

SOME STUDIES ON THE WATER QUALITY PARAMETERS OF VUDA (MITHILAPURI) COLONY VISAKHAPATNAM

A.V. N. S. H. HARIHARAN

Department of Engineering Chemistry, College of Engineering, GITAM
Visakhapatnam 530 045, A.P., India

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ABSTRACT

Physico-chemical analysis of well and bore well water samples was carried out from eight sampling stations of VUDA (Mithilapuri) Colony area during the month of September 2004. The analysis of different parameters namely- pH, turbidity, colour, total alkalinity, total hardness, chloride, sulphate nitrate, TDS, DO, BOD, COD were carried out as per standards methods. The parameteric ratios and variation of temperature with D.O. and Nitrate were studied. The results indicate that the water is extensively hard and the reason might be sewage pollution through a sandy aquifer, which is likely to be influenced by salt water contamination.

INTRODUCTION

Water is one of the most important components of our environmental resources, for all the living organisms. Ground water resources meet the increasing demand of water for domestic and industrial purposes. It has been estimated that about 25% of the irrigated land of the world is affected to some degree by water salinity (Chatwal, 1995). Water pollution is a phenomenon which is characterized by deterioration of the quality' as a result of various human activities (Kudesia, 1980). The poor quality of drinking water in our country is more due to contamination than due to the inferiority of the source (Gibbons,

1984). Therefore, a continuous periodical monitoring of water quality' is necessary so that appropriate steps may be taken for water resource management practices (Rajvaidya, 1998). The present investigation was undertaken to study the physico-chemical parameters of water samples collected from Mithilapuri colony, Visakhapatnam in order to assess its suitability for drinking purposes.

MATERIAL AND METHODS

Water samples collected from eight sampling stations selected for the analysis were given below: S₁ School area - (Well water), S₂ Mithilapuri bus stop (Bore water), S₃ Sivalayam street (Well water), S₄ Church area (Bore Water), S₅ VUDA road (Bore well water), S₆ Near water tank (Bore Well), S₇ Ramalinga Swamy temple (Bore well water) and S₈ Ramalinga swamy temple (Well water). Samples for analysis were collected in sterilized bottles using the standard procedure for grab (or) catch samples in accordance with Standard Methods of APHA, (1995). The analysis of various physico chemical parameters namely pH temperature, total hardness, alkalinity, calcium hardness, magnesium hardness, chloride, sulphate, nitrate, DO, BOD, COD, TDS etc., were carried out as per the methods described in APHA (1995).

RESULT AND DISCUSSION

The results of various physico - chemical parameters are summarized in Tables 1 to 3. Samplings were also done at an interval of three hours commencing from 08.00 hrs. of 11th September 2004 to 08.00 hrs. of the next day. The measurement of water temperature, DO, carbonate and bicarbonate alkalinity were done at the sites immediately after collecting samples. However analysis of other parameters were carried out at laboratory soon after the collection.

Temperature

Temperature of water is basically important because it effects bio-chemical reactions in aquatic organisms. A rise in temperature of water leads to speeding up of chemical reactions in water, reduces the solubility of gases and amplifies the tastes and odors. The highest temperature being at 17.00 hrs. and the lowest at 05.00 hrs. The average temperature of the present study ranged from 26.18 - 28.32° C. It is known that the hydrogen ion concentration affects the taste of water. Lower pH value below 5.0 produce sore taste and has higher value above 8.5 and alkaline taste. The pH values of the present investigation were within the ICMR standards (7.0- 8.5).

Electrical conductivity is a total parameter for determining the water quality for drinking and agricultural purposes. Many dissolved substances may produce aesthetically displeasing colour, taste and odour. The average values obtained are in the range 0.5 to 1.9 mmhos (Table 1).

Total Dissolve Solids

TDS values beyond the prescribed limit impart taste to water and reduce its palatability. The TDS values in the present study ranged within 309 to

702mg/L. The high TDS values (above 600 mg/L) may be due to proximity of sea coast.

Dissolved Oxygen (DO)

It is needed for living organism to maintain their biological processes, presence of DO in water may be due to direct diffusion from air and photosynthetic activity of autotrophs (Shanti *et al.* 2002). Oxygen can be rapidly removed from the waters by discharge of oxygen demanding wastes. Higher values of DO may cause corrosion of iron and steel. The DO values obtained in the present study are within ICMR standards.

Alkalinity

Most of the alkalinity in natural water is formed due to dissolution of carbon dioxide in water. Large amounts of alkalinity imparts a bitter taste to water. In the present investigation the total alkalinity' of the water samples is found in the Range 103.8 to 192.6 mg/L.

Hardness

In general surface waters are softer than ground waters. Water with Hardness above 200 mg/L. may cause scale deposition in the distribution system and results in excessive soap consumption and subsequent scum formation. Soft water with hardness of less than 100 mg/L may have lower buffer capacity and more corrosive for water pipes (WHO, 1984). The hardness values of the present study were found to range between 220.4 to 408.7 mg/L.

Calcium is one among the essential metals which play an important role in biological system. Magnesium though an essential and beneficial metal is toxic at higher concentrations. Principal sources of magnesium in natural waters are rocks. Sewage and industrial wastes also contribute to magnesium (Guru Prasad, 2003). In the present study calcium and magnesium contents are found in the range of 35.4 - 119.2 and 28.3 - 76.0. mg/L respectively.

Chloride

The high concentration of chloride in water is considered to be an indication of pollution by sewage waste of animal origin. (Trivedy and Goel, 1986). Industries are also important sources of chloride in water. Chloride values obtained in the study are found to be higher (209.2 mg/L) in S₃ sampling station than other stations. Bio-Chemical Oxygen Demand (BOD) & Chemical Oxygen Demand (COD) : BOD & COD are the parameters used to assess the pollution of surface water and ground waters. Both these of the parameters (BOD & COD) values obtained in the present study are within permissible levels (Table 1).

Sulphate

Domestic sewage and waste generated in the industries are the causes in increasing sulphate ion concentration in water. Sulphate ion if present in excess amount produce cathartic effect upon human beings (Dhembare, 1998). The sulphate ion concentration in the present investigation varied

Table 1

Physico-chemical parameters of VUDA (Mithilapuri) colony water samples collected on 11-09-2004.

Parameter	S ₁	S ₂	S ₃	S ₄	S ₅	S ₆	S ₇	S ₈
Temperature	27.05	26.55	27.10	27.02	27.12	28.30	26.90	26.23
pH	7.83	7.75	7.68	7.82	8.03	7.87	7.58	7.62
E.C.	0.5	0.4	1.2	1.7	1.9	0.5	1.9	1.7
TDS	309	200	585	690	632	360	702	588
Hardness	26.3	45.7	57.9	34.7	44.6	28.5	32.8	52.0
Calcium	119.2	35.4	87.2	78.8	55.3	39.04	66.11	93.8
Magnesium	28.3	27.4	68.5	66.6	51.0	15.7	76.0	72.4
Chloride	118.2	103.5	209.2	142.7	126.5	89.3	68.7	186.3
DO	4.21	5.20	5.02	4.54	4.34	5.92	4.62	4.60
BOD	0.8	0.7	1.6	0.7	0.6	0.8	0.5	0.7
Sulphate	128.5	141.6	132.8	156.7	135.3	72.8	92.8	129.3
Alkalinity	162.8	138.8	192.6	170.4	122.3	156.8	136.9	103.4
Nitrate	1.05	1.80	2.50	2.25	2.53	1.23	2.02	2.12
COD	5.9	3.2	5.3	6.2	5.3	6.6	5.6	5.2
Iron	0.002	0.004	0.003	0.004	0.002	0.001	0.005	0.004

All the parameters expressed in mg/L except pH and EC (μ mhos)

* All the values are the average of 3 determinations.

Table 2

Mean values of physico-chemical parameter of water samples collected in Sep 2004.

Parameter	8.00 hrs	11.00 hrs	14.00 hrs	17.00 hrs	20.00 hrs	23.00 hrs	2.00 hrs	5.00 hrs	8.00 hrs
Temperature	27.84	28.50	29.38	29.35	28.52	28.05	27.85	27.24	27.83
D.O.	4.21	4.56	4.84	4.65	4.52	4.40	4.23	4.13	4.21
Nitrate	1.08	0.96	0.85	0.62	0.54	0.72	1.03	2.07	1.08

Table 3

Parametric ratios of water samples- VUDA (Mithilapuri) colony

Parameter	Min	Max	Average	Parametric ratio	Values found
Temperature	26.23	28.3	27.265	pH/TDS	0.05438
pH	7.58	7.83	7.705	pH/Chloride	0.051625
E.C.	0.4	1.9	1.15	pH/Alkalinity	0.05206
TDS	30.9	702	505.5	pH/Calcium	0.9968
TSS	26.3	57.9	42.1	pH/DO	1.5257
Hardness	190.6	584.8	340.4	pH/COD	1.5724
Alkalinity	103.4	192.6	148.0	EC/Calcium	0.01488
Magnesium	15.7	76.0	45.85	EC/Sulphate	0.72108
Chloride	89.3	209.2	149.35	Chloride/TDS	0.29525
Sulphate	72.8	141.6	107.2	Hardness/TDS	2.28074
Nitrate	1.05	2.53	1.79	--	--
DO	4.2	5.9	5.05	--	--
COD	3.2	6.0	4.9	--	--

from 72.8 to 156.7 mg/L.

Nitrate

Nitrate is the most important nutrients in an ecosystem. Generally water bodies polluted by organic matter exhibit higher values of nitrate (Patnaik, 2003). The maximum value for the observed at 5.00 hrs. while minimum at 20.00 hrs. which is inversely related to surface water temperature (Table 2). In the present study water samples from the stations (S₁ to S₈) showed low concentrations of nitrate (1.05 to 2.53 mg/L) well below permissible levels as per the standards.

CONCLUSIONS

Some of the samples have total dissolved solids, hardness and calcium values exceeding the permissible limits as prescribed by Indian standards.

The above results indicate that the water is excessively hard and the reason is sewage pollution through a sandy aquifer.

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