International Journal of Science, Environment and Technology, Vol. 6, No 2, 2017, 1294 – 1298

ISSN 2278-3687 (O)
2277-663X (P)

GROUNDWATER QUALITY OF CHANDGAD TOWN, MAHARASHTRA, INDIA

S.P. Dorugade[1], R.S. Sawant[2] and A.G. Godghate[3*]

[1-2]Department of Botany, [3]Department of Chemistry, Dr. Ghali College, Gadhinglaj, M.S., India

E-mail: ashvinrgodghate@gmail.com (**Corresponding Author*)

Abstract: Present investigation describes the groundwater quality of Chandgad Town, Maharashtra. Bore well water samples were collected during the month of December, 2016. The physico-chemical parameters such as pH, E. C., Alkalinity, Total Hardness, Calcium Hardness, Magnesium Hardness and Chloride were assessed for collected water samples. The results were compared with water standards given by WHO, ICMR and BIS. All samples were well within the permissible limit and are suitable for drinking and domestic purposes.

Keywords: Bore well, Water quality, Physico-chemical parameters, Potability.

Introduction

Life on the earth is originated in water. Water is essential for the survival of every organism. Water also plays vital role in human civilization. Most of the civilization occurs along the water resources. The main sources of water are rivers, lakes, dug wells and bore wells. Increase in population, modern agricultural concepts, industrialization, urbanization, deforestation, increasing living standards & broad spheres of human activities are responsible for increasing pollution of water (Sharma 2005). Thus monitoring of water quality has become a need of the hour.

Chandgad is a town and Tehsil headquarters of the second largest taluka of Kolhapur district. Chandgad is located at 15°N 74°E in the Kolhapur district of Maharashtra. It belongs to Desh or Paschim Maharashtra region.It is surrounded by Ajara taluka towards north, Dodamarg taluka towards south, Gadhinglaj taluka towards north, Belgaum taluka towards east. Rainfall here is heavy and is above 3000 mm. in a year.

Besides river water supplied by panchayat, peoples living in this town are depend on borewells for domestic and drinking purpose. So, the present investigation deals with physico-chemical assessment of bore wells from Chandgad town, Maharashtra, India.

*Received Mar 8, 2017 * Published Apr 2, 2017 * www.ijset.net*

Materials and Methods

Study Area:

The present investigation is confined to Chandgad town only.

Collection of samples:

The collection of water samples was done in the month of December, 2016. Total 13 water samples were collected in clean, tight packed plastic containers from the bore wells of Chandgad town. These samples were brought to the laboratory.

Analysis of physico-chemical parameters:

Analysis of physico-chemical parameters of the collected water samples was done according to the standard methods suggested by APHA (2005) and Trivedi and Goel (1984). The obtained results were compared with WHO, ICMR and BIS water standards.

Results and Discussion

The obtained results of Physico-chemical analysis of the collected water samples are presented in Table 1 and Table 2 contains the drinking water standards of WHO (1963), ICMR (1975) & BIS (1991).

pH: pH is an important indicator which indicates acidic and alkaline nature of water. The pH of water is mostly influenced by carbon dioxide, carbonates and bicarbonates equilibrium. (Chapmen, 1996) .It was fluctuated from 8.12 – 8.48. All the samples are within the permitted limit of WHO. BIS and ICMR. All the samples are suitable for drinking and domestic use.

E.C.: Electrical Conductivity values reflect the ability of water to carry an electric current. Various factors such as the presence of ions, mobility, nutrient status, variations in dissolved solid contents and temperature of water are responsible for Electrical Conductivity. Electrical conductivity values ranges between 0.715 to 0.785 mmho.Allthesamples show high electrical conductivity.

Total Alkalinity: Total Alkalinity in itself is not harmful to human beings but the water with less than 100 mg l^{-1} is desirable for domestic purpose (Loganayagi et.al 2008).The high alkalinity gives an unpleasant taste to the water. Total Alkalinity values fall between 14 to 44 mg l^{-1}. All samples are within the permissible limit.

Total Hardness: The total hardness is due to the presence of divalent cations of which Ca and Mg are the most abundant in ground waters (Sawant et.al 2011).Hardness of water is the indication of suitability of its used in drinking, washing, cooking, domestic purpose and in agriculture.

The total hardness of the samples shows values ranging from 58 to 168 mg l^{-1}. The total hardness values below 300 mg l^{-1} are considered as potable. As per Kanan (1991), allwater samples lies between moderately hard to hard. The hardness below 300 mg l^{-1} is considered as potable (WHO, 1993).

Calcium Hardness: Calcium is a main skeleton component of many animals and some plant, but it is also important in buffering lake water (Goldmen and Horne, 1993). All the values are in a range from 17.64 mg l^{-1} to 64.93 mg l^{-1}. The low content of Calcium in drinking water may cause Rickets and defective teeth. It is essential for nervous system, cardiac function and in coagulation of blood (Khurshid and Baseer, 1997).As per WHO (1993), desirable limit is 75 mg l^{-1}. All samples lies between desirable limit and suitable for drinking purpose.

Magnesium Hardness: It is a main cation which causes water hardness. Magnesium comes from natural processes i.e. dissolution of minerals containing magnesium, industrial and agricultural water. Theminimum value of magnesium hardness is 6.41mg l^{-1}(C9) and maximum value is 23.59 mg l^{-1}(C4).

Chloride: Chloride in excess (< 250 mg l^{-1}) imparts a salty taste to water and people who are not accustomed to high Chloride maybe subjected to laxative effect. High Chloride concentration is also an indicator of large amount of organic waste (Godghate, et.al 2013). The values are in a range from 32 mg l^{-1} to 72 mg l^{-1}. All values are under permissible limit and were found safe for drinking and domestic purposes.

Conclusion

The present research work has shown that all drinking water quality parameters were found well within the limit specified by WHO, ICMR and BIS. Therefore, the water from all the bore wells is suitable for drinking and domestic purpose.

Acknowledgement

Authors are very grateful to The Principal, Dr. Ghali College, Gadhinglaj, 416502 for providing research laboratory.

References

[1] Sharma, B.K. 2005. Environmental chemistry. Goel publication House - 19th edition.

[2] APHA-AWWA-WPCF, *Standard methods for the examination of water & waste water.21st ed. American Public Health Association, Washington, DC,*(2005).

[3] Trivedi, R.K. and Goel, P.K. (1984). Chemical and Biological methods for water pollution status. *Environmental publication*, Karad (India).

[4] WHO 1963. Guidelines for drinking water quality 2nd edition; Geneva Vol. 1, PP. 56.

[5] ICMR 1975. Manual of standards of quality for drinking water supplies.Indian Council of Medical Research. Report No-44, 27.

[6] BIS 1991. Indian standard for drinking water, Bureau of Indian standard, New Delhi, India, 1-9, 179.

[7] Chapman, D.V. 1996. (Ed) "Water quality assessments, a guide to the use of biota, sediments and water in environmental monitoring". 2nd Ed. Spon Press, Abingdon.

[8] Loganayagi, A., Damodarkumar, S. and Murugesan, S. 2008. Quality of drinking water in and around Thiruvallur district, Tamil Nadu.*Nat. Env. & Poll. Tech.*, 7(1): 133-138.

[9] Sawant, R.S., Jadhav, S.D., Godghate, A.G., and Patil, S.R. 2011. Groundwater Quality of Gadhinglaj Tahsil of Maharashtra. *Nat. Env. & Poll. Tech.*, 10(4): 613-616.

[10] Kanan, K. 1991. Fundamentals of environmental pollution. S. Chand and Co.Ltd. New Delhi.

[11] WHO 1993. Guidelines for drinking water quality, Vol. 2 Recommendations World Health Organization, Geneva. 130.

[12] Goldman, C.R.and Horne, A.T.1993. Limnology .McGraw Hill Co. PP-464.

[13] Khurshid, S.Z. and Baseer, A.1997. Pollution assessment and water quality status in parts of Kochin. *Indian J. Envi.Poll.* 18 (4):246-249

[14] Godghate, A.G., Sawant, R.S. and Jadhav, S.D. 2013.An Evaluation of Physicochemical parameters to assess Borewell water quality from Madyal and Vadgaon Villages of Kagal Tahsil, MS, India, *Int.Res.J.Environment Sci.* 2(5): 1-5.

Table 1: Physico-chemical parameters of Bore Well water from Chandgad Town

Site / Parameters	pH	E. C.	Total Alkalinity	Hardness			Chloride
				Total	Calcium	Magnesium	
C1	8.26	0.735	44	160	64.13	23.30	60
C2	8.12	0.769	24	132	52.91	17.76	68
C3	8.31	0.75	32	58	23.25	8.44	48
C4	8.42	0.72	40	162	64.93	23.59	40
C5	8.43	0.73	38	136	54.51	19.80	52
C6	8.48	0.722	30	62	24.85	9.03	44
C7	8.36	0.734	28	86	34.47	12.52	56
C8	8.26	0.725	14	126	50.50	18.35	60
C9	8.35	0.715	28	44	17.64	6.41	28
C10	8.30	0.724	28	64	25.65	9.32	48
C11	8.15	0.755	26	76	30.46	11.07	32
C12	8.19	0.744	28	100	40.08	14.56	36
C13	8.10	0.785	14	134	54.51	19.32	72

Table 2: Drinking water standards of WHO (1963), ICMR (1975) & BIS (1991).

Parameters	**WHO**	**ICMR**	**BIS**
Total Hardness	500	300	500
Calcium	75	75	75
Magnesium	50	50	50
Chloride	200	250-1000	200
Alkalinity	75	--	--
pH	6.5-8.5	7-8.5	7 to 8
E.C.	0.300	0.300	0.300

All values are in mg/L except E.C.& pH