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Analysis of physico-chemical characteristics of drinking water of (Hoshangabad bore wells) of Bhopal (India)

H.C KATARIA[1], RUHI HAQUE[2], MUDRIKA AHMAD[3] and SHAHILA BUX[4]

[1]Department of Chemistry, Government Getanjali Girls PG College, Bhopal - 462 038 (India)
[2]Project Assistant, BMDG, Regional Research Laboratory, CSIR, Bhopal (India)
[3]GH, Raisoni college, Harigarge MTDC, Hingna, Nagpur (India)
[4]Research Scholar, 34/13 South TT Nagar, Bhopal - 462 002 (India)

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ABSTRACT

Physico-Chemical analysis of drinking water of bore-wells of Hoshangabad road has studied seasonally i.e. summer, winter and monsoon for one year during 2006-07. Two readings in one season have take to analyze different parameters i.e., temperature, pH, EC, Free CO_2 , Chloride, total solids (TS), S.S (Suspended Solids), T.D.S. (Total Dissolved solids), Total alkalinity, total hardness (T.H), Calcium hardness (Ca-H) and magnesium hardness (Mg-H), The results are observed in the range of 22.8-31.4 ^oC, 6.4-7.2, 292-530 mmhos/cm, 6.5-7.84, 80.2-126.8, 510-630, 300-358, 205-284, 108.2-380, 104.6-149.5, 74-364.4 and 20-92 ppm. Respectively. D.O., B.O.D, C.O.D Nitrate and sulphate has been noted in the range of 1.06-1.76, 2.16-5.6, 12.6-62.4, 7.6-14.94 and 33.4-90.2 ppm respectively.

Key words: Physico-chemical, parameters, analysis, observed range, season, and bore-wells.

INTRODUCTION

Water is the mirror of civilization since the origin of human life. The increase in population coupled with unplanned urbanization and industrialization has resulted a large damage and deterioration in drinking water supply for irrigation, industries and for drinking purpose. The mismanagement of wastes & Sewage deteriorates the water quality of study area. The paper deals with the determination of these parameters at various locations and analysis of data in the light of various prescribed standards.

Bhopal is the capital of Madhya Pradesh. Water samples of drinking water (bore-wells) are collected in 5 liter clean polythene jerry canes after flushing the bore-wells upto 5 minutes to analyse the selected parameters. The changes in Physico-Chemical parameters are the direct and indirect indices of water quality index. The proper groundwater samplings and analysis are very important to assure effective monitoring. Hoshangabad road of drinking water is mainly through bore-wells and municipality water supply.

MATERIAL AND METHODS

Drinking water samples are collected from the 8 selected sampling stations:

1. Habibganj Railway station
2. Narayan Nagar
3. Saket Nagar

Table 1: Analysis of Physico-chemical Characteristics of Drinking Water of Hoshangabad Road bore well's of Bhopal, India, 2006-07

Parameter	Unit	BW_1	BW_2	BW_3	BW_4	BW_5	BW_6	BW7	BW_8
Temperature	^oC	26.0	24.9	23.0	22.8*	31.4**	30.0	28.2	27.2
pH	-	6.4*	6.9	6.5	6.6	6.8	71	7.2**	7.0
E.C.	mmhos/cm	472.0	520.0	494.0	478.0	530**.0	518	324	292*.0
Free CO_2	ppm	6.5*	6.8	7.5	7.2	7.84**	6.92	6.8	6.6
Chloride	ppm	103.4	105.8	98.4	95.8	96.6	80.2*	124.2	126.8**
Total Solids (T.S)	ppm	146.4	148.2	163.0*	139	146	208.4	216.4	250.4
Suspended Solids (S.S.)	ppm	68.6	58.8*	62.4	64.6	64.0	64.2	112.8	128**.4
T.D.S	ppm	38.2	34.4*	44.0	44.6	40.0	38.4	74.0	78**.6
Total Alkalinity	ppm	30.4	24.4	18.4*	20.0	24.0	25.8	38.8	49**.8
Total Hardness	ppm	518.0*	278.0	586	598	624	620	633**	514
Ca-H	ppm	310*.0	344.0	346	312	356**	312	324	340
Mg-H	ppm	205*.0	216.0	234	244**	284*.0	260	242	236
D.O.	ppm	1.08*	1.52	1.16	1.20	1.18	1.60	1.66	1**.76
B.O.D	ppm	2.42	2.94	2.64	2.90	2.24	2044	2.16*	5**.6
C.O.D	ppm	48.6	42.4	28.6	62.4**	58.6	12.6	28.6	14.28
Nitrate	ppm	16.4	16.8	7.6*	8.42	12.42	14.8*	8.8	9.68
Sulphate	ppm	38.6	36.8	32.6*	72.4	58.6	59.4	64.8	92**.2

BW_1= Habib Ganj Railway Satation
BW_2= Narayan Nagar
BW_3=Saket Nagar
BW_4= Barkatullah University
BW_5= Near Petrol Pump Hoshangabad Road
BW_6= Surendra Land Mark
BW_7= Vidhya Nagar
BW_8= Bag- Mugaliya

4. Barkatullah University campus
5. Surendra Land mark
6. Near Petrol Pump
7. Bagmugaliya
8. Vidhya Nagar

The Samples has analyzed with standard instruments and chemicals pH measured by pH-metry, D.O & B.O.D by Winkler's azide method, C.O.D by reflux method, Chloride by argentometric titration, Hardness by complexometric titration (EDTA), and the methods prescribed by APHA (1975) and NEERI (1986).

RESULTS AND DISCUSSION

The results are summarized in Table 1. In the present study, temperature has the range of 22.8-31.4°C. Higher value of temperature accelerated the rate of Chemical reactions is water pH measurement is one of the most important frequently used test in water chemistry pH indicates the intensity of acidity and alkanity and measures H+ ions in water. In this study, minimum pH value 6.4 and maximum 7.2 has recorded at BW_1 and BW_7 respectively in summer and monsoon seasons. Electrical conductivity (EC) measures the dissolved ions; it ranges from 292-530 mmhos/cm. Minimum value is found at BW_8 and maximum at BW_5. Bore-wells water used for drinking purpose is extra rich in CO_2 because water comes by percolation through various strata and water absorbs a large amount of free co_2. It ranges form 6.5-7.88 ppm in this study., During tenure of work, Minimum chloride 80.2 and maximum value of 128.04 ppm has observed at sampling stations BW6 and (1CMR,1995) BW8, tolerance limit of chloride in natural water is 250 ppm. Water with higher chloride concentrations imparts peculiar taste, total solids, suspended solids and TDS ranges from 510-630, 300-358 and 205-284 ppm at different sampling stations.

Total alkalinity, total hardness, Ca-H & Mg-H has ranged frpm 18.4-49.8, 518-633, 310-356 and 205-244 ppm respectively. Minimum values of these parameters are found at BW_3, BW_1, BW_1 and BW_1. While the higher values are recorded at BW_8, BW_7, BW_5, and BW_4 . Alkalinity measures the capacity to absorb H^+ ions without significant change in pH value. Hardness is the result of geological formations of the water sources.

D.O., B.O.D and C.O.D Values range from 1.06-1.76, 2.16-5.64 and 12.6-62.4 ppm respectively, minimum values has observed at sampling stations BW_1, BW7 and BW6 while the higher values at BW8, Permissible limits are 4.6, 6.0 ppm and 10.0 ppm respectively for water prescribed by WHO (1984).

Nitrate

Concentration in bore-wells water is due to leaching of nitrate with percolation of water. In this study nitrate varies from 7.6-14.94 ppm is well within the permissible limits (ISI; 2000-) i.e. 45ppm

Sulphate

Is an important constituent of hardness with Ca and Mg. Excess amount of Sulphate in water has cathartic effect on human health. In this study Sulphate ranges from 30.8-90 ppm, Sulphate concentration has found well within the permissible limit of 250 ppm (I.C.M.R. 1975, W.H.O., 1984). The most of the samples analyzed show that water in safe for domestic use. Low concentration of Sulphate may be due to less oxidation of sulphide to Sulphate. The above findings has found similar with those of kataria (1994), Kataria (2000), Kataria et al. (2004, 2005, and 2006). Taqveem Ali Khan et al. (2003).

CONCLUSION

Qualitatively, the bore-wells drinking water of study area is potable, hard and slightly mineralized. It is suitable for domestic and irrigational use.

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