

Physico-chemical characteristics of Borewells water of Kolar road area of Bhopal city

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ABSTRACT

Physico-chemical parameters affect directly or indirectly the water quality of bore-wells. Analysis of groundwater was done in monsoon season for one year 2004-05. Two readings of samples observed and analysed to assess the water quality with parameters like temperature, pH, electrical conductivity, Free CO₂, chloride, total alkalinity, total hardness, Ca-H, Mg-H, D.O., B.O.D., C.O.D., nitrate, sulphate and MPN (Most probable number of bacteria) were analysed during 2004-05. Most of the parameters are found well within the permissible limits as prescribed by WHO (1978). The study is very important and significant for hygienic point of view.

Key words: Borewells, Kolar road, percolation, hygienic.

INTRODUCTION

Environment is deranged due of man's economic exploitation. Water is vital for existence of all life forms and is essential for all activities of human being. The valuable resource of groundwater is infect depleting and has great demand for drinking purpose.

Groundwater is highly susceptible to pollution form natural as well anthropogenic activities. Development activities in major sector, such an industries, agricultural etc. are polluting surface and groundwater bodies I.e. also affecting water quality.

Bhopal is the capital of Madhya Pradesh. It is situated at 32°16' N latitude and 77°26' E longitude on hard pink red sandstone of vindhyan region. Water sample of bore-wells water were collected is 2 litre clean jerry cane after flushing and pumping the hand pumps to analyze.

Throughout the world, there is an increasing interest in the quality of gournwater's which is degraded by human activities, over pumping and by some geological changes. Municipal and domestics sewage water when enter into aquifer or by percolation can pollute and deteriorate the water quality. Hence it becomes very important to assess and analyze the water regularly. The major sources of pollution are human, animal, industrial and agricultural activities and domestic wastes. The present district of Bhopal was carved out of sehere district in 1972 with population of 10,63,662 (1991) census and out of this about 78,000 population is living in the Kolar area of Bhopal.

MATERIAL AND METHODS

Bhopal is the capital of M.P. The average rain fall recorded is about 1156 mm/yr. Samplings of bore-wells of kolar road areas (i) Kolar Guest house BW₂ Chuna Bhatti BW₃-Sterling homes BW₄ Shalimar park, BW₅- Sarva Dharma, BW₆- Beema

Kunj. BW7- Danish Kunj BW₈-vinnnet Kunj BW9- Nayapura Bus stand has been chosen for present study. samples have in 2004-05 The methods applied for analysis are usually followed as prescribe by NEERI (1986).

Pre-sterilized bottles were used for the collection of D.O and B.O.D samples. Temperature, pH of the samples was measured in the sampling stations. The water samples have preserved to determined D.O., B.O.D the test of the samples were analyzed is Laboratory.

RESULTS & DISCUSSION

The result are summarized in Table -1. In the present study, temperature varied from 20.8 to 33.1°C. Temperature of water influences the biological reactions in water. Higher values of temperature accelerated the chemical reaction in water. pH indicates the intensity of acidity. pH ranged from 6.8-7.5 Electrical conducts of water samples ranged from 280-980 umhos/cm measure the dissolve ions and it is the capacity to carry an

electrical charge, both number of ions, Minimum value was noted at BW2 & higher value at BW7, free CO₂ ranged from 5.8-28.4ppm at BW5 and BW3 Groundwater is rich in CO₂ because it comes for percolation through various strata and absorbs a large amount of free CO₂. In this study chloride total alkalinity, Total hardness, Ca-H and Mg-H has ranged from 19.4, 126.50-22.6-336, 103.8-386, 70-312 and 33.8-74 ppm respectively at different sampling stations. Higher values of alkalinity were due to leaching of soil during natural filtration of water from sewage. The findings are similar with Kataria and Jain (1995-96).

D.O., B.O.D and C.O.D ranged from 1.08-3.82, 0.84-3.98, 5.8-766 ppm at different sampling stations. B.O.D is the amount of D.O required to stabilize the biodegradable organic matter by micro-organisms of water under aerobic conditions. Higher B.O.D values may attribute to the stagnations of water body leading to the absence of self-purification cycle. Increase of C.O.D values are due to the pollution of input Zones. Kataria (1996, 2000). Nitrate concentration in ground water

Table - 1: Physico-chemical characteristics of bore-well water of Kolar road area of Bhopal

S. No.	Parameter	Unit	Bw 1	Bw 2	Bw 3	Bw 4	Bw 5	Bw 6	Bw 7	Bw 8	Bw 9
1.	Temperature	°C	20.9*	32.2	32.2	31.8	23.4	29.0	24.0	32.8**	25.4
2.	pH	-	6.5*	6.8	7.0	7.2	6.6	7.1	7.5**	7.20'	7.30
3.	Electrical Cond.	Umbos/cm	320	235*	438	966	470	436	386	980**	468
4.	Free CO ₂	ppm	9.8	11.5	9.5	32.6	6.6	4.8*	40.2**	29.6	7.3
5.	Chloride	ppm	18.6	68.25	39.06	63.4	96.2	128.5**	26.4	41.24	34.5
6.	Total alkalinity	ppm	136	112	274	23.8	204	362	242	180	211.6
7.	Total hardness	ppm	144*	374	286**	286*	172	242	348	218	222.4
8.	Ca-H	Hardness	118*	288	316*	246.0	144	212	274	124	193.4
9.	Mg-H	Hardness	2.6*	86**	70	40.0	28	30	74	94	29
10.	DO	Hardness	1.04*	1.72	1.46	4.26**	1.64	2.70	3.72	1.8	1.54
11.	BOD	Hardness	3.2	2.42	3.72**	2.80	2.4	1.88	0.84*	3.6	1.44*
12.	COD	Hardness	30.6	14.02	24.32	12.6	74.8**	14.2	4.8	5.8*	17.8
13.	Nitrate	Hardness	9.1	10.4	8.2	2.8	6.8	1.16	24.2**	0.38*	4.86
14.	Sulphate	Hardness	14.2	12.4	32.6	44.8	44.0	52.6**	10.6*	20.02	32.6
15.	MPN	Index/100ml	24.0	136	18	308**	48.4	12.2	10.0*	24.8	Nil

* - Minimum; ** - Maximum values

Bw1 - Kolar Guest House

Bw2 - Chuna Bhatti

Bw3 - Sterling Homes

Bw4 - Sarvadhama

Bw5 - Shalimar Park

Bw6 - Beema Kunj

Bw7 - Danish Kunj

Bw8 - Vineet Kunj

Bw9 - Nayapura bus stand

is due to leaching of nitrate with percolation of water. In the present study nitrate ranged from 0.40-23.8 ppm were well within the permissible limit. Sulphate is an important constituent of hardness with Ca&Mg. Excess amount of sulphate in water has cathartic effect of human health (Rangwala K.S., and Rangwala P.S. 1927, it ranged from 12.40-46.8 ppm. In this study MPN count by inoculation of appropriate volume of a number of tubes of medium (McConkey broth) 10, 1, 0.1 ml of samples in 3 sets of 5 test tube containing 10ml of medium was inoculated. MPN ranged from 10-380 Index/100ml in this study) i.e. similar to Khatri and Tambekar (2003). Most of

the parameters are found within the permissible limits recommended by WHO (1987) while MPN are found beyond the limits of ISI (1983). Hence water samples analysed in the present study were found suitable for drinking purpose after proper required treatment.

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