



A STUDY OF GROUND WATER QUALITY OF KARCHALIAPARA WARD IN MUNICIPAL AREA OF BHAVNAGAR (GUJARAT)

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ABSTRACT

Ground water is the most important source of water supply for drinking, irrigation and industrial purposes. Seven sampling points were selected at different depths for the study in Karchaliapara ward in Municipal area of Bhavnagar in May 2008. The parameters studied were temperature, pH, chloride, sulphate, total hardness, total alkalinity, turbidity, and TDS. The ionic concentration is expressed in mg/L.

Key words : Ground water, Quality of water, TDS.

INTRODUCTION

Main source of water is rain. After rainy season, source of water is ground water, which is available for domestic, agriculture and industrial purposes. The natural quality of ground water tends to be degraded by human activities. Municipal and industrial waters entering in to an aquifer are the major sources of organic and inorganic pollutants. Water is polluted in all the parts of earth and Karchaliapara is not an exception to it.

Due to rapid growth of industrialization and urbanization, much sewage water is disposed off that generates ground water pollution. The pollutants in ground water may reach by leaching, drainage and surface runoff during monsoon and hence, it is essential to study quality of water.

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EXPERIMENTAL

Water samples were collected in cleaned borosilicate bottles washed with acetone in month of May at selected sampling sites (Dunky-Hand pump) see Fig. 1 (D₁, D₂, D₃, D₄, D₅, D₆, D₇) between 09.30 a.m. to 10.30 a.m. at different depths and brought to the laboratory of Industrial Chemistry, Sir P. P. Institute of Science for study of properties of ground water. Methods used for the analysis are from existing literature¹⁻⁹.

Temperature of the water was measured in Equip-tronics digital auto temperature meter. Borosilicate glass wares, distilled water and E-Merck reagents were used throughout the testing. pH values of water sample under investigation were measured using Equip-tronics pH meter, Type No. 611. The pH was standardized by buffer solutions of 4.0 pH and 9.2 pH by E-Merck buffer tablet.

The chloride ions were determined by titrating the water samples against a standard solution of AgNO₃ using potassium chromate as an indicator. Sulphate was estimated by UV-visible Spectrometer, type-II. Total hardness was determined by complexometric titration with EDTA using eriochrome black-T as an indicator. Total alkalinity of the water was determined by titrating with N/50 H₂SO₄ using phenolphthalein and methyl orange as indicators.

Turbidity was measured by digital turbidity meter, Type No. 611. TDS was estimated by digital TDS meter, Type No. 703.

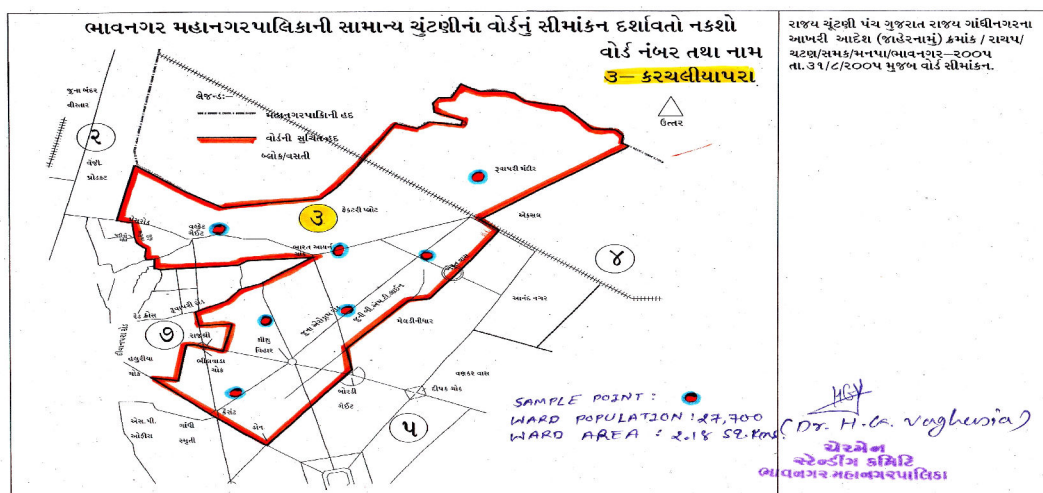


Fig. 1 : Different locations of ground water in Karchaliapara ward, Bhavnagar.

RESULTS AND DISCUSSION

The pH of the water indicates the degree of deterioration of water quality. The desirable pH range necessary for drinking water is from 7.0 to 8.5. The pH value of water sample in the study area ranged from 7.2 to 9.5. This shows that pH of water sample was slightly alkaline.

Table 1 : Properties of ground water

Properties	D ₁	D ₂	D ₃	D ₄	D ₅	D ₆	D ₇
Depth (m)	60	64	70	65	62	73	66
Temp. (°C)	27	27	27	28	28	28	28
pH	7.3	7.2	7.7	9.5	9.0	8.3	8.6
Chloride (mg/L)	374	342	311	357	401	468	499
Sulphate (mg/L)	28	19	23	58	31	22	56
Total hardness (mg/L)	519	305	442	290	231	541	495
Total alkalinity (mg/L)	423	312	234	345	456	467	578
Turbidity (NTU)	76	17	70	71	43	31	18
TDS (mg/L)	1604	1812	1198	1081	1210	1015	1564

D₁ = Ruvapari Mandir, D₂ = Khedutvas, D₃ = Bharat Iron, D₄ = Volkait Gate, D₅ = Near Old B.M.T. Line, D₆ = Near Shishuvihar, D₇ = Near Crescent.

The concentration of chlorine in the sample was found to 311 to 499 mg/L. High chloride contents have toxic effects on plants, animals and human beings. The concentration of sulphate was found to be 19 to 58 mg/L.

Total hardness was found in the sample water ranges from 231 to 541 mg/L. The desirable limit for total alkalinity is 200 mg/L. The values of total alkalinity of ground water samples varied from 234 to 578 mg/L.

Turbidity is one of the common forms of pollution. This prevents growth of the aquatic plants by reducing rate of their photosynthesis. This becomes obstacle for self purification of water. Turbidity in sample water was found between 18 to 76 NTU. The value of TDS was found in the water samples between 1015 to 1812 mg/L.

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