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STUDY OF DRINKING WATER QUALITY IN SOUDHABAD AREA

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ABSTRACT

The recent analysis was carried out to evaluate the magnitude of the physico-chemical parameters of the drinking water of Soudhabad of the Malappuram district. The examination of water is necessary for assessing its quality to provide a pure and whole some water to the public for drinking and other purposes. The results point out that almost all the values of the parameters measured for well water samples are too low to reach the standard values indicating clearly no pollution or very less pollution status of the well water. The turbidity value of one sample is very high, which may be due to the suspended particles in the tank (water is pumped directly into the tank without any process). The low pH values in the southern part of the village necessitated soil analysis. The well water is safe for human consumption, of course with proper treatment like coagulation and disinfection and deserves for irrigation and other uses, in the stretch of investigation.

Key words: Drinking water, Parameters, Soudhabad area.

INTRODUCTION

Ground water is the major source of drinking water in both urban and rural areas[1]. Pollution of ground water is an important aspect of environmental pollution with the fast industrialization and urbanization in the world[2]. The examination of water is necessary for assessing its quality to provide a pure and whole some water to the public for drinking and other purposes. Soudhabad is located south of the Kadalundi river. Well water is preferred to other sources of water by the villagers for drinking and cooking purposes. These dug wells have a maximum depth of about 10 meters and diameter of about 3 m.

In the present study, drinking water samples at 10 different sites from open well were collected during September 2011 and analyzed qualitatively following standard procedure[3,4]. The physico-chemical data obtained were compared with the standard values[5].

EXPERIMENTAL

Open well water samples at 10 selected sites in Soudhabad village were collected following standard procedures. All reagents were of analytical grade and solutions were made of distilled water. All the instruments were calibrated before the measurement.

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As a matter of fact, temperature, pH and dissolved oxygen were determined in the field as quickly as possible after sampling. The methodologies adopted are given below (Table 1).

Table 1: Parameters determined and methods used

S. No.	Parameter determined	Method used
1	pH	pH Metry
2	Conductivity	Conductivity meter
3	Turbidity	Nephelo turbidity meter
4	Total dissolved solid	Conductance
5	Dissolved oxygen	Winkler's method
6	Bio chemical oxygen demand	Winkler's method
7	Alkalinity/acidity	Titrimetric
8	Total hardness	EDTA titration
9	Ca & Mg hardness	EDTA titration

RESULTS AND DISCUSSION

The results obtained for various physico-chemical parameters are given in Table 2.

Table 2: Results of physico-chemical parameter

Parameters	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5
Acidity	11	16	103	29	102
Alkalinity	46	46	26	22	20
B.O.D.	0.9	6.2	2.7	0.7	3.6
Ca hardness	24	26	26	24	12
Colour	Colourless	Colourless	Colourless	Colourless	Colourless
Conductivity	58.4	105.2	58.3	40.6	116.6
D.O.	3.6	6.8	3.5	4.1	4.1
Mg hardness	20	10	24	2	14
Odour	Odorless	Odorless	Odorless	Odorless	Odorless
pH	7.4	8.1	5.2	5.9	4.2
T.D.S.	30.952	55.78	31	21.25	61.78
Temperature	28	29	30	32	31
Total hardness	44	36	50	26	26
Turbidity	15	< 5	< 5	< 5	< 5

Parameters	Sample 6	Sample 7	Sample 8	Sample 9	Sample 10
Acidity	150	134	138	83	43
Alkalinity	16	20	18	30	12
B.O.D.	0.4	0.9	1.6	4.1	2.4
Ca hardness	12	20	12	40	3.4
Colour	Colourless	Colourless	Colourless	Colourless	Colourless
Conductivity	37	137.4	88.7	88.8	131.4
D.O.	4.4	4.0	4.6	7.6	6.9
Mg hardness	0	4	4	8	6
Odour	Odorles	Odorles	Odorles	Odorles	Odorles
pH	6.1	6.2	5.4	4.8	4.5
T.D.S.	19.6	72.8	47.011	47.064	69.6
Temperature	31	31	31	31	30
Total hardness	12	24	16	48	40
Turbidity	< 5	< 5	< 5	< 5	< 5

A critical analysis of the data and its comparison with the drinking water quality standards revealed the following facts regarding the drinking water quality of open wells at Soudhabad during the course of study.

The pH of most natural waters fall within the range of 4 to 9. Most of the waters are slightly alkaline due to the presence of carbonate and bicarbonate. It may be affected by humic substances by a change in the carbonate equilibrium due to the bioactivity of plants and in some cases by hydrolysable salts. The effect of pH on the chemical and biological properties of liquid makes its determination very important.

The WHO prescribes the limiting value of pH between 6.5 to 9.0 and according to IS, it is 6.5 to 8.5 for a sample of water to be used for domestic purposes. In the present study, the pH values of the sample varies 6 to 8.1, which lies within the prescribed limit except for five samples; 5 and 6. Hence, it is evident from the observed pH value that almost all the water sample in the present investigation are suitable for domestic and other purposes. The low values of pH for almost all the samples taken from southern area of college campus may be due to the special properties of the soil. The pH value is affected by the presence or absence of certain elements. Presence of Fe^{2+}, Al^{3+} etc. can make the sample acidic due to the reactions.

$$Fe^{2+} + H_2O \rightarrow Fe(OH)^{+} + H^{+}$$

$$Al^{3+} + H_2O \rightarrow Al(OH)^{2+} + H^{+}$$

Decrease in concentration of certain alkali and alkaline earth metals like Na, K, Ca, Mg etc. can decrease pH. In addition, pH depends on carbon dioxide/carbonate-bicarbonate equivalence. Results of soil analysis of the two areas are given below (Table 3).

Table 3: Details of soil analysis

Element	Southern area (ppm)	Other area (Northern side) (ppm)
Cu	1.2	3.7
K	155	290
Ca	1502	1507
Mg	163	233
Fe	12	60
Mn	15	32
Zn	0.90	2.6

Turbidity may be caused by a wide variety of suspended materials ranging from colloidal to coarse dispersion, making water unfit for drinking. The permissible limit for turbidity is 5 NTU. It follows consequently that the pollution in all the samples except at sample number 1 is within the safe limits. At sample 1, the turbidity is twice as compared to standard value. Specific conductance can measure the dissolved solids. The permissible limit is 300 micro mho/cm. In the present study, the obtained values are very low. The high value of conductivity in the sample 5 and 9 might be due to organic conducting species from soaps and detergents. TDS content of the water samples collected ranges between 0.53 to 65.83 which are lower than the value prescribed for drinking water quality. All the water samples shows zero phenolphthalein alkalinity and have a methyl orange alkalinity may indicating that alkalinity of the samples is due to bicarbonate only and not due to carbonate and hydroxide ion. The observed values for the alkalinity merge with the standard values and thus not contributing to pollution. Methyl orange acidity gives mineral acidity and total acidity using phenolphthalein gives both mineral and CO_2 acidity. Excess acidity is harmful to fish and aquatic life. Total hardness is not high indicating absence of contamination by Ca and Mg salts from detergents and soaps of the bathing places. Generally surface waters are softer than ground water. Soft water will be having hardness value in the range 0 – 75. The investigation of dissolved oxygen reveals that the value lies between 3.6-6.8, i.e. at all places, water has higher DO than the limiting value, indicating that DO content satisfies the public water supplies needs. Higher solubility due to lesser hardness in combination with the prevalence of primary production might results in the higher values of DO. Iron, Cl^-, PO_4^{3-} are present in negligible concentration and F^- is not at all presents.

CONCLUSION

With a view to create awareness among the people about the quality of water they use for drinking and other domestic purposes, this study has been under taken. Assessments of the water samples for pollution are made by comparison of the assessed values of all parameters with the corresponding standards prescribed for drinking water by various agencies like BIS, WHO etc.

The present study reveals that almost all the open well water is palatable, potable and suitable for drinking purposes. Water is pumped directly to the distribution system in a few cases. In a few area well

water is more and more contaminated that locals are abandoning their domestic well and depend on crave for public water supply. It is imperative that proper treatment like bleaching and coagulation using scientific methods must be adopted before the water is allowed to the public water supply system. Chlorination can produce virus free water from faecally polluted source water. The present study suggests need for water quality management in the area of study and the residents must be educated for safe drinking water.

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