

Quality Assessment of Physicochemical and Biological Parameters of bore well water in Chisda Village, Dadra and Nagar Haveli in Surat region

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Abstract

In order to determine the bore well quality of Chisda village, bore water samples were collected from Khoripada, Patel pada, Rabadpada, Mulgam and Dadripa locations in Chisda village. Water sample were analyzed for the chemical parameters such as, pH, Colour, Taste, Odor, TDS, Turbidity, Calcium, Magnesium, Phenolic compounds and Biological parameters which are *E.Coli* and Total coliform bacteria. Test results of Khoripada bore well water were observed within the specification limits. In Patelpada bore well water sample, Average turbidity value was found 1.55 NTU which is high than the specification limit. Total coliform bacteria test of bore well water was found in month of March and October. Rabadpada bore water test results shows high average turbidity 1.57 NTU. Other chemical and biological test parameters found within specification limits.

Bore well water sample in Mulgam location found satisfactory results for human consumption. Dadripada bore water sample observed high average turbidity value 1.16 NTU, also total coliform bacteria found present in month of March and October.

Keywords: pH | Colour | Taste | Odor | TDS | Turbidity | Calcium | Magnesium | Phenolic compounds

Introduction

Atmosphere, Lithosphere and Hydrosphere are the three assents of earth's ecosystem. Those are the vital for all creatures and plants for living. Water is the one of the important factor for earth's eco cycle, around 71 % part of earth is covered with water (PA. Paritha 2016, K. Saravana Kumar and R. Ranjith Kumar 2011). 1.7% water sources are found in ground water and of North and South Pole ice glaciers occupy 1.7 % of water sources. Human body contains 60% of water. Water is used for various applications by human,

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animals and plants (Maurya, P. M. and Singh, V. K. 2016).

Humans are used water in a huge quantity for many applications such as, drinking, cooking, washing, bathing etc. Hence, water quality affects the human health directly. It is important to consume pure water which is free from any contaminants and pollutants. WHO (2007), USEPA and BIS guidelines are established by the regulatory bodies for the evaluation of water quality and measurement of contaminants and pollutants in water (Maurya, P. M 2016, Maurya, P. M. and Qureshi, I. 2016).

In the present research paper, Bore well water of Chisda village Dadra & Nagar haveli was evaluated by sampling and analyzing bore water from five locations. Bore water sample were collected from Khoripada, Patel pada, Radadapada, Mulgam and Dadripada locations and analyzed for the pH, Colour, taste, Odor, Total Dissolved Solids, Calcium, Magnesium, Phenolic compounds, *E.Coli* and total coliform bacteria parameters. Samples were collected and analyzed in the month of March -2016, July-2016 and October-2016. Water quality of selected locations was evaluated on the basis of seasonal sampling and analysis reports.

Methodology

Total 15 bore water samples were collected from five locations during the month of March-2016, july-2016 and October-2016. Sampling site was tracked with GPS identifications. Water sample were collected and analyzed as per IS 10500(2012) specifications. Water quality was evaluated

as per specifications given in Indian Standard guideline IS 10500 (2012) and APHA.

Sampling Time: Water sampling was done in the first week of March 2016, July 2016 and October 2016. Sampling time was, from morning 10.00 am to evening 5.00 pm.

Sampling Process: In order to achieve accurate test results, sample preservation method is highly required. Sampling container and sampling technique also have an impact on Analytical test results. Indian standard method (IS) and APHA method was followed for sampling and preservation of water sample.

Results and Discussion

Analysis of water sample of Chisda village shows significant variations in chemical and biological parameters. Water sample were analyzed for nine chemical and two biological parameters. Five bore well sample locations were identified in Chisda village. In the khoripada location average ph value was observed 6.9, obtained colour value was 1.3 Hazen. Taste and odor was found suitable for human consumption. TDS value was observed 248 mg/l, average turbidity was observed 0.98NTU, average value of calcium and magnesium was observed 35.33 and 13.67 mg/l respectively. Result of Phenolic compound, *E.Coli* and Total coliform bacteria parameters found within the specification limit.

Water analysis of patelpada location reported average pH value 7.0, average colour value obtained 1.7 Hazen, Taste and odor of water sample found suitable for drinking purpose, average value of TDS, Turbidity, Calcium, and Magnesium observed 259 mg/l, 1.55

NTU, 35.7 mg/l and 14.93 mg/l respectively. Phenolic compounds and *E.Coli* found absent in water sample. Total coliform bacteria test found positive in the March and October month, In July month it found negative.

Water sample analysis results of Rabdapada location shows the average pH value 7.07, average colour value was 1.33 Hazen, Taste and odour of water sample compliance with the required specification for during purpose. Evaluated average value of TDS, Turbidity, Calcium and Magnesium were 244 mg/l, 1.57 NTU, 37.03 mg/l, 17.47 mg/l respectively. Phenolic compound was found absent in water sample. *E.Coli* and Total coliform bacteria found absent in water sample.

In Mulgam bore well water sample shows the average pH value 7.71, average colour value 3.3 Hazen, Taste and odor of water sample were found suitable for drinking purpose. Average Calcium and Magnesium value were observed 46.17 mg/l and 2.7 mg/l respectively. Phenolic compound test, *E.Coli* and coliform test parameters found within the limit.

Bore well water sample of Dadripada location shows the pH value 6.8 and average colour value 3.7 Hazen. Average value of TDS, Turbidity, Calcium and Magnesium were observed 213 mg/l, 1.16 NTU, 29.3 mg/l, 13.93 mg/l respectively. Phenolic compounds were found absent in water sample.

Location No	Name of Location	GPS
1	Khoripada	N 20° 6' 39" E 73° 7' 20"
2	Patelpada	N 20° 6' 46" E 73° 7' 22"
3	Rabadpada	N 20° 6' 37" E 73° 7' 29"
4	Mulgam	N 20° 6' 53" E 73° 7' 37"
5	Dadripada	N 20° 6' 35" E 73° 8' 4"

Table 1: Sampling location and GPS Identification

S. No	Test Parameter	Unit	Specification Limit	Method
1	pH Value	NA	6.5 to 8.5	IS3025(Part-11)
2	Colour	Hazen	5 Max.	IS3025(Part-4)
3	Taste	NA	Agreeable	IS3025(Part-7&8)
4	Odor	NA	Agreeable	IS3025(Part-5)
5	Total Dissolved Solids	mg/L	500 Max.	IS3025(Part-16)
6	Turbidity	NTU	1 Max.	APHA 2130 B
7	Calcium as Ca	mg/L	75 Max.	IS3025(Part-40)
8	Magnesium as Mg	mg/L	30 Max.	IS3025(Part-46)
9	Phenolic Compound	mg/L	0.001 Max.	IS3025(Part-43)
10	E.Coli	/100 ml	Absent	IS1622:1981Edi.2.4(2003-05)
11	Total Coliform Bacteria	/100 ml	Absent	APHA(22ndEdi) 9221-D

Table 2: Specification and Test Method

S. No	Test Parameter	Unit	March 2016	July 2016	October 2016	Average Result
1	pH Value	NA	7.1	6.7	6.9	6.90
2	Colour	Hazen	2	1	1	1.33
3	Taste	NA	Agreeable	Agreeable	Agreeable	Agreeable
4	Odor	NA	Agreeable	Agreeable	Agreeable	Agreeable
5	Total Dissolved Solids	mg/L	306	193	244	247.67
6	Turbidity	NTU	0.91	0.82	0.98	0.90
7	Calcium as Ca	mg/L	42	30	34	35.33
8	Magnesium as Mg	mg/L	19	10	12	13.67
9	Phenolic Compound	mg/L	ND	ND	ND	ND
10	E.Coli	/100 ml	Absent	Absent	Absent	Absent
11	Total Coliform Bacteria	/100 ml	Present	Absent	Present	Present

Table 3: Bore water analysis results of Khoripada Location

S. No	Test Parameter	Unit	March 2016	July 2016	October 2016	Average Result
1	pH Value	NA	7.1	6.9	7.01	7.00
2	Colour	Hazen	2	1	2	1.67
3	Taste	NA	Agreeable	Agreeable	Agreeable	Agreeable
4	Odor	NA	Agreeable	Agreeable	Agreeable	Agreeable
5	Total Dissolved Solids	mg/L	291	227	258	258.7
6	Turbidity	NTU	1.71	1.28	1.67	1.55
7	Calcium as Ca	mg/L	42.6	30.1	34.4	35.70
8	Magnesium as Mg	mg/L	19.25	10.66	14.88	14.93
9	Phenolic Compound	mg/L	ND	ND	ND	ND
10	E.Coli	/100 ml	Absent	Absent	Absent	Absent
11	Total Coliform Bacteria	/100 ml	Present	Absent	Present	Present

Table 4: Bore water analysis results of Patelpada Location

S. No	Test Parameter	Unit	March 2016	July 2016	October 2016	Average Result
1	pH Value	NA	7.3	6.9	7	7.07
2	Colour	Hazen	2	1	1	1.33
3	Taste	NA	Agreeable	Agreeable	Agreeable	Agreeable
4	Odor	NA	Agreeable	Agreeable	Agreeable	Agreeable
5	Total Dissolved Solids	mg/L	273	207	253	244.33
6	Turbidity	NTU	1.67	1.41	1.62	1.57
7	Calcium as Ca	mg/L	46.2	30.1	34.8	37.03
8	Magnesium as Mg	mg/L	22.6	13.5	16.32	17.47
9	Phenolic Compound	mg/L	ND	ND	ND	ND
10	E.Coli	/100 ml	Absent	Absent	Absent	Absent
11	Total Coliform Bacteria	/100 ml	Absent	Absent	Absent	Absent

Table 5: Bore water analysis results of Rabadpada Location

S. No	Test Parameter	Unit	March 2016	July 2016	October 2016	Average Result
1	pH Value	NA	7.9	7.4	7.83	7.71
2	Colour	Hazen	4	2	4	3.33
3	Taste	NA	Agreeable	Agreeable	Agreeable	Agreeable
4	Odor	NA	Agreeable	Agreeable	Agreeable	Agreeable
5	Total Dissolved Solids	mg/L	277	232	258	255.67
6	Turbidity	NTU	0.54	0.39	0.48	0.47
7	Calcium as Ca	mg/L	52.3	39.4	46.8	46.167
8	Magnesium as Mg	mg/L	3.21	2.01	2.88	2.7
9	Phenolic Compound	mg/L	ND	ND	ND	ND
10	E.Coli	/100 ml	Absent	Absent	Absent	Absent
11	Total Coliform Bacteria	/100 ml	Absent	Absent	Absent	Absent

Table 6: Bore water analysis results of Mulgam Location

S. No	Test Parameter	Unit	March 2016	July 2016	October 2016	Average Result
1	pH Value	NA	6.8	6.9	6.6	6.767
2	Colour	Hazen	4	3	4	3.67
3	Taste	NA	Agreeable	Agreeable	Agreeable	Agreeable
4	Odor	NA	Agreeable	Agreeable	Agreeable	Agreeable
5	Total Dissolved Solids	mg/L	236	196	208	213.33
6	Turbidity	NTU	1.28	0.96	1.23	1.16
7	Calcium as Ca	mg/L	36.9	21.4	29.6	29.3
8	Magnesium as Mg	mg/L	17.62	10.72	13.44	13.93
9	Phenolic Compound	mg/L	ND	ND	ND	ND
10	E.Coli	/100 ml	Absent	Absent	Absent	Absent
11	Total Coliform Bacteria	/100 ml	Present	Absent	Present	Present

Table 7: Bore water analysis results of Dadripada Location

Conclusion

All the test parameters of Khoripada bore well water found within the limit, Hence, it can be concluded that bore well water at this location can be used for human consumption

but more water parameters need to be study for determination for other contamination. Water sample of Patel pada location obtained high Turbidity value and it is above specification limits. Total coliform bacteria

test was found positive in water sample. Hence, it is advisable that water treatment is needed at this location to reduce the turbidity and biological contamination in water. Bore well water sample of Rabadapada location shows the high turbidity value and it is found higher than the specification limit and other chemical and biological parameters found within the specification limits. Bore well water sample test results of Mulgam location compliance with the specification limit and it can be used for human consumption. Bore well sample of Dadripada location shows the high Turbidity value, also Total coliform bacteria test was found positive. Hence, it is highly recommended to obtain a water treatment before human consumption.

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