



Physico-Chemical Analysis of Ground Water Quality of Kalavad Taluka of Jamnagar District (Gujarat)

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Abstract

Physicochemical analysis of ground water samples were collected from different places of Kalavad taluka of Jamnagar district (India). These Fifteen samples of water samples from different places were analyzed for their physicochemical characteristics. All the samples were collected from the different places. People used water for drinking and irrigation purpose these water samples from fifteen different places of Kalavad, were analyzed for their physicochemical characteristics. Laboratory tests were performed for analysis as Temperature Calcium, Magnesium, hardness, pH; Chloride, Alkalinity, TDS, sulphate, phosphate and nitrate were studied. The usefulness of these parameters in predicting ground water quality characteristics were discussed. Thus an attempt has been made to find the quality of ground water in and around Kalavad suitable for drinking purposes after proper purification.

Keywords: Physiochemical parameters; Drinking water and Hardness.

1. Introduction

Water is a wander of the nature. “No life without water” is a common saying depending upon the fact that water is the one of the naturally occurring essential need of all human life. Under ground and surface water are essential natural resources for sustaining life and environment that we have always thought to be available in abundance and free gift of nature.

Water is essential natural occurring resources for human life and environment, which we have always thought to be available in abundance and free god gift of nature[1-2].The water for the consumption of human beings comes in different forms and from different sources. There were two main sources of drinking water; one is a surface water resources river, lakes. Under ground water mainly from the seepage of surface water and is held in the subsoil and in previous rock. About 94% of total available water all over world is in the form of ground water. In villages the main source of drinking water is under ground water available from wells, bore wells or hand pumps [3-6].

Bore wells underground water samples from fifteen different areas located in and around Kalavad, were collected in plastic sampling bottles with necessary precautions. People’s lives and live hood depend on water; demand for cleans water increases continuously as the growth in world population. People in many areas of the world lack the fresh, drinkable water essential to their survival if they are proper; more secure water supplies are needed.

Here we report the physicochemical analysis of bore wells drinking water of Kalavad territory. Kalavad is located in Jamnagar district of Gujarat. bore wells 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, are the main sources of bore wells water pollution[9] in the absnce of fresh water supply, people residing in this area forced to use bore wells water for their domestic and drinking consumption. In order to assess water quality index, we have carried out the Physico-chemical analysis of bore wells drinking water.

2. Material and Methods

The Water Samples of drinking water of Kalavad taluka of Jamnagar district (India). Were collected from 15 different villages in the morning hours between 10 to 12 am in Polythene bottle. All the chemicals used water of AR grade. Double distilled water was used for the preparation of reagents and solutions. The major water quality parameters considered for the examination in this study are temperature PH ,dissolved oxygen (DO)total dissolved solid(T.D.S),total alkalinity, calcium and magnesium hardness, sulphate, phosphate and nitrate contents[10]. Temperature pH, dissolved oxygen (DO) total dissolved solid (T.D.S), phosphate, Nitrate values were measured by water analysis kit and manual methods. Calcium and magnesium hardness of water was estimated by complexometric titration method [11, 12]. Chloride contents were determined volumetrically by silver nitrate titration method using potassium chromate as an indicator. It was calculated in terms of mg/L. sulphate contents were determined by volumetric method [12].

Table 1. Physico-chemical parameters of ground water samples

No.	Sample Station	Temp °C	pH	TDS	D.O. m/L	Chloride mg/L	Total Alkalinity mg/L	Ca Hardness mg/L	Mg Hardness mg/L	SO ₄ ⁻² mg/L	PO ₄ ⁻³ mg/L	NO ₃ ⁻ mg/L
1	BALAMBHADI	29.8	6.6	410	8.2	116.62	609	50.09	46.85	274.03	6.95	179
2	BERAJA	29.5	6.9	520	8.7	105.73	381	41.47	38.75	260.79	9.45	299
3	CHELA BEDI	31.2	7.9	270	7.4	73.88	460	15.06	21.42	143.99	17.45	234
4	CHHATAR	31.0	7.6	550	7.9	102.06	539	31.13	32.47	108.93	12.45	96
5	BODI	29.9	7.5	620	8.5	125.67	648	5.96	34.78	183.7	9.45	129
6	DAVLI	28.6	7.1	500	8.6	130.11	581	26.6	86.04	78.84	9.45	120
7	DERI	30.8	7.8	1205	6.4	156.43	385	13.71	100.28	78.84	9.45	119
8	DUDHALA	29.9	7.3	230	8.5	66.48	340	34.63	21.9	193.29	11.95	229
9	MOTA	29.2	7.4	430	7.7	73.26	610	26.43	27.68	27.48	7.45	128
10	KHAREDI	32.8	7.4	260	7.2	169.65	581	9.2	18.81	370.18	4.45	283
11	JUVANPAR	33.9	7.8	850	8.1	167.79	634	16.96	77.66	348.85	5.45	373
12	LALOI	33.7	7.7	480	8.4	92.17	456	17.7	10.82	61.73	6.25	233
13	JIVAPAR	30.2	6.9	810	6.9	50.12	471	8.28	84.2	369.69	2.95	103
14	VADALA	28.1	7.1	860	7.2	142.56	310	14.35	25.81	265.25	5.45	143
15	SANALA	29.8	6.6	740	6.6	139.38	634	36.67	62.22	154.79	2.45	175
16	VIRVAV	30.2	6.8	650	6.1	98.77	581	36.67	29.38	111.19	5.45	149

3. Results and Discussion

The Physico-chemical data of the bore wells water samples collected are present in table respectively. The results of the samples vary with different collecting places because of the different nature of soil contamination [10]. All metabolic and physiological activities and life processes of aquatic organisms are generally influenced by water temperature.

Temperature.

In the present study temperature ranged was kept from 28.1°C to 33.9°C.

PH

In the present study pH ranged from 6.6 to 7.9 which lies in the range prescribed by APHA1. The pH value of drinking water is an important index of acidity, alkalinity and resulting value of the acidic basic interaction of a number of its mineral and organic components. pH below 6.5 starts corrosion in pipes. Toxic metals which are present in water increase the pH value of water. The tolerance pH limit is 6.5 to 8.5.

TDS:

In the present study TDS ranged from 230 mg/l to 1205 mg/l. according to WHO and Indian standards. TDS value should be less than 500 mg/l for drinking water. All the sample station except sample station no 9 higher ranged as prescribed by WHO and Indian standards [13, 14].

D.O.

In the present study dissolved oxygen (D.O) ranged from 6.1 mg/l to 8.7 mg/l. The minimum tolerance range is 4.0 mg/l for drinking water.

Chlorides:

The chlorides contents in the samples between 50.12 mg/l to 169.65 mg/l natural water contain low chloride ions. In the present study sample No.5 shows 169.65 mg/l chloride which is highest value in twenty different sampling stations. The tolerance range for chloride is 200 to 1000mg/l.

Total Alkalinity:

In the present study total alkalinity range was from 310 mg/l to 648 mg/l.

Calcium Hardness:

The calcium hardness range is from 5.96 mg/l to 50.09mg/l. The tolerance range for calcium hardness is 75 to 200 mg/l. Calcium contents in all samples collected fall within the limit prescribed. Calcium is needed for the body in small quantities, though water provides only a part of total requirements.

Magnesium Hardness:

Magnesium hardness ranged from 10.82 to 100.28 mg/l. The tolerance range for magnesium is 50 to 100 mg/l.

Sulphate:

Sulphate ranged from 27.48 mg/l to 370.18 mg/l. The tolerance range for sulphate is 200 to 400 mg/l. The high concentration of sulphate may induce diarrhea.

Phosphate:

In the present study phosphate ranged from 2.45 mg/l to 17.45 mg/l. The evaluated value of phosphate in the present study is much higher than the prescribed values. The higher values of phosphate are mainly due to use of fertilizers and pesticides by the people residing in this area. If phosphate is consumed in excess, phosphine gas is produce in gastrointestinal tract on reaction with gastric juice. This could eve lead to the death of consumer.

Nitrate:

In the present study nitrate ranged from 96 mg/l to 373 mg/l. The tolerance range for nitrate 20mg/l to 45 mg/l. Nitrate nitrogen is one of the major constituents of organisms along with carbon and hydrogen as amino acid, protein and organic compounds present in the bore wells water. In the present study nitrate nitrogen levels show higher values than the prescribed values. This may be due the excess use of fertilizers and pesticides in this area.

4. Conclusion

Physico-chemical analysis such as temperature, pH, dissolved oxygen, total dissolved solids, chloride, total alkalinity, calcium and magnesium hardness, sulphate, phosphate nitrate of bore wells water was carried out. TDS value should be less than 500 mg/l for drinking water. All the sample station except sample station no 11 and 13 higher ranged as prescribed by WHO and Indian standards. It can affect human being and plants. From the data of drinking water we should know the properties of bore-well drinking water which is used to prevent our plant growth.

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