



Assessment of Ground Water Quality in Rural Area of Kheda District in Winter Season by Physico-Chemical Study

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Abstract:

Kheda district is situated in the middle site of Gujarat State. Quality of Ground Water is indispensable for healthy population. So in this study we are assessing Ground Water Quality in winter season. Water Quality has been studied at 10 different sites of Kapadwanj County of Kheda district. Physico-Chemical parameters like pH, TDS, Chloride, EC, Sulphate, BOD, COD, Dissolved Oxygen, Fluoride, Nitrate, Carbonate- Bicarbonate, Potassium, Sodium, Calcium, Magnesium, Total Alkalinity etc analyze in present study.

Keyword: *Ground Water, assessment, Physico-Chemical Parameters, Kheda District, Gujarat State*

1. Introduction

Kheda district is situated in the Middle site of Gujarat State. There ten Taluka in this district. For drinking Water and irrigation majority peoples in this district is dependent on the Ground Water .from Bore well and Tube well. So Ground Water Quality has become an important issue. Now days peoples doing too much use of fertilizers and pesticides in agriculture and day by day rapid growth of industrialization so this matter can effect on ground water quality. On account of water quality issues, we like to analysis different Physico-Chemical parameters like pH, TDS, Fluoride, Chloride, Nitrate, Sulfate, Carbonate-Bicarbonate, etc in rural area of Kapadwanj taluka mandal, Kheda district.

2. Experimental

In the present study we collected ground water samples from different rural areas which location in Kheda district's different Taluka. We collected total 10 samples in plastic bottles. All samples from Kapadwanj County. All the water samples were collected during winter season (In January-february-2011). All chemical used are of LR/AR grade. We prepared all solutions and reagents by using double distilled water. pH was measured by pH- meter, TDS was measured by TDS meter, and Conductivity was measured by Conductivity meter. Chloride & Total Alkalinity measured by volumetrically titration method. Ca^{+2} , Mg^{+2} and total hardness measured by complex metric EDTA titration method. Assessment of water samples for different Physico-Chemical parameters was done by using standard methods.[1]

3. Results and discussion

We collected 10 Ground Water samples from different bore wells of rural area of Kapadwanj county of Kheda district in winter season. The results of Physico-Chemical assessment of that ground water samples are given in Table. The samples were taken in winter season.

**Table. Ground Water from rural area of Kapadwanj county of Kheda district in winter
Latitude: 23.02000 Longitudes: 73.07300**

Sr.	Para meter	Name of Villages (Sample)										
		Lakhaji nia muvadi	Bhagvanjini muvadi	Bhagatna muvada	Bhagvanpura	Atroli	Singhali	Jaloya	Gadiyara	Anklai	Math	Kapadwanj
	Deep of bore well Ft.	300	200	200	200	225	180	220	140	120	120	250
1	Temp.°c	23.7	23.4	23.2	23.5	23.2	23.1	23.8	22.9	23.6	23.8	23.3
2	pH	7.10	7.14	7.50	7.52	7.48	7.54	7.48	7.24	7.16	7.23	7.45
3	EC	1.3	0.8	1.0	0.9	1.6	0.8	1.0	0.9	0.5	1.0	0.9
4	Turbidity	1.3	3.1	2.8	1.8	2.4	2.1	3.3	1.9	2.1	1.7	2.2
5	Total Hardness	168.84	208.15	114.13	325.56	201.36	218.75	207.48	233.41	151.57	139.32	194.17
6	Calcium	81.23	59.63	98.41	134.90	116.03	47.25	65.82	43.44	33.44	76.52	33.75
7	Magnesium	61.29	65.11	56.38	86.88	47.51	65.15	42.31	56.56	27.19	28.39	25.78
8	Alkalinity	358	471	578	601	579	335	432	342	482	456	388
9	TDS	550	540	612	530	495	374	570	490	515	442	312
10	Chloride	65.71	78.12	65.05	46.32	58.45	102.40	85.33	81.25	82.50	78.48	71.00
11	Bicarbonate	474	495	375	298	302	359	410	487	513	468	301
12	Carbonate	25.98	26.34	28.11	21.73	27.81	26.31	35.76	27.53	29.61	34.90	31.08
13	Dissolve Oxygen	7.9	6.9	7.5	7.8	8.3	10.0	8.9	8.7	7.3	8.4	7.6
14	Sulphate	125.62	99.723	125.14	157.85	213.17	286.19	288.18	271.23	258.35	194.38	205.24
15	Nitrate	278	421	212	278	145	211	233	313	301	389	105
16	Fluoride	0.86	0.89	0.94	0.68	0.77	1.06	1.04	0.87	1.08	0.68	0.93
17	Sodium	276	354	370	326	390	410	350	298	254	381	406
18	Potassium	1.00	1.03	0.92	1.15	1.31	1.98	0.90	0.83	0.97	0.94	0.79

Note : All parameters are in mg/L except pH, EC and EC in micromho /ml. TDS value is in ppm and Temp. value is in 0c

- We collected this all sample in winter (January-february-2011) and we found Temp. varied between 22.9 °c to 23.8 °c.
- In all samples pH level is under desirable limit which is given by Indian standard.[2] The pH values of all samples varied between 7.10 to 7.54.
- Salinity of water is indicated by Total Dissolved Solid. Desirable limit of TDS is 500 ppm and Permissible limit is 2000 ppm which is given by Indian Standard.[2] In 10 samples TDS level is found more than desirable limit but we found that in all samples TDS level is under permissible limit. The TDS values of all samples varied between 312 ppm to 612 ppm.
- Electric Conductivity is signifies the amount of TDS in water. The EC values of all samples varied between 0.5 to 1.6 EC is found more than 1.0 in 5 samples. [5]
- Total Alkalinity is depending on the presence of Carbonate-Bicarbonate, Calcium hydroxide, Sodium hydroxide, Potassium hydroxide. Total Alkalinity is found desirable limit in all samples

and also we found that in one sample it is more than permissible limit. The Total Alkalinity values of all samples varied between 335 mg/ l to 601 mg/ l.

- All ten samples we found Chloride level is under maximum permissible limit. Desirable limit of Chloride is 250 mg/ l and Permissible limit is 1000 mg/ l which is given by Indian Standard.[2] Here in all sample we found Chloride values varied between 46.32 mg/ l to 102.40 mg/ l.
- We found Sulphate values in all samples varied between 99.72 mg/ l to 288.18 mg/ l. Desirable limit of Sulphate is 200 mg/ l and Permissible limit is 400 mg/ l which is given by Indian Standard.[2] We found that in 6 samples Sulphate level is more than desirable limit but all samples it is under permissible limit.
- Calcium level is higher than desirable limit in 5 samples and it is higher than permissible limit. Calcium values in all samples varied between 33.44 mg/ l to 134.90 mg/ l. Desirable limit of Calcium is 75 mg/ l and Permissible limit is 200 mg/ l which is given by Indian Standard.[2]
- Desirable limit of Magnesium is 30 mg/ l and Permissible limit is 100 mg/ l which is given by Indian Standard.[2] In 7 samples we found Magnesium level is higher than desirable limit but also found that in all samples Magnesium level is under permissible limit. Magnesium values in all samples varied between 25.78 mg/ l to 86.88 mg/ l.
- Sodium values in all samples varied between 254 mg/ l to 410 mg/ l.
- Potassium values in all samples varied between 0.79 mg/ l to 1.98 mg/ l. Potassium found major in weathering of rocks.
- Hardness as (Bicarbonate) level is nearest desirable limit in one sample but it is under permissible limit in all samples. Hardness (as Bicarbonate) values in all samples varied between 298 mg/ l to 513 mg/ l. Bicarbonate level is found all most nil in all samples. Desirable limit of Total Hardness is 300 mg/ l and Permissible limit is 600 mg/ l which is given by Indian Standard.[2]
- Desirable limit of Nitrate 45 mg/ l and Permissible limit is 100 mg/ l which is given by Indian Standard.[2] Nitrate level is under desirable and permissible limit in all samples. Nitrate values in all samples varied between 105 mg/ ml to 421 mg/ ml. Nitrate Nitrogen levels higher values due to excess use of fertilizers and pesticides.
- Fluoride level is under desirable and permissible limit in all samples. Desirable limit of Fluoride 1.00 mg/ l and Permissible limit is 1.5 mg/ l which is given by Indian Standard.[2] In present study we found that in all samples Fluoride values varied between 0.68 mg/ l to 1.08 mg/ l. Higher level of Fluoride in drinking water can cause dental problems. The Fluorosis is happen due to intake of high fluoride level in water.
- In all samples Dissolved Oxygen level is higher than tolerance limit which is given by Indian Standard.[2] The minimum tolerance limit of Dissolved Oxygen is 7.0 mg/ l for drinking water. The values of Dissolved Oxygen are varied between 6.9 mg/ l to 10.0 mg/ l in all samples. Dissolved Oxygen Level in water is affected in Physical and Biological Processes.
- We found in present study Turbidity values varied between 1.7 NTU to 3.3 NTU. Desirable limit of Turbidity is 5.00 NTU and Permissible limit is 10 NTU which is given by Indian Standard.[2]

4. Conclusion

It was observed that most of the Physico-Chemical Parameters of Ground Water of rural area of Kapadwanj taluka mandal from Kheda district, Gujarat, India were within the limits which are prescribed by BIS. Over all Ground Water Quality is not at risk level. In some samples we found some parameters like EC, BOD, Dissolved Oxygen, Total Hardness, Potassium, Sodium, Calcium, Chloride etc. little higher. However, some treatments may be required in some areas.

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