



## Physico Chemical Characteristics Study of Selected Ground Water Samples of Daskroi taluka villages, Dist. Ahmedabad, India

**Sanjay J. Parmar**

Assistant Professor, Gujarat Arts and Science College, Ahmedabad

**Mahesh R. Solanki**

Assistant Professor, Gujarat Arts and Science College, Ahmedabad

### ABSTRACT

Nature's biggest boon is fresh water provided to all living and non living entities in different ways. Ground water is one of the sources of potable water in many areas. Now a day's level of purity of potable water is different at different places. So the quality of potable water must be monitored time by time important too. The parameters of water sample have studied like pH, TDS, Total Alkalinity (TA), Chloride (Cl-) and Total Hardness (TH) for various villages of Daskroi Taluka Dist. Ahmedabad. Samples were taken in pre monsoon season during March 2017 to May 2017 from different sample sites. These all parameters were compared with WHO and Indian Standard to classify the level of quality.

**KEYWORDS** : Ground water, parameters, pH, TDS, TA,WHO.

### Introduction:

Water is the most abundant natural resources on the earth. Water is not only important to human beings, it is also same important for animals and plants. Water can survive the lives of people some days without food. We cannot live without water In India; we have many resources of potable water now days. From them groundwater is one of the eminent resource for urban as well as in rural area. The quality of water is not only important for human beings it is also useful in irrigation. The quality is determined by many parameters as per WHO recommended guideline as well as Indian guideline.

The growth of population in the world creates shortage of water. The ground water quality is contaminated by Industrial development, environment harmful activities of people, uncontrolled use and waste in many ways in city area and by unprecedented uses of fertilizers and pesticides in villages. Water quality management is continuous process through monitoring and assessment time by time. For awareness against quality of water the demand is increasing for measuring different physico chemical parameters of all resources of water. The study of different physico chemical parameters could help us to understanding the properties of the samples.

### Materials and Methods:

#### Study Area

The ground water samples were collected from different villages like Shilaj, Bhadaj, Lapkaman, Khodiyar, Chharodi, Jagatpur, Hebatpur, Jetalpur, Aslali, Pirana of dist. Ahmedabad for analyzing different parameters.

#### Sample collections:

The ground water samples were collected from various places in plastic bottles as per standard method. The samples were collected in pre monsoon time from March 2017 to May 2017.

#### Method:

**Table 1: Determination of water quality parameters**

Sr. No.	Water quality parameters	Description	Method of determination
1	TDS	The measure of the amount of particulate solids that are in the water	Evaporation Method
2	pH	The major of acidity in the water	pH Metry
3	Total Hardness	Measurement of calcium and magnesium in water	EDTA titrimetry
4	Calcium	Measurement of Calcium amount in water	EDTA titrimetry
5	Chloride	Measurement of Chloride amount in water	Titrimetry
6	Total Alkalinity	Alkalinity of water is its quantitative capacity to react with a strong acid to a designated pH	Titrimetry

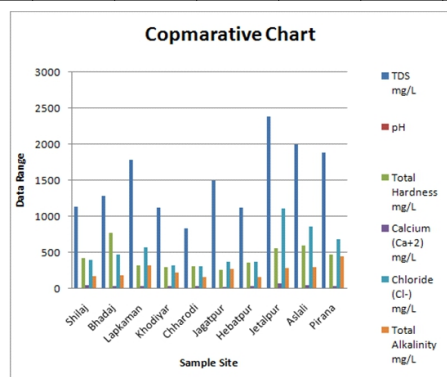
### Results and Discussion:

**Table 2: Physico-chemical parameters of different pre monsoon water samples**

Sample No.	Place	TDS mg/L	pH	Total Hardness mg/L	Calcium (Ca <sup>+2</sup> ) mg/L	Chloride (Cl) mg/L	Total Alkalinity mg/L
1	Shilaj	1136	8.12	419	46	398	177
2	Bhadaj	1289	8.34	769	39	478	185
3	Lapkaman	1792	8.19	322	37	572	326
4	Khodiyar	1125	7.19	294	34	324	219
5	Chharodi	835	8.00	310	41	316	157
6	Jagatpur	1496	7.37	258	27	374	269
7	Hebatpur	1127	8.01	364	35	379	163
8	Jetalpur	2389	8.02	563	79	1113	293
9	Aslali	1994	7.23	597	52	858	297
10	Pirana	1893	7.19	479	32	684	451
Maximum		2389	8.3	769	79	1113	451
Minimum		835	7.2	258	27	316	157
Average		1507.6	7.8	437.5	42.2	549.6	253.7

**Table 3: Comparison of groundwater quality with drinking water standards, Indian, WHO and ICMR**

Parameters	Minimum	Maximum	Average	ICMR (Desirable Limits)	WHO Standard	INDIAN Standard
TDS	835	2389	1507.6	500	100	300
PH	7.2	8.3	7.8	7.0-8.5	7.0-8.0	6.5-8.5
Total Hardness	258	769	437.5	300	100	600
Calcium	27	79	42.2	75	200	200
Cl-	316	1113	549.6	200	250	250
Alkalinity	157	451	253.7	200	600	600



**TDS** stands for total dissolved solids, and represents the total concentration of dissolved substances in water. TDS is made up of organic sources such as leaves, silt, plankton, industrial waste and sewage. Other sources come from runoff from urban areas, road salts used on street during the winter. Dissolved solids also come from inorganic materials such as rocks and air that may contain calcium bicarbonate, nitrogen, iron phosphorous, sulfur, and other minerals. Total dissolved solids level in these ground water samples are 835-2389 mg/L which exceeds the permissible limit of 500 mg/L as per ICMR, 600 mg/L as per Indian standards and 100 mg/L as per WHO Standards. The high values of TDS can originate by a number of sources, both natural and as a result of human activities. The effects of TDS on drinking water quality depend on the levels of its individual components; excessive hardness, taste, mineral depositions and corrosion are common properties of highly mineralized water.

High level of TDS in drinking water may cause the unpleasant taste of water. Water is less thirst quenching. Sometime it may cause stiffness in the joints, hardening of arteries, kidney stones etc.

The treatment options for total dissolved solids are really depend on the nature of the cations and anions. If the total dissolved solids are due to actions like calcium, magnesium, and iron, it may be possible to remove these ions using a water softener. If the problem is associated with concentration of sodium, chloride, or potassium, the primary recommendations would include a reverse osmosis system or distillation unit.

A pH level is a measurement of acid-base equilibrium, and that number can indicate whether a substance is acidic or basic. Water with a pH level between 6.5 and 8.5 is safe to drink because it is neither acidic nor alkaline enough to be dangerous in the human body. Most of aquatic organisms are try to live in an average pH and do not withstand abrupt changes so far that pH is an important parameter of water body. In present study pH values vary from 7.2 to 8.3. So the results revealed that the samples lie in alkaline region. Water with a pH of less than 6 can be corrosive and filled with toxic metals. Water with a pH of higher than 8.5 can be hard, which poses less of a health risk than acidic water but can taste bad and leave scale deposits on dishes, sinks, and more.

The **Total hardness** of water is a measure of the amount of minerals, primarily calcium and magnesium, it contains. Water that contains more than 200 mg/l as calcium carbonate is considered to be hard and may cause plumbing and laundry staining problems. So the adverse effects of such hard water are

- Large quantities of detergent are needed to produce a lather when doing laundry, or
- Scale is present on the interior of piping or water tanks, laundry sinks or cooking utensils.

Total Hardness varies from 258-769 mg/L as CaCO<sub>3</sub>. The hardness values for the study area are found to be high for almost all locations and determined to fall above the desirable limit of WHO specification and Indian standards. Most of All water samples fall under the hard class.

#### Classification of water based on hardness by Sawyer and McCarthy

Hardness as CaCO <sub>3</sub> (mg/L)	Water quality
0-75	- soft
75-150	- moderately hard
150-300	- hard
>300	- very hard

**Calcium** occurs in water naturally. Seawater contains approximately 400 ppm calcium. Rivers generally contain 1-2 ppm calcium, but in lime areas rivers may contain calcium concentrations as high as 100 ppm.

Here in our study the level of calcium in samples are in between 27 to 79. Most of the samples are fall under the desirable level. Hard water may assist in strengthening bones and teeth because of its

high calcium concentration. It may also decrease the risk of heart conditions. Drinking water hardness must be above 8.4 °dH. When one takes up large amounts of calcium this may negatively influence human health. The lethal dose of oral uptake is about 5-50 mg/ kg body weight. Metallic calcium corrodes the skin when it comes in contact with skin, eyes and mucous membranes.

**Chloride** is one of the most common anions found in tap water. It generally combines with calcium, magnesium, or sodium to form various salts. Chloride present in ground water samples are in the range of 316-1113 mg/L, which are not in permissible limit of 250 mg/L as per Indian standards as well as WHO Standards. Whenever the Higher concentrations are usually indicate contamination by septic systems, road salt, fertilizer, animal or other industrial effluent wastes. Chloride is not toxic, but people can detect a salty taste and undesirable odors at 250 mg/L.

The good news is that chlorides can easily be removed from water with either a reverse osmosis system or a distiller.

**The alkalinity** of water is a measure of how much acid it can neutralize. Alkalinity of the samples is in the range of 157 to 451 mg/L. The alkalinity levels of all the most water samples are above the desirable limit of ICMR. Alkalinity and total hardness are usually nearly equal in concentration when both are reported in 200 mg/L CaCO<sub>3</sub> (calcium carbonate), because they come from the same minerals. If alkalinity is much higher than total hardness in an unsoftened sample, consider testing for sodium. If alkalinity is much lower than total hardness, test for chloride, nitrate and sulfate. The lower the alkalinity, the more likely water is to be corrosive. Water with high alkalinity (greater than 150 mg/L) may contribute to scale (lime) buildup in plumbing.

#### Conclusion:

The pH analyze data of these water samples are greater than 7.0 showing the alkaline nature of water and all the pH values lies in permissible limits. Total Hardness of samples is found in the highest degree. Total hardness values of rest of the samples are in suitable range. Chloride values of all samples are lies higher from permissible limit. TDS values of all samples are greater than the desired limit; they are harmful for using as potable water. Most of all samples have near to above values of alkalinity desirable limits. Level of Calcium is in desirable limit. Chloride levels of samples are also above on desirable limit. Such water required to be softening treatment or RO system required to make them drinkable.

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