

Physico-chemical analysis of drinking water of Karond, MIC Gas effected area of Bhopal (M.P.) India

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ABSTRACT

Physico-chemical analysis of groundwater (bore-wells) of gas affected area Karond of Bhopal city has been studied in winter, summer and monsoon seasons for one year 2009-10. Parameters temperature, pH, EC, free CO₂, Chloride, total alkalinity, T-H, Ca-H and mg-H were reported in the range of 22-29°C, 6.4-7.4, 292-710 mmhos/cm, 6.2-36.8, 78-130, 124-208, 64.8-108.4, 36.4-160.2 and 18.2-32.4 ppm respectively while D.O., B.O.D., C.O.D., nitrate, sulphate, fluoride and MPN has identified in the range of 1.16-1.90, 2.24-3.12, 22.4-78.8, 4.8-16.9, 34.2-90.4, 0.6-1.2 ppm and 6.4-980 NO/100 ml. respectively.

Key words : Ground water, MPN, *Coliform*, *bacteria*, permissible limits, damage, deterioration, sterilized.

INTRODUCTION

Water is the most vital necessity of life. It is in abundance 97.3% of the world's water is ocean water i.e. salty and can not be used for agricultural, domestic and industrial purpose, 0.6% is stream's and lake water and 2.1% (i.e. $8.5 \times 10^{15} \text{ m}^3$) is groundwater, occurs at the depth of 80 m to 150 m below the ground surface according to distribution. Ground water is an important source of water supply throughout the world. The increase in population coupled with unplanned urbanisation and industrialization has resulted damage and deterioration in ground water quality.

Bhopal is the capital of Madhya Pradesh. Water samples of bore-wells water are collected in 2 lit clean polythene jerry-canes after flushing the bore-wells to analysis. The procedure has adopted as prescribed by APHA (1985), NEERI (1986). Presiterilized battles are used to collect the D.O. and B.O.D. samples.

Temperature, pH, EC in the present study is varied from 22-29°C, 6.4-7.4, 292-712 mmhos/

cm respectively, while free CO₂ chloride, Total alkalinity in the range of 6.2 – 36.8, 78-130 and 124-208 ppm respectively. Higher values are found at SS₈, the gas affected area of union carbide factory. Total Hardness Ca-H, Mg-H, D.O., B.O.D. & C.O.D. ranges from 64.8 at SS₁ – 180.4 at SS₈, 36.4 (at SS₂) – 160.2, 18.2 – 32.4, 1.16 – 1.90, 2.24 – 3.12 and 22.4 (at SS₅) – 78.8 (at SS₃) ppm respectively. Nitrate, SO₄²⁻ and F⁻ has found within the range of 4.8 (at SS₁) – 16.9, 34.2 – 90.4 and 0.6 – 1.2 (at SS₈) ppm respectively.

To estimate the number of presumptive coliforms (MPN count) present in water by inoculation of appropriate volume of a number of tubes of medium (Mac Conkey Brath) 10, 1 and 0.1 ml. of sample inoculated in 3 sets of 5 test tubes each containing 19 ml. of medium on inoculation, it is assumed that each test tube receives 1 ml. or more viable organisms (bacteria) in the inoculum to show positive (+)ve reaction and growth of bacteria in the medium used. MPN has ranged in this study from 6.4 (at SS₁) to 988 (at SS₈) / 100 ml. of sample is beyond the prescribed limit of WHO (1978) and IS:10500.

The findings are similar with those of Kataria (2000, 2005, 2009), Rangwala KS and P.S.Rangwala, Most of the parameters in the present study are found within the prescribed limits of IS:10500 while MPN, SO_4^{2-} , NO_3^- & F^- are found in increasing trends.

Table 1: Physico-chemical Analysis of Borewells water of Karond area during 2009-10

Parameters	Unit	Mean seasonal values							
		SS ₁	SS ₂	SS ₃	SS ₄	SS ₅	SS ₆	SS ₇	SS ₈
Temperature	°C	27.0	24.8	22.4	22.0*	28.8	29*	26.5	27.0
pH	pH Scale	6.5	6.8	6.7	6.4*	6.9	7.2	7.0	7.4**
EC	mmhos/cm.	480	512	478	476	516	378*	292	710*
Free CO ₂	ppm	6.2*	6.6	7.0	7.2	7.8	6.4	6.3	36.8**
Chloride	ppm	100.8	112.6	98.4	96.4	78.0*	122.4	128	130**
Total alkalinity	ppm	148	154	138.0	136	144	208**	220	124*
Total hardness	ppm	64.8*	68.8	70.2	78.4	68.2	112	118	180.4**
Ca-H	ppm	38.4	36.4*	44.4	53.8	50.0	82	86	160.2**
Mg-H	ppm	26.4	32.4**	25.8	24.6	18.2*	30	32	20.2
D.O.	ppm	1.24	1.16*	1.36	1.34	1.60	1.64	1.84	1.90**
B.O.D.	ppm	2.4	2.24*	2.32	2.42	3.12**	2.4	2.64	2.08
C.O.D.	ppm	52.4	56.8	78.8**	78.8	22.4*	25.6	48.4	78.4
Nitrate	ppm	4.8*	5.6	8.4	5.9	10.8	12.4	16.9**	8.6
Sulphate	ppm	36.8	46.4	38.4	36.4	34.2*	72.8	80.2	90.4**
Fluoride	ppm	0.6*	0.64	0.72	0.80	0.90	0.64	0.70	1.2**
MPN	ppm/100 ml.	6.4*	7.2	16.0	8.0	100.0	884	988**	960

*Minimum

**Maximum value

SS₁ = Sindhi Colony

SS₅ = P.G.B.T. Campus

SS₂ = Kaji Camp

SS₆ = Near Railway Crossing

SS₃ = DIG Bungalow

SS₇ = Karond Chouraha

SS₄ = Gautam Nagar Thana

SS₈ = Arif Nagar (Near Union Carbide Factory)

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