QUALITATIVE ANALYSIS OF GROUND WATER OF VADAVA-B WARD IN MUNICIPAL AREA OF BHAVNAGAR (GUJARAT)

H. D. NAVADIYA[*] and H. G. VAGHASIA[a]

*Industrial Chemistry Department, Sir P. P. Institute of Science, Bhavnagar University,
BHAVNAGAR – 364002 (Guj.) INDIA
[a]Bhavnagar Municipal Corporation, BHAVNAGAR (Guj.) INDIA

ABSTRACT

Seven sampling points were selected at different depths for the study in Vadava-B Ward in Municipal area of Bhavnagar in April 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: Water quality, TDS, Bhavnagar.

INTRODUCTION

Ground water is the most important source of water supply for drinking, irrigation and industrial purposes. The natural quality of ground water tends to be degraded by human activities. Municipal and industrial water entering into an aquifer are the major source of organic and inorganic pollutants. Water is polluted in all the parts of earth and Vadava-B is no exception to this phenomenon.

Due to rapid growth of industrialization and urbanization, much sewage water is disposed off that generates fair chances of 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.

---

[*] Author for correspondence; Email: dr.navadiya@yahoo.com

EXPERIMENTAL

Water samples were collected in cleaned borosilicate bottles washed with acetone in month of April at a selected sampling sites (Dunky-Hand pump) see Fig. 1 (K_1, K_2, K_3, K_4, K_5, K_6, K_7) between 06.00 p.m. to 07.00 p.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. Different methods were used for analysis[1-10].

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 samples under investigation were measured using Equip-tronics pH meter, Type No. 611. The pH was standardized by buffer solutions of 4.0 pH and 10.0 pH by E-Merck buffer tablet.

The chloride ions were generally determined by titrating the water samples against a standard solution of $AgNO_3$ 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 H_2SO_4 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.
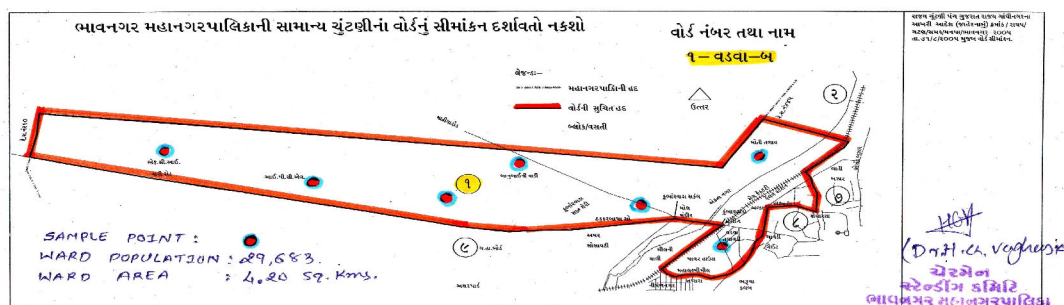

Fig. 1 : Different location of ground water in Vadava-B ward, Bhavnagar.

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 7.3 to 9.9. This shows that pH of water sample was slightly alkaline.

Table 1 : Properties of ground water

Properties	K_1	K_2	K_3	K_4	K_5	K_6	K_7
Depth (m)	60	62	70	70	52	63	56
Temp. (^{0}C)	29	29	29	29	29	29	29
pH	7.6	7.3	7.7	9.9	8.3	8.7	9.7
Chloride (mg/L)	364	359	312	360	401	468	487
Sulphate (mg/L)	27	19	30	59	33	19	69
Total hardness (mg/L)	518	315	412	267	243	540	434
Total alkalinity (mg/L)	459	320	289	323	440	545	596
Turbidity (NTU)	80	29	64	88	63	31	16
TDS (mg/L)	1304	1650	1003	1091	1190	1715	1114

The concentration of chlorine in the sample was found to 312 to 487 mg/L. High chloride contents have poisonous effects on plants, animals and human beings. The concentration of sulphate was found to be 19 to 69 mg/L.

Total hardness was found in the sample water ranges of 243 to 540 mg/L. The desirable limit for total alkalinity is 200 mg/L. The values of total alkalinity of ground water samples varied from 289 to 596 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 31 to 88 NTU. The value of TDS was found in the water samples between 1003 to 1715 mg/L.

K_1 = Near F.C.I., K_2 = Near I.P.C.L., K_3 = Near Corporator's house, K_4 = Banubai ni Wadi, K_5 = Near Kunbharwada Circle, K_6 = Moti Talav, K_7 = Vadava Talavdi.

ACKNOWLEDGEMENT

The authors are grateful to Dr. D. R. Korat, Principal, Sir P. P. Institute of Science, Bhavnagar University, Bhavnagar for providing necessary research facilities. Authors are also thankful to Bhavnagar Municipal Corporation for providing necessary map of locations in Municipal area of Bhavnagar.

REFERENCES

1. WHO Guidelines for Drinking Water, Recommendations, Geneva, Switzerland, **Vol. 1**, 130 (1984).

2. A. Goel, Asian J. Chem., **14**, 537 (2002).

3. V. P. Kudesia, Water Pollution, 1st Edition, Pragati Prakashan, Meerut (1980).

4. ISI 0500, Indian Standard Drinking Water Specification Bureau of Indian Standards, New Delhi, **5**, (1991).

5. Kannan Krishnan, Fundamental of Environment Pollution, S. Chand & Co. Ltd., New Delhi (1991).

6. S. Sharma, Asian J. Chem., **16**, 309 (2004).

7. A. K. et al, Asian J. Chem., **14**, 1209 (2002).

8. APHA Standard Methods for Examination of Water and Waste Water 19th Edition, APHA, New York (1995).

9. O. P. Bansal, Heavy Metal Pollution of Soils and Plants Due to Sewage Irrigation, Ind. J. Health, **40**, 51 (1998).

10. Hand Book of Geochemistry (1974).