

PHYSIOCO-CHEMICAL ANALYSIS OF UNDERGROUND WATER OF BHIWANI CITY

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ABSTRACT

Physico-chemical analysis such as temperature, salinity, alkalinity, total hardness, phosphate, sulphate, nitrate, pH, electrical conductivity, T.D.S., turbidity, dissolved oxygen, fluoride, chloride of bore-well water was carried out from twenty five sampling stations of Bhiwani City during May-2010 (before monsoon) and October-2010 (after monsoon) in order to assess water quality index.

KEYWORDS: - Chemical analysis, Bore-well drinking water, Morbi-Malia, Gujarat

INTRODUCTION

In continuation of earlier studies on bore-well water¹⁻³, here we have investigated intensively the Physico-Chemical analysis of drinking water of Bhiwani City territory, located in Haryana state. Bore-well water is generally used for drinking and other domestic purposes in this area. The use of fertilizers and pesticides, manure, lime, septic tank, refuse dump etc. is the major sources of bore-well water pollution⁴. In the absence of fresh water supply people residing in this area use bore-well water for their domestic and drinking purpose. In order to assess water quality index, we have conducted the physico-chemical analysis of bore-well drinking water.

EXPERIMENTAL

In the present study bore-well water samples from twenty five different areas located in Bhiwani City territory were collected in brown glass bottle with necessary precautions⁵. All the chemicals were used of AR grade. Double distilled water was used for the preparation of reagents and solution. The major water quality parameters considered for the examination in this study are temperature, pH, D.O., turbidity, electrical conductivity, T.D.S., salinity, alkalinity, phosphate, sulphate, nitrate, fluoride, total hardness and chloride contents⁶. Temperature,

pH, D.O., turbidity, electrical conductivity, T.D.S., salinity, phosphate, nitrate and fluoride value were measured by water analysis kit, portable D.O. meter and manual methods. Total hardness of water was estimated by complexometric titration methods⁷⁻⁸. Chloride content was determined volumetrically by silver nitrate titrimetric method using potassium chromate as an indicator and was calculated in terms of mg/ l. Alkalinity of water samples were measured volumetrically by titrimetric method⁷⁻⁸. Sulphate content was determined by volumetric method⁷.

RESULTS AND DISCUSSION

Temperature

In the present study, temperature in May-2010 ranged from 29.6 to 32.6⁰C and temperature in October-2010 ranged from 29.1 to 31.8⁰C.

D.O.

In the present study, D.O. in May-2010 ranged from 3.9 to 7.3 ppm. The minimum tolerance range is 4.0 ppm for drinking water. But the D. O. was found lower in sample station Nos. 8. In October-2010 D.O. ranged from 4.1 to 8.3 ppm.

pH

In the present study, pH in May-2010 ranged from 7.10 to 8.90. The tolerance pH limit⁹ is 6.5 to 8.5. The sample station No. 1, 5, 6, 7, 8, 11, 12, 13, 15, 16, 17, 20, 21, 23, 24 and 25 showed higher pH than prescribed range. In October-2010 pH ranged from 7.67 to 9.02. The sample station No. 8, 12, 15, 16, 17, 20, 21 and 23 showed higher pH than the prescribed range.

Turbidity

In the present study, Turbidity in May-2010 ranged from 0.08 to 2.35 NTU and in October-2010 Turbidity ranged from 0.15 to 4.60. The tolerance range for Turbidity is 5 NTU¹⁰. So all the sample station Nos. have shown lower NTU values than the prescribed range.

Electrical conductance

In present study, Electrical conductance in May-2010 ranged from 0.74×10^{-3} to 6.15×10^{-3} mho/cm, while in October-2010 Electrical conductance ranged from 0.51×10^{-3} to 4.97×10^{-3} mho/cm.

T.D.S.

In the present study, TDS in May-2010 ranged from 399 to 3070 ppm. According to WHO⁹ and Indian standards¹⁰, TDS value should be less than 500 ppm for drinking water. The sample station Nos. 1 to 25 except 10 and 21 showed higher ranges compare to prescribed WHO and Indian standards. In October-2010 TDS ranged from 247 to 2460 ppm. But sample station Nos. 1 to 25 except 10, 20, 21 and 24 showed higher range than prescribed range.

Salinity

In the present study, Salinity in May-2010 ranged from 390 to 3060 ppm and in October-2010 Salinity ranged from 240 to 2450 ppm.

Alkalinity

In the present study, Alkalinity in May-2010 ranged from 100 to 650 ppm while in October-2010 Alkalinity ranged from 110 to 710 ppm.

Phosphate

In the present study, Phosphate in May-2010 ranged from 13 to 41 mg/l and in October-2010 Phosphate ranged from 10 to 39 mg/l. The evaluated value of phosphate in the present study is higher than the prescribed value¹⁴. The higher value of phosphate is mainly due to the use of fertilizers and pesticides by the people residing in this area. If phosphate is consumed in excess, phosphine gas is produced in gastro-intestinal tract on reaction with gastric.

Nitrate

In the present study, Nitrate in May-2010 ranged from 85 to 445 mg/l and in October-2010 Nitrate ranged from 92 to 423 mg/l. The tolerance range for Nitrate is 20-45 mg/l. Nitrate nitrogen is one of the major constituents of organism along with carbon and hydrogen as amino acids proteins and organic compounds in the bore-well water¹⁵. If the nitrate reduces to nitrite then it cause smethaemoglobinaemia in infants¹⁶⁻¹⁸ and also diarrhea.

Sulphate

In the present study, Sulphate in May-2010 ranged from 130.28 to 362.07 mg/l and in October-2010 Sulphate ranged from 109.25 to 359.55 mg/l. The tolerance range of Sulphate is 200-400 mg/l¹².

Total hardness

In the present study, Total hardness in May-2010 ranged from 115 to 960 ppm and in October-2010 Total hardness ranged from 85 to 820 ppm. The tolerance range for Total hardness¹¹ is 300-600 ppm.

Chloride

In the present study, Chloride in May-2010 ranged from 122.2 to 1465.7 mg/l and in October-2010 Chloride ranged from 68.9 to 1257.5 mg/l. While the tolerance range for chloride is 200-1000 mg/l¹⁰.

Fluoride

In the present study, Fluoride in May-2010 ranged from 0.8 to 1.2 mg/l and in October-2010 Fluoride ranged from 0.9 to 1.2 mg/l. While the tolerance range for Fluoride is 1.0 to 1.5 mg/l¹⁰. The study has shown that the essential elements in water like TDS, Salinity, Phosphate, Nitrate, pH, Total hardness, Chloride are higher than tolerance range. Therefore, the bore well water in this territory is not drinkable.

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