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Physico-chemical Studies of Ground water samples

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Abstract: Rain is the primary source of all water. A part of the rain water absorbs into the ground to form ground water. Water sources available for drinking and other domestic purposes must needed high degree of purity, free from chemical contamination and growth of microorganisms. Physico-chemical analysis of bore wells underground water samples were collected from different places of Raver (India). These six samples of water samples from different places were analyzed for their physic-chemical characteristics. Water is an important part of human life, physicochemical analysis of underground water was carried out during April 2014. All the samples were collected from the different places. People used water for drinking and irrigation purpose these water samples from six different places of Raver, were analyzed for their physicochemical characteristics. Laboratory tests were performed for analysis as Temperature Calcium, Magnesium, hardness, total hardness; pH, Chloride, Alkalinity, TDS, Conductivity, sulphate, phosphate, nitrate & COD were studied.

Key words: Physico-chemical parameters, Drinking water, Hardness.

INTRODUCTION

Water is natural resources of are the important wealth of our country. Water is a wonder of the nature. " No life without water '' is a common saying depending upon the fact that water is the one of the naturally occurring essential requirement of all life supporting activities[1]. The main purpose of analyzing physical, chemical and microbiological characteristics of water is to determine its nutrient status. Since, the water contains dissolved and suspended materials in various proportions, its physical and chemical characteristics differ along with its biological characteristics. Any change in the natural water quality may disturb the equilibrium system and would become unfit for designated

uses[2].Underground and surface water are essential natural resources for sustaining life and environment that we have always thought to be available in abundance and free gift of nature. The water for the consumption of human beings comes in different forms and from different sources. There were two main sources of drinking water; one is a surface water resources river, lakes. Under ground water mainly from the seepage of surface water and is held in the subsoil and in previous rock. About 94% of total available water all over world is in the form of ground water. In villages the main source of drinking water is under ground water available from wells, bore wells or hand pumps[3-6].Bore wells underground water samples from six different areas located in and around Raver, were collected in brown plastic sampling bottles with necessary precautions. People's lives and live hood depend on water; demand for cleans water increases continuously as the growth in world population. People in many areas of the world lack the fresh, drinkable water essential to their survival if they are proper; more secure water supplies are needed. The study will be helpful in estimating the impact of water bodies various physicochemical and biological parameters of the water.

MATERIALS AND METHODS

Water samples from the selected sites were collected from different villages of Raver in Jalgaon District (India). All the water samples were collected in the month of April 2014. Samples were collected in one liter brown plastic sampling bottles with necessary precautions. The sampling places form Raver are S_1 Vagoda, S_2 Chinaval, S_3 Razoda, S_4 Khrioda, S_5 Savada, S6 Nimbhora and samples were collected using the standard method for collection of samples. This water which was being used mainly for the purpose of drinking, cooking and irrigation the village's form Raver, Standard procedure was used for determination of physiochemical parameters. Most of the chemicals were used from Loba Chime Pvt. Ltd., Mumbai and rests were purchased from S.D. Fine Chemicals Ltd., All reagents were of analytical grade and were used as received without further purification. All solutions were prepared from double distilled water. Standard lab ware, glassware were acid-washed and rinsed with Double distill water. The collected samples were analyzed for different physicochemical parameters such as temperature, pH, Electrical conductivity (EC), total dissolved solids (TDS), total hardness (TH), Ca^{2+}, Mg^{2+},SO_4^{2-} and Chloride, sulphate, nitrate, the chloride was determined by Volhard's method using ferric alum indicator. COD was determined by standard procedure. Total hardness and calcium were measured by EDTA titrimetric method respectively.

RESULTS AND DISCUSSION

Table 1 shows physicochemical parameters of water samples from six sampling places of Raver, Jalgaon District. The temperature, pH, conductivity and dissolved solids of the water samples were determined by using a thermometer; pH meter, Electrical conductivity was measured using a conductivity meter. The chloride, calcium, magnesium and total hardness were estimated by the standard methods of water. The samples were analyzed using various analytical methods; Total hardness and calcium were measured by EDTA titration method[7-12].

The EC values were found higher at S_3 Fakari village (1240mhos/cm) and very low conductivity was found at S_1 Duskad (930mhos/cm). EC values can be used to estimate the dissolved solids concentration which may affect the taste of water and suitability for various uses. Higher the conductivity values indicate higher the dissolved solids concentration in water. As the concentration of acid, base and salts in water increases there will be increase in the conductivity of water. The variation of pH values are shown in table. TDS is commonly found as carbonates, bicarbonates, chlorides, sulphates and nitrates of calcium, magnesium, mineral containing rocks. The high content

of dissolved solids increases the density of water and influences osmo regulation of fresh water organisms.

The Chloride was determined by Volhard's method using ferric alum indicator. The data revealed that there were minor variations in the examined samples from different sources with respect to their chemical characteristics. The results indicate that the quality of water considerably varies from location to location as well as depth of samples[13-18].

Table 1: shows physicochemical parameters of bore wells water samples from six places of Raver, Jalgaon District.

Sr. No.	PARAMETERS	UNIT	WHO	ISI	S1	S2	S3	S4	S5	S6
1	Temperature	^{0}C	-	-	31^{0}c	32^{0}c	32^{0}c	33^{0}c	31^{0}c	32^{0}c
2	pH		7.5-8.5	6.5-8.5	7.3	7.2	7.5	7.8	7.4	8.1
3	TDS	mg/L	1000	500	480	496	605	575	700	560
4	Ca hardness	mg/L	100	75	116	135	155	130	159	169
5	Mg hardness	mg/L	150	300	79	115	110	114	135	98
6	Total hardness	mg/L	500	300	205	250	257	259	270	253
7	Chlorides	mg/L	250	250	205	218	208	189	275	235
8	Sulphates	mg/L	250	200	58.5	68.5	65.8	62.5	55.8	83.8
9	Nitrate	mg/L	5	45	9.5	10.8	21.2	19.2	18.9	20.6
10	Phosphate	mg/L	0.2	0.2	0.28	0.35	0.50	0.45	0.81	1.15
11	DO	mg/L	2- 5	5	6.4	7.8	6.9	5.5	6.3	7.6
12	COD	mg/L	-	9	11.4	11.7	12.6	13.2	12.2	12.8
13	EC	mho/cm	1400	-	940	650	1240	1080	1160	1120

In the present study physical properties color, temperature ranges from 31^{0}C to 33^{0}C, from color and appearance of water shows it is suitable for drinking purpose, the taste of water samples was as usual, The pH value of water samples varied in a narrow range from7.2 to 8.1which is within the permissible limits in all sources. The pH has showed significant positive relation with electrical conductivity and alkalinity. The variation of pH values are shown in table. The TDS values were varied from 480 to 700. In the present study the EC values were found higher atS_3 village (1240mhos/cm) and very low conductivity was found at S_2 village (650mhos/cm).EC values can be used to estimate the dissolved solids concentration which may affect the taste of water and suitability for various uses. Higher the conductivity values indicate higher the dissolved solids concentration in water. Higher the concentration of base and salts in water, more will be the conductivity[18-21]. The COD is the measure of oxygen consumed during the oxidation of oxidizable organic matter present in the water by strong oxidizing agent. The values of COD were comparatively less indicating that the water was not suitable for the growth of micro-organisms. A number of bases like carbonate phosphate, hydroxide contributes to the alkalinity.

It was clear from results that the Basicity of water for all the sources was due to contamination of alkaline earth ion. Hardness is the measure of the capacity of water to produce lather with soap or detergent. Hardness is one of the very important properties of ground water from utility point of view for different purposes. Calcium and magnesium are directly related to hardness and hence they are discussed in combined. The acceptable limits for calcium and magnesium for domestic use are 75 mg/L and 30 mg/L, respectively in ground water[22-27].

CONCLUSION

All the physicochemical parameters of samples which were studied it can be observed that the pH of water is within the permissible limit while most of the parameters like TDS, Alkalinity, Ca hardness, Mg hardness, Chloride, and Nitrate have the values more than the permissible limit. So it is concluded that Groundwater of Raver region is in permissible limit shows positive and negative correlation between each other. However water from this region is suitable for drinking purpose after some purification. The study of various physico-chemical parameters such as color, taste, odor, hydrogen ion concentration (pH), electrical Conductivity, total alkalinity, dissolved Oxygen, chloride, total hardness, magnesium, calcium, total dissolved solid, chemical oxygen demand (hereafter COD), was carried out by using various standard methods reported in the literature.

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REFERENCES

1. D. G. Shah, P. S. Patel; *Der Chemica Sinica,* 2011, 2(5), 8.

2. R. B. Dhake, R. P. Phalak, G. P. Waghulde; *AJCER.*,2008,1(1),54.

3. K. V. Mehta; *J.Chem.Pharm.Res*, 2010, 2(4), 663.

4. S. Makwana, C. G. Patel, T. J. Patel; *Arch.Appl.Sci.Res.*, 2012,4(1),461.

5. S. S. Yadev, R. Kumar; *Adv.Appl.Sci.Res.* 2011, 2(2), 197.

6. A. Singh, S. Malik, M. Bhattachary; *Der Chemica Sinica.*, 2011,2(6),269.

7. A. O. Majolagbe; *Adv.Appl.Sci.Res*, 2011, 2(1), 289.

8. M. Ramesh, K. E. Valuth; *Der Chemica Sinica*. 2012, 3(5), 1272.

9. B. Chauha, F. J. Thakor; *Asian J.ExpBiolSci*, 2012, 3(3), 582.

10. V. Sunith, B. M. Reddy, M. R. Reddy; *Adv.Appl.Sci.Res*., 2012,3(5),3382.

11. I. Sen, A. Shandil, V. S. Shrivastava; *Adv.Appl.Sci.Res*., 2011,2(2),161.

12. R. P. Hasna, M. Salam, A. M. Kamaraj; *Annals of Biological Research*, .2012, 3(7), 3533.

13. K. G. Chaudhari; *Der Chemica Sinica*. 2014, 5(1), 135.

14. K. G. Chaudhari; *Der Chemica Sinica*, 2013, 4(6), 67.

15. K. G. Chaudhari; *Der Chemica Sinica*. 2013, 4(16), 29.

16. A. M. Narwad; *Eur.J.Exp.Bio.*, 2011,1(1),97.

17. P. N. Kamble, V. B. Gaikwad, S. R. Kuchekar; *Der Chemica Sinica,* 2011, 2(4), 229.

18. N. G. Telkapalliwar, V. M. Shivankar; *JCPBS*. 2012, 2(2), 1123.

19. C. Balamurugan, M. S. Dheenadaydan; *JCPBS*. 2012, 2(2), 1073.

20. S. Patel, S. H. Quadri; *DerChemicaSinica.*, 2011, 2(5), 194.

21. Y.A. Maruthi, K. Hossaini, A. Goswami; *Der Chemica Sinica*, 2012,3(5),1071.

22. P. E. Venkatesan*; J. of Chemistry*, 2010,7 (2),473.

23. B. Rajapp, S. Manjapp, E. T. Puttaia, D. P. Nagarajappa; *Adv.Appl.Sci.Res.*,2011,2(5),143.

24. N. Haloi, H. P. Sharma; *Arch.Appl.Sci.Res.*,2011,3(6),107.

25. A. M. Kalwale, P. A. Savale; *Adv.Appl.Sci.Res.*, 2012,3(1),273.

26. P. A. MaryHalen, I.H. Belsha JayaEdith, R.J Shalani Jase; *JCPBS.*, 2012, 2(2), 1102.

27. A. K. Sutar, R. Sharma, R. Mathur, S.Shrma; *JCPBS.*, 2012, 2(2),1061.

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