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Physicochemical Quantitative Analysis of Selected Ground Water Samples of Parbhani city, Maharashtra, India

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Abstract

Water plays vital role in human life. It is extremely essential for survival of all living organisms. Groundwater is ultimate, most suitable fresh water resource with nearly balanced concentration of the salts for human consumption. Ground water has long been considered as one of the purest forms of water available in nature and meets the overall demand of rural and semi-urban people. Water is the most useful and important commodity which we exploit than any other resources for the substances of our life. Several studies elsewhere and have indicated that the ground water crossing the limits of health criteria due to anthropogenic factors like disposal of domestic waste, sewage, industrial waste and septic tanks. All forms of life on the earth depend upon water for their mere existence. Life and water may be aptly said to be two faces of the same coin. The quantity of ground water of any area is a great important for human beings. The quality of ground water is a functional natural processes as well as anthropogenic activities. The ground water resources are under threat from pollution due to human life style manifested by the low level of hygiene practiced in the developing nations. The present study reveals that five samples were suitable for drinking and safety can be assured.

Keywords- *physicochemical,analysis,ground water, parbhani city*

1.Introduction

Parbhani district is located on the Deccan plateau the Eastern side of Maharashtra state. It is bounded a North by Buldhana and Hingoli districts, while at west by Jalna district of Maharashtra. To the South it is bounded by Beed and Latur districts and to the East by Nanded district of Maharashtra. It is located between 18.450 and 20.010 North latitude and 76.130 to 77.290 East longitudes. The total geographical area of Parbhani district is 6311 sq.kms. Parbhani district comes under assured rain fall zone of the state. The average rainfall is 774.59 mm. The district has black soil rich in nutrients. The study also aimed to assess the suitability of the wells water for domestic purposes.

2. Materials and Methods

2.1 Sample selection

The present investigation was carried out by selecting five open various wells (S_1, S_2, S_3, S_4 and S_5) representing five localities in Parbhani city.**(Table-2.1)**

Table 2.1 -+

Sr. No.	Sample No.	Place of the sample
1	S_1	Teachers Colony
2	S_2	Kadrabad Plot
3	S_3	Datta Dham
4	S_4	Parvati Nagar
5	S_5	V.N.M.Krushi Vidyapeeth

Water samples were selected from the five open places in polythene bottles of one litre capacity. The

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samples were brought to the water testing laboratory at Department of Chemistry, B. Raghunath Arts, Commerce and Science College, Parbhani. The samples were kept cool in darkness until the analysis was completed. Water quality parameters viz, color, odor, taste , P^H, turbidity, chloride, total hardness, total alkalinity, calcium, iron, magnesium were analyzed as per the standard methods.

3. Results and Discussion

3.1 Physical properties

3.1.1 Odor

Odor is generally measured as "threshold odor number" which is equal to dilution ration of the sample at which the odor is just detectable. The sample is diluted with odor free water until a least perceptible odor is detected by the tester. As the sensitivity to odor of different person varies, therefore, minimum five persons and preferably ten of more should observe the samples for odor. These persons should not suffer from cold or any such disease which interferes with the sense of smell. The odor varies with the temperature. For most odors to be detected the temperature should be high, therefore, the odors are generally determined at higher temperature 60^0c.A standard temperature of 44^0c can also be used in case of heat sensitive odors which escape at higher temperature.

3.1.2 P^H

P^H is the measure of the intensity of acidity alkalinity and measures the concentration of hydrogen ions in water. It does not measure total acidity or alkalinity in fact, the normal acidity or alkalinity depends upon excess of H^+ or OH^- ions the other and measured in normality or gram equivalents of acid or alkali. If free H^+ are more than OH^- ions, the water shall be a, or alkaline the way round.The maximum P^H was recorded 7.5 at S_5 sampling location and minimum at S_1 was 7.1. When composed with the standard values of WHO and IS 10500-91, the samples are found to be in the permissible limits as prescribed. The observed P^H values of various samples shown in Table- 3.1.2.

Table-3.1.2 shows P^H various samples of water samples

Parameter	S_1	S_2	S_3	S_4	S_5	IS
P^H	7.1	7.2	7.0	6.9	7.5	6.5-8.5

3.1.3 Turbidity

Turbidity is a measure of the light scattering potential or water caused by the presence of colloidal and suspended material. The turbidity of water samples varied from 2.8 to 10.00 at highest was 10.8 at S_2 and lowest was 2.8 at S_3.According to international standards, water is acceptable for domestic use when its turbidity lies within 10. IS does not propose any threshold level of turbidity of fresh waters for the support of aquatic life. The ministry of health has set a threshold level of raw water turbidity at 1000. Highest turbidity was noted in S_2, this is due to the presence of suspended organic and inorganic matters in ground water. The calculated values of turbidity shown in Table-3.1.3.

Table-3.1.3 shows values of turbidity of various water samples

Parameter	S_1	S_2	S_3	S_4	S_5	IS
Turbidity	6.5	10.8	2.8	7.9	4.5	10.00

3.1.4 Chloride

Chlorides occur naturally in all types of waters. In natural freshwaters, however its concentration remains quite low and is generally less than of sulphates and bicarbonates. The most important source of chlorides in the water is the discharge of domestic sewage. The chloride content ranged from 305 mg/l to 1140 mg/l. The acceptable limit of chloride in drinking water is 250mg/l according to IS. Higher concentration of chloride in water may be due to the runoff from surrounding catchments areas and discharge from sewage. In sample S_5, the chloride content is very high 1140mg/l. This is due to dissolution of rocks, soil and decomposition of sewage and irrigation return flow. The calculated values of chloride ion in various samples shown in Table-3.1.4.

Table- 3.1.4 shows concentration of Chloride ion in various water samples

Parameter	S_1	S_2	S_3	S_4	S_5	IS
Cl^- mg/l	360	305	420	1040	1140	250

3.1.5 Total hardness

Hardness is the property of water which prevents theater formation with soap and increases the boiling point of waters. Principle cations importing hardness are calcium and magnesium. However, other cations such as strontium, iron and manganese also contribute, to the hardness. The anions responsible

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for hardness are mainly bicarbonate, carbonate, sulphate, chloride, nitrates and silicates, etc.It prevents the collision in the pipes by forming a thin layer of scale, and reduces the entry of heavy metals from the pipe to the water. The values ranged from (1425 mg/l) to (240 mg/l).The high value recorded at S_5 was 1425mg/g could be due to the high temperature Total hardness of water is the sum total of concentration of alkaline earth metals such as calcium and magnesium in it. Both calcium and magnesium are essential for flora and fauna. All water samples had total hardness between 168 mg/l to 210 mg/l which was desirable according to the drinking water standard (300mg/l) by IS. High value of total hardness may be due to organic wastes and it can lead to kidney stone and heart diseases. The calculated values oh hardness shown in Table-3.1.5.

Table-3.1..5 Shows concentration of hardness in various water samples

Parameter	S_1	S_2	S_3	S_4	S_5	IS
Hardness mg/l	590	670	750	240	1425	300

3.1.6 Total Alkalinity

Alkalinity value in water provides an idea of natural salts present in water. The values of total alkalinity ranged from 340 mg/l to 512 mg/l. The present results revealed high alkalinity in S_2 (512 mg/l) that indicates the pollution lead in water. Similar results were also reported with higher values of alkalinity by Gupta and Verma. Total alkalinity is generally imparted by salts of carbonates, bicarbonates, phosphates, nitrates, silicates etc together with hydroxyl ions in free state. The recommended value of alkalinity in drinking water should be less than 120mg/l. Alkalinity in the water sample is highly primarily a function of carbonate and hydroxide content. Alkalinity values correlate positively with the pattern of rainfall, total hardness and chlorides. The low value of alkalinity was observed in water sample S_5 at 340 mg/l.The high value of alkalinity in well S_5 water sample show the presence of weak and strong bases such as carbonates bicarbonates and hydroxides. This can account for the high alkalinity values recorded especially in S_2.The calculated concentration of alkalinity shows in Table-3.1.6.

Table- 3.1.6 shows concentration of alkalinity in various water samples

Parameter	S_1	S_2	S_3	S_4	S_5	TA
Alkalinity	365	512	400	390	340	200

TA- Total alkalinity

3.1.7 Calcium

Calcium is one of the most abundant substances of the natural waters. Being present in high quantities in the rocks, it is leached from there to contaminate the water. The quantities in natural waters generally vary from 72 to 322 mg/l depending upon the types of the rocks. Disposal of sewage and industrial wastes are also important sources of calcium. Calcium as such has no hazardous effects on human health. In fact, it is one of the important nutrients required by the organisms concentrations up to 322 mg/l have been found not to impair any physiological reaction in man. The value of calcium ranged from 72 mg/l to 322 mg/l. Any value above 250 mg/l indicates calcium rich water. As per this definition the water in all the wells was rich in calcium and the value at S_5. Excess amount of calcium due to the dissolution from flocks soils in those wells. The calculated values of concentration of calcium ion in various water samples in table-3.1.7

Table-3.1.7 shows concentration of calcium ion in various water samples

Parameter	S_1	S_2	S_3	S_4	S_5	IS
Ca^{+2} mg/l	120.6	146	172	72	322	250

3.1.8 Magnesium

Magnesium is supposed to be non-toxic at the concentrations generally met with in natural waters. High concentration may cathartic and diuretic for the initial user but a tolerance is developed. High concentration combined with sulphate act as laxative to human beings. Concentrations as high as 500 mg/l impart an unpleasant tastes to the water thus rendering it.Magnesium contents were recorded in the range of 14.5 mg/l to 151.2 mg/l magnesium concentration in groundwater is generally lower than calcium. The principle sources of magnesium are various kings of rocks in the area in low concentration it is non toxic. Hugh concentration reduces the utility of water for domestic use and causes nausea and paralysis. In drinking water, the permissible limit of magnesium is 30 mg/l. The calculated values of magnesium ion shown in table -3.1.8.

Table 3.1.8- Shows concentration of magnesium in various water samples

Parameter	S_1	S_2	S_3	S_4	S_5	IS
Mg^{+2} mg/l	68.2	75.2	64.6	14.5	151.2	30

3.1.9 Iron

Iron is one of the most abundant elements of the rocks and soils, ranking fourth by weight. All kinds of waters including ground water have appreciable quantities of iron. Iron has more solubility at acidic P^H, therefore, large quantities of iron are leached out from the soils by acidic waters (e.g., acid mine drainage). The Permissible range of iron in drinking water is 3mg/l (WHO). In water S_1, S_3, S_5 the iron content is more than the permissible limit, except S_4, so it shows hardness of the water. The concentration of iron in various samples shown in table in 3.1.9

Table 3.1.9 shows concentration of iron in various samples

Parameter	S_1	S_2	S_3	S_4	S_5	IS
Fe^{+2} mg/l	3.1	3.05	3.25	2.85	3.17	3

4 Conclusion

Quantitative analysis of water samples collected from various locations of Parbhani city revealed that all water samples do not comply with WHO standards and Indian Standards 10500-91. Groundwater in Parbhani city region requires precautionary measure before dinking. So as to prevent adverse effects on human beings.

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References

[1] Gulp R.l., Gulp G.l., Advanced Waste-water Treatment, Van Nostrand Reinhold Company, New York, 1971.
[2] Faur G.M., Geyer J.C., Okukn D,A., Water and Wastewater Engineering, vol. II, Wiley, New York, 1968.
[3] Raja R E Lydia Sharmila, J. Prince Merlin, Christopher G, Indian J Environ Prot., 2292:137,(2002).
[4] Patil PR, Badgujar S.R. and Warke A M. Orienteal J Chem., 17(2):283,(2001).
[5] American Public Health Association: Standard Methods for the examination of water and waste water, 17th ED., Washington, DC. 1989.
[6] Trivedy R K and Goal P K Chemical and Biological methods for water pollution studies Environmental Publication, Karad. 1986
[7] Manivaskam N, Physiochemical examination of water sewage and industrial effluent, 5th E.D. Pragati Prakashan Merrut., 2005.
[8] Sudhir Dahiya and Amarjeet Kaur, J Environ Poll, 6(4):284,(1999).