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Studies on Physicochemical Parameters to Assess The Water Quality of Gaikhed Town For Drinking Purpose in Lonar Tahsil

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Abstract

Water is an essential component of the environment and it sustains life on the earth. Drinking water has great effects on human health. This works focus on to the physico-chemical analysis of drinking water in Gaikhed town, Lonar Tahsil, Maharashtra (India). In present study two different scenarios were compared: Well water and bore well water. The parameters such as water temperature, total dissolved solid, hardness, pH, alkalinity, dissolved oxygen, chemical oxygen demand, biological oxygen demand, conductivity and chloride, were analyzed. The results of works demonstrated that drinking water collected from different places of Gaikhed town, Lonar Tahsil was not found to be suitable for human health.

Keywords: Water samples, Physico-chemical analysis, TDS, COD, BOD

1. Introduction

Water is necessary for industry, agriculture and human existence. Human beings depend on water for their survival. Water is also a raw material for photosynthesis and therefore, is important for crop production. The availability of good quality water is an indispensable feature for preventing diseases and improving quality of life. Water quality is a growing global concern. Polluted water and inadequate sanitation kill two children every minute worldwide. Water quality is the physical, chemical and biological characteristics of water in relationship to a set of standards. The primary uses considered for such characterization are parameters which relate to drinking water, safety of human contact, and for health of ecosystem. Interest in water analysis is due to the enormous importance of water to all categories of living things. It is necessary for the healthy development of man, animals and plants. Inspire of abundant water resources, 1/3rd population has to depend on drinking water scarcity, is always a burning problem. Many catchments areas do not have sufficient water for drinking purpose is very much limited as compared to its consumption. Water can be distributed and water scarcity problem can be resolved to some extent.

According to the standard drinking water guidelines drinking water must not contain chemicals, inorganic substances or organisms that may be harmful to human health. Drinking water should also be at reasonable temperature and be free of unappealing odours, taste and colour. The guideline defines drinking water as water which is safe to drink over a life time that is, it constitutes no significant risk to health. Because water is a very good solvent, it is rarely pure, and some

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of the properties of impure water can vary from those of the pure substance.

Accurate and timely information on the quality of water is necessary to shape a sound public policy and to implement the water quality improvement programmes efficiently. One of the most effective ways to communicate information on water quality trends is with indices. Water quality index (WQI) is commonly used for the detection and evaluation of water pollution and may be defined as "a rating reflecting the composite influence of different quality parameters on the overall quality of water." The indices are broadly characterized in to two parts: the physico-chemical indices and the biological indices. The physico-chemical indices are based on the values of various physico-chemical parameters in a water sample. During past two decades, it is observed that ground water get polluted significantly due to human activities such as verity of chemical used in agricultural field in the form of fertilizers, insecticides, etc. Hence, it is necessary to check the quality of well and bore well water at regular time interval, because due to use of infected drinking water, human population suffers from wide-ranging of water borne diseases. It is complicated to comprehend the biological phenomena fully because the chemistry of water revels much about the metabolism of the ecosystem and explain the general hydro -biological relationship.

In the above reference, works aims to analyze the physico-chemical properties of well and bore well water. This water is basically for drinking agriculture and domestic purpose collected from different places of Gaikhed town in Lonar Tahsil.

2. Materials and methods

All chemical used for chemicals tests are of analytical grade. In order to determine or investigate the water quality, well water and bore well water of different points from Gaikhed Town in Lonar tahsil. Water samples were collected using standard methods[2] (APHA 1989). The samples were collected in polyethylene bottle of 1L capacity. Before sampling, all the bottles were washed thoroughly with the detergent, tap water, ethanol and then distilled water. Samples were collected in the pre-cleaned polythene bottles after rinsing in with the samples water. From each sample point, water was collected three times and analyzed for various water quality parameters. The physico-chemical parameters are determined by the method prescribed in the literature and the suitability for drinking is suggested by comparing the value reported by WHO & ISI. The results were also interpreted with respect to influence of chemicals and chemical fertilizer activities on its quality and possible treatment is proposed for hygienic potable water.

Determination of water temperature

The temperature of water samples were measured at the time of collection. The temperature of the water measured with help of standard centigrade thermometer in ^{o}C. It is better to take the sample in a container to measure the temperature immediately.

Determination pH of water

The pH value expressed as the negative logarithm of the hydrogen ion concentration. The pH of the water sample was carried out by using pH meter. The readings were taken after the indicated value remains constant for about 1 min.

Total dissolved solids (TDS)

Most of the salts and a variety of organic substances except lipids are soluble in water. Solids refer to matter dissolved or suspended in water. Solids may effect on water quality adversely in a number of ways. The TDS of all water samples were carried out at room temperature by using TDS meter. After each measurement, the TDS meter was washed with distilled water and was cleaned with tissue paper. TDS determined in form of total filterable residue is estimated by gravimetric method in mg / L.

Electrical conductivity

The conductivity of a sample is a numerical expression of its ability to carry on electric current, which, in turn, depend on the ionic strength. The ionic strength of a sample depends on ionization of solutes and other

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substances dissolved in it. The conductance is measured directly with the help of a conductivity meter.

The conductivity of the water samples were measured by using pre-calibrated conductivity meter. Before measurement of the conductivity the electrode and beaker must be washed several times with distilled water and the sample under test. The measurement was taken at room temperature. The samples were transferred into beaker in sufficient volume to dip the electrode and then the scale was set before the conductivity of each sample was then noted.

Total hardness

Total hardness of water samples were carried out by using complexometric titration method with Ethylene Diamine Tetra Acetic acid (EDTA) solution by using Erio chrome black-T indicator (EBT). There are two types of hardness of water, Permanent hardness and temporary hardness. The hardness due to bicarbonates and carbonates are known as temporary hardness and hardness due to sulphates and chlorides of calcium and magnesium known as permanent hardness. Ecologically, temporary hardness plays a key role in buffering capacity thus neutralizing an off set in pH due to addition of acidic products. This has a great effect on biotic diversity and biomass in an ecosystem. Hardness also restricts water use; hard water is unsuitable for cooking, washing and bathing due to his boiling point in the first, while poor lathering forming capacity latter two uses.

BOD and COD

BOD indicates the magnitude of water pollution by the oxidizable organic matter the main sources of organic enrichment are 1) Raw domestic sewage containing cabnonaceous organic matter 2) Nitrogenous compounds 3) chemically reducing compounds in natural course the organic matter on oxidation mineralization enters bio-geo-chemical cycle. However, when a system receives excessive pollution load, its carrying capacity ids exceeded and due to less oxygen available for oxidation, a net oxygen demand generate. Thus BOD cab be defined as the quantity of DO imp pm required under test condition for complete oxidation of the organic matter in a representative sample.

Chemically polluted water sample in which microbial oxidation is not possible due to the presence of toxins, BOD cannot be determined accurately. In such sample the degree of organic pollution is assessed by COD (Chemical oxygen demand). Thus it is the measurement of oxygen required in oxidizing organic compounds by involving chemical oxidants such as potassium chromate or $KMnO_4$. Biochemical oxygen demand (BOD) were carried out by using alkali H_2SO_4, or NaOH, thiourea and Winkler's reagents method and COD of all water samples were carried out by using dichromate reflux method.

Alkalinity

Alkalinity defines as quantitative capacity to neutralize an acidic solution, the alkalinity to natural waters is mainly imparted by three predominant bases carbonates, bicarbonates and hydroxides. Thus the measure of hydroxide and carbonate ion content of water sample. Water sample is titrated with standard HCl using indicator.

Determination of DO

Dissolved oxygen is one of the most important parameter of water quality directly affecting survival and distribution of flora and fauna in an ecosystem the two main sources of DO are diffusion and photosynthesis, while major factors responsible for its depletion of biochemical oxidation and respiration by flora and fauna. Generally, in ecosystem free from pollution, high DO is found in euphotic zone, while their values are negligible in case of polluted water bodies due to the presence of H2S, NH3, Nitrites, ferrous ions etc. DO in given water sample determined by using Winklers reagents and starch indicator.

Determination of chlorides

Natural Water normally has a low chloride contents compared to bicarbonates and sulphates. High chlorides are found in inland saline lakes, estuaries and marine water. High chlorides level indicates pollution from domestic sewage and industrial effluents.

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Though chloride level as high as 250mg/L is safe for human consumption, a level above this imparts a salty taste to the potable water. This test was carried out to evaluate the quantitative determination of chloride ions. This test was carried out by titrating given water sample with silver nitrate solution; end point was yellow to brick red. Dissolved oxygen (DO) of water samples were carried out by using titration method.

3. Result and Discussion

Temperature and pH of water

Temperature of water samples taken at the time of collection were in the range of 28 to 30°C. The maximum permitted standard of drinking water is 25°C. The pH value of water samples collected from well and bore well water were in the range of 6.8 to 8.8.

Total dissolved solids (TDS)

The maximum TDS for well water was found to be 435 mg/l and minimum was 206 mg/l and maximum TDS for bore well water was 856 mg/l and minimum was 210 mg/l. From the results, it is clear that water samples of studied area are not suitable for drinking in terms of TDS.

Electrical conductivity

The conductivity of well water and bore well water is shown in Tables 1 and 2. The results reveal that obtained value was not accordance with slandered value of drinking water.

Total hardness

In the present investigation, maximum and minimum total hardness for well water was 310 mg/l and 170 mg/l and for bore well water 870 mg/l and 180 mg/l. The total hardness of bore well water was high in comparison with well water. These high values may be due to the addition of calcium and magnesium salts. Results revealed that bore well water is not suitable for drinking in terms of total hardness.

COD and BOD

Chemical oxygen demands (COD) and biochemical oxygen demand (BOD) is an important parameters for oxygen required to degradation of organic matter. In this case results of both COD and BOD parameters were not agreement with slandered data.

Alkalinity

The alkalinity range set by WHO is 500 mg/L. The results showed that alkalinity of both well and bore well water samples is not accordance with standard data.

Dissolved Oxygen

Dissolved oxygen is a most important aquatic parameter, whose existence is essential to aquatic fauna. It plays an important role in life process of animals. In this study DO values found from 1.9 to 5.2 mg/L for well water and 3.0 to 5.2 mg/L for bore well water.

Chlorides

Chloride found high value for both the water samples. In well water it ranges from 24.99 to 94.97 mg/L and for bore well water it ranges from 19.99 to 109.96 mg/L. It is reported that the higher value of chloride is associated with increased level of pollution.

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Table -1:-Result of Well water Analysis

Parameters	Sample points					
	Ia	**Ib**	**Ic**	**Id**	**Ie**	**If**
pH	7.2	7.4	7.2	6.8	8.2	7.6
TDS	424	398	302	206	435	432
EC (ohm^{-1}) A $x10^{-3}$	1.46	1.06	1.04	1.24	1.34	1.40
TH	310	270	190	170	304	308
BOD	430	360	420	380	310	280
COD	360	520	480	410	420	340
AK	40.0	38.2	34.4	44.0	38.2	42.0
DO	3.4	2.4	2.7	5.4	1.8	2.0
Cl^-	44.20	64.30	52.24	25.00	64.20	48.00

Table -2:-Result of Bore well water Analysis

Parameters	Sample points					
	IIa	**IIb**	**IIc**	**IId**	**IIe**	**IIf**
pH	7.8	7.5	8.6	8.8	7.4	7.8
TDS	794	735	824	856	210	798
EC (ohm^{-1}) A $x10^{-3}$	2.12	2.04	2.24	2.36	1.44	2.08
TH	710	730	830	870	180	680
BOD	890	610	840	860	380	790
COD	450	610	730	640	480	520
AK	48.2	46.40	50.20	52.10	34.2	44.80
DO	3.2	5.3	4.2	3.0	5.6	5.4
Cl^-	86.20	74.02	81.30	82.40	68.10	80.04

pH= negative logarithm of the hydrogen ion; TDS: Total Dissolved Solids; EC: Electrical Conductivity; TH: Total Hardness; BOD: Biochemical Oxygen Demand ; COD: Chemical Oxygen Demand; AK: Akalinity; DO: Dissolved Oxygen; Cl: Chloride.

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4. Conclusion

From above results and discussion, it is clear that, the well and bore well water samples from selected points are of poor quality and they require higher degree of treatment before consumption.

Some following treatment methods are suggested.

- Water samples from studied area were not suitable for drinking.
- An adequate filter system before the use, which will remove suspended solids & colloidal particles.
- Both the well and bore well water samples can be quite safe after the boiling.
- Sewerage waste treatment.
- Proper aeration by keeping the water in atmosphere and addition of $KMnO_4$, after pumping the water from bore well.
- Addition of coagulant like alum to water.
- Create awareness in peoples through media about the harmful effect of water on human health.

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6. Reference

1. Trivedi, R.K. and Goel,P.K., 1986. Chemical and biological method for water pollution studies. Enviroment Publications, Karad.
2. APHA, AWWA, WPCF, 1989.Standard Methods for the analysis of water and waste- water. AP Inc.,New York.
3. APHA standard methods for examination of water and waste water, 1998.American Public health Association, Washington D.C.
4. Sharma, B.K. and Kaur, 1998. Environmental chemistry, Goel Pub. House, Meerut .p 40.
5. Vermani, O.P., and Narula, A. K., 1989. Applied Chemistry, Theory and Practice. Wiley Eastern Ltd., New Dehli.
6. P.W. Botton, J.C. Currie and D.J. 1978, Ternet, *Cent.*, 20, 653.
7. Bandopadhyaya, B.K., and Dutta, N.C., 1986.Poll. Res. 5(1):7-11.
8. Someshwara Rao,N., Gunaseelan, K., Prakashan, N.K. and Shrinivas, D.S., 1999.Poll.Res.18, (1):43-47.
9. Singh, T. B., Indu Bala Singh, D., 1999. Poll.Res. 18(1):43-47.
10. Pande, K.S. and Sharma, S.D., 1999. Poll.Res., 18(3):335-338.
11. Manivaskam, N., 1984. Physico-Chemical Examination of water, sewage and industrial effluents. Pragti Prakashan, Meerut p 46.
12. Y.A. Maruthi and S.R. Rao, 2004, *Asian J. of Chemisty*, 16, 122.
13. Haruna R, Ejobi F, Kabagambe EK. The quality of water from protected springs in Katwe and Kisenyi parishes, Kampala city, Uganda. 2005 *Afr Health Sci*, 5: 14.
14. Devaraju TM, Venkatesha MG, Singh S. Studies on the physico-chemical parameters of Maddur Lake with reference to suitability for aquaculture. 2005, *Nat Environment and Pollution Technology*,