, the water samples were first buffered to a pH of 10.0 with ammonia buffer and 2 or 3 drops EBT indicator was added. The indicator reacts with calcium and magnesium ions to yield a wine red colored complex. As EDTA is added, it combines with free calcium and magnesium ions in the sample to produce EDTA – calcium and EDTA – magnesium complexes.

Hardness as mg $CaCO_3$ = A x B x mol. wt. of $CaCO_3$ x 1000/vol. of sample where A = Volume of EDTA consumed (ml); mol. wt. of $CaCO_3$=100;

B = concentration of EDTA

7) Dissolved Oxygen

1. Collection of samples- The samples were collected using special BOD bottles (glass bottles with a turtle neck and a ground glass stopper). The bottles were directly filled by dipping them in the wells or by filling them up to the brim without any air bubbles. The sample bottle was submerged and allowed to fill without

allowing air to mix with the sample. The bottle was completely filled and kept submerged until the cap was firmly in place Measurement of DO- To the sample collected in 300ml bottle, 1.0ml of 0.414M $MnSO_4$ solution was added followed by 1.0ml alkali-iodide-azide (NaOH, NaI, NaN3) reagent. The solution was mixed by inverting the bottle a few times. When precipitate had settled sufficiently 1.0ml conc.H_2SO_4 was added to clear supernatant liquid above the manganese hydroxide flock. The bottle was restoppered and the contents were mixed by inverting several times until dissolution was complete. 200.0ml mixture solution was titrated with 0.025M hypo solution to pale straw color. A few drops of starch solution were added and titration was continued up to first disappearance of blue color.

8) Electrical conductivity (EC):- Conductivity is the capacity of water to carry an electrical current and varies both with number and types of ions in the solutions, which in turn is related to the concentration of ionized substances in the water. Most dissolved inorganic substances in water are in the ionized form and hence contribute to conductance.

Result and discussion: -

Drinking and agriculture water from different source were analyzed by following parameter.

1) Color: Color of water sample found to be colorless.

2) **Taste:** Taste of different water sample has sweetest and salty test.

3) **Temperature:-** Temperature of water sample was found to be 24.5 to 28.4^{0}c.

4) pH: The amount of pH present in the water sample was found to be in between range of 7.2 to 7.4 The normal pH is 6.5 to 8.5 .

5) Chloride: The amount of chloride ion present in the water sample was found to be in between 42.76 to 20.16 mg/lit.

6) Alkalinity: The amount of total Alkalinity present in the water sample was found to be in between range of 489 to 546 ppm.

7) Hardness: Hardness in water is mainly caused by Ca and Mg although Fe and Mg also contribute to actual hardness. The value are found to be the ranges is 281 to 320.

8) **DO:** All sample are analyzed for DO and the value are found to be the range of 9.4 to 9.2 ppm

9) CND: The conductivity of a given 10 sample the range 375 to 327 s/m

10) SAL: The amount of SAL present in the water sample was found to be in between range of 000.1 to 000.9 ppm.

11) TDS: The amount of TDS present in the water sample was found to be in between range of 281 to 318 ppm

Table: water quantity of physical parameters chemical parameters of water sample of Pokhari, Tehsil & District Buldana

Parameter	Water sample (Include the farmer of sample)				
	Bore well	Well water	RO water	Well water	Bore well
1) Color	Colorless	Colorless	Colorless	Colorless	Colorless
2) Test	Salty	Sweetish	Sweetish	Sweetish	Salty
3) Temperature	24.5^0c	25.1^0c	26.8^0c	27.5^0c	25.5^0c
4) pH	7.2	7.5	7.2	7.6	6.4
5) Chloride	42.76	34.13	27.31	33.21	83.16
6) Alkalinity	489	653	710	562	754
7) Hardness	281	395	431	276	318
8) DO	9.4	7.8	5.4	3.2	2.6
9) CND	375	475	432	529	348
10) SAL	000.1	000.3	000.2	000.5	000.8
11) TDS	281	395	431	276	318

Discussion:

1. Temperature varies in the range of 24.5^0C to 29.5^0C .Maximum temperature is found in Pokhari due to presence of Effluents.

2. The pH Values varies from 6.4 TO 7.8 the Desirable limit of Indian Standard is 6.5 to 8.5.It is observed that the values of PH is in the Desirable limit.

3. Dissolved Oxygen ranges from 2.6 to 9.4 mg/lit, D.O. indicating the pure symptoms.

4. The values of Total Dissolved Solid ranges in between 270 to 433 mg/lit, and all the values are in Desirable limit of Indian Standard, Because of high Dissolved Salts of Ca and mg and it requires cation and anion analysis.

5. Alkalinity ranges from 264 to 432 mg/lit. All the values of Alkalinity are in the Permissible limit of I.S. Alkalinity is the cause of Carbonate and Bi –carbonate.

6. The value of Chloride ranges from 17.5 to 222 mg/lit. It is observed that the all values of Chloride are below the Desirable limit I.S.

7. Total Hardness ranges between 230 to 740 mg/lit, maximum values of Total Hardness are below Permissible limit of I.S.

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