



Ground Water from Bore Wells Water Quality Investigation in Balasinor Taluka, District: Kheda Gujarat State: Some Physico-Chemical Studies

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Abstract:

This paper deals with the Physico-chemical Parameters of Rural part of Balasinor Taluka mandal, district: Kheda Gujarat State to assess the quality of bore wells/wells/Tube wells water such as temperature, pH, EC, TDS, Ca, Mg, Na, K, Cl, and SO_4 CO_3 , HCO_3 such ions. Samples were analyzed from May-June 2012. The water of bore wells/Tube wells was carried out from ten sampling villages of Balasinor Taluka mandal, district: Kheda Gujarat State.

Keywords: Rural, Water of bore wells, Physico-chemical analysis, TDS, summer, Balasinor mandal

1. Introduction

In central Gujarat five District and in Kheda district has many villages are facing water quality problem as well as drinking water shortage, especially during summer season. Adults and children of this region are suffering from health problems due to consumption of contaminated water.[1-3] Ground water levels vary from place to place and time to time and are therefore dynamic. They can be classified into categories based on the rainfall patterns.[4-6] This paper investigated ground water quality of Balasinor taluka mandal, Kheda district region for determining its suitability for drinking as well as agriculture purpose.[7]

2. Materials and Method

Ten different water samples were collected from different locations of rural areas from Balasinor taluka and Kept in polythene bottles with cover. Analysis of water samples was done as per standard process. All the chemicals used of AR grade. Double distilled water was used for the preparation of reagent and solutions. The water samples were immediately brought in to Laboratory for the estimation of Physico-Chemicals parameters, like water temperature were recorded at the time of sample collection by using Thermometer,[8-10] While other parameters such as pH, Chlorides, TDS, Calcium, Magnesium hardness, Sulfate, Bisulfate, Sodium and Potassium contents. Temperature, pH and TDS measured by water analysis kit and methods. Calcium and Magnesium hardness of water was estimated by complex metrics titration method. Chloride contents were determined volumetrically by silver nitrate titration method using potassium chromate as indicator.[11-13]

3. Results and Discussion

The Physico-chemical data of the ground water samples collected in May-June 2012 are presented in Table -1 and Table -2 respectively. The results of the samples vary with different collecting places because of the different nature of soil contamination.

Temperature: Measurement of temperature indicates the trends of various chemical, biochemical and biology activities. It is useful in detecting thermal pollution. It helps in understanding thermal stratification in water bodies. Temperature is one of the most essential parameter in water. It has significant impact on growth and activity of ecological life and is greatly affects the solubility of oxygen in water. In the study temperature ranges from 27.9⁰C to 29.9⁰C.

pH: It helps in understanding the chemical processes that take place in water bodies. It helps to gauge the nature of use of water. pH is expressed as a number 0-14. Since pH is temperature dependent the temperature of the water sample at which pH is measured, must be specified. Most of water samples are slightly alkaline due to presence of bicarbonates and carbonates. The pH value observed in this study, of water samples varied between 7.06 to 7.82.

Electrical Conductivity (EC): Electrical Conductivity is a measure of water capacity to convey electric current. It signifies the amount of total dissolved salts. It give an estimate as mho/cm at 25⁰C or milli simenens per meter(mS/m).It helps in determining suitability of water for irrigation and domestic uses. EC values were in the range of 0.95 mMhos/ml to 2.01 mMhos/ml.

Total Dissolved Solids (TDS): Total dissolved solids indicate the salinity behavior of ground water. It helps in understanding the level of turbidity and hardness of water. A large number of solids are found dissolved in natural water the common ones are carbonates, bicarbonates, chloride, sulphate, phosphate, iron, etc. There for TDS is sum of the cations and anions concentration. According to WHO and Indian Standards TDS values should be 500 mg/L for drinking water. In the present Study TDS ranged from 625 mg/l to 1020 mg/l.

Chloride: Chlorides get added to water due to the discharge of effluents from chemical industries, oil well discharge, and irrigation drainage in these areas. This may results in the contamination of both surface and ground waters. It is useful in determining salinity. The chloride was found between 38.14 mg/l to 124.71 mg/l. Natural water contains low chloride ions. The tolerance range for chloride is 250 to 1000 mg/l.

Calcium Hardness: Hardness of water prevents lather formation with soap. Hard water therefore is not suitable for bathing and washing. Hard waters have high boiling points and so are not suitable for cooking either. The calcium hardness is ranging from 17.85 mg/l to 34.98 mg/l. The tolerance range for calcium hardness is 75 to 200 mg/l.

Magnesium Hardness: From results shows Magnesium hardness was ranging from 18.55 mg/l to 48.85 mg/l. The tolerance range for magnesium is 50 to 100 mg/l.

Sodium (Na+): Sodium concentrations were found in between 197.6 mg/l to 311.31 mg/l.

Potassium (K+): The major source of potassium in natural fresh water is weathering of rocks but the quantities increase in the polluted water due to disposal of waste water. Potassium content in water, in the present study, varied from 1.39 mg/l to 5.59 mg/l.

Sulfate: In a taluka mandal where the atmospheric sulphur values are very high due to industries and auto mobile exhausts, the rain water may contain high amounts of sulphur, thus decreasing the pH and polluting the surface waters. Sulfates parameter helps to gauge pollution from acid mine drainage and industrial pollutants. Sulfate ranged from 89.0 to 219.0 mg/l. The tolerance range for sulphate is 200 to 400 mg/l. The high concentration of sulfate may induce diarrhea and intestinal disorders.

Table No. 1 Physical Properties of Ground Water of Balasinor Taluka mandal

No.	Name of Village	Well/ Bore well	Depth in foot	Temp 0C	TDS mg/L	EC (mMho)	pH
1	Balasinor	Bore Well	180	28.6	925	1.12	7.58
2	Galetar	Bore Well	130	29.3	848	1.36	7.50
3	Timba	Bore Well	250	27.3	625	0.95	7.06
4	Pandva	Bore Well	180	28.4	729	1.86	7.26
5	Maharaj na	Bore Well	145	29.9	938	1.42	7.46

	muvada						
6	Dev	Bore Well	250	28.3	1020	1.62	7.82
7	Dada na muvada	Bore Well	175	27.9	982	2.01	7.48
8	Khandivav	Bore Well	160	27.4	936	1.95	7.21
9	Limdi-1	Bore Well	170	29.3	834	1.84	7.45
10	Limdi-2	Bore Well	175	28.4	918	1.69	7.10

Table No. 2 Chemical Properties of Ground Water of Balasinor Taluka mandal

No.	Name of Village	CO ₃ ²⁻	HCO ₃ ²⁻	Cl ¹⁻	Ca ²⁺	Mg ²⁺	Na ⁺	K ⁺	SO ₄ ²⁻
1	Balasinor	28.15	527	91.24	32.88	42.35	311.0	2.10	219
2	Galetar	29.12	301	39.46	23.24	38.24	197.6	1.84	128
3	Timba	33.22	287	38.14	25.87	42.83	275.26	1.89	120
4	Pandva	27.25	321	41.35	27.13	45.36	284.15	1.97	143
5	Maharaj na muvada	32.57	326	43.85	33.29	30.04	274.42	1.71	160
6	Dev	30.14	486	52.24	34.98	31.10	295.95	1.77	198
7	Dada na muvada	31.78	441	66.32	38.05	48.85	294.25	1.83	152
8	Khandiva v	37.16	495	69.89	32.54	39.35	311.31	1.39	137
9	Limdi-1	25.02	408	124.7 1	19.65	18.55	207.54	5.59	92
10	Limdi-2	24.89	422	119.5 2	17.85	21.65	199.82	5.54	89

Note: All parameters are in mg/l, except pH, EC and EC in mMho/ml

4. Conclusion

The important Physico-chemical parameters of well/bore well water samples collected from 10 locations of rural areas of Balasinor Taluka mandal in May/June 2012. It was observed that the pH, EC, TDS, Chloride, Total hardness and sulfate are normal for the water samples. Only very few samples showed values above the desirable limits India Standard Index.

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