International Journal of Science and Research (IJSR)
ISSN (Online): 2319-7064
Index Copernicus Value (2015): 78.96 | Impact Factor (2015): 6.391

# Assessment of Drinking Water Samples of Bhiloda Taluka Area Villages in Aravalli District, Gujarat, India

**Sanjay J. Parmar**

Department of Chemistry, Gujarat Arts and Science College, Ahmedabad

**Abstract:** ***Water quality is directly affected to health of human and also useful to survival of life. Human body contains approximate seventy percentage of water as its weight. Sometimes water are not in condition to use for the purpose as a drinking water due to some physico chemical parameters are not in ranged according to WHO standard and also as per INDIAN standard and as a result causes water born diseases. Physicochemical parameters were studied and analyzed to understand the quality of water in Bhiloda taluka area villages, dist. Aravalli during January 2016 to May 2016 and analyzed some of following parameters pH, EC, Total Hardness, Chloride, TDS and Alkalinity. Some seasonal variations found in some parameters and some of were in normal range. Suitable suggestions were made helpful to increase the level of quality of ground water.***

**Keywords:** Physicochemical parameters, drinking water, WHO, Indian Standard, Bhiloda.

## 1. Introduction

Water is the essential needs for survival of life, but quality of water must be the most important aspect for healthy life in concern with all the living beings. Generally Bore well water is used for drinking and other domestic purposes now a day in most of areas. In rural area most of the drinking water sources are open well or bore well or common water storage tank mean totally depend on ground water source. With the increase population of country it is necessary to increase the farming activities to overcome grains deficiency at every area. Parallel we think the other things also required at huge level to facilitate the life. Do for this its necessary to increase industrial growth to supply all things at the every corner of country. The side effects of these changes in growth of farming activities and industries also harm the human life as compare to provide food and facilities simultaneously. The use of fertilizers and pesticides, Industrial waste and human anthropogenic activities disturb the ground water chemistry at harmful level. Once the groundwater is contaminated, its quality cannot be restored back easily and ways and means have to be devised to protect it. The basic aim of our study is to check physico-chemical parameter of the underground drinking water in around the Bhiloda area villages.

## 2. Study Area

The samples were taken from different sample sites from Bhiloda taluka area villages for physico chemical analyses. The Aravalli district is surrounded by Sabarkantha, Gandhinnagar, Mahisagar, Kheda also some of part joined with Rajashthan state.

## 3. Material and Methods

Preparation of water samples the samples were collected in clean polythene bottles without any air bubbles. The bottles were rinsed before sampling and tightly sealed after collection and labeled in the field. Analysis was carried out for various water quality parameters such as pH, EC, Total Hardness, Chloride, TDS and Alkalinity as per standard procedures.

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

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

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

| Sample Nos. | Village | PH | EC (µmhos/cm) | Total Hardness (mg/L) | $Cl^-$ (mg/L) | TDS (mg/L) | Alkalinity (mg/L) |
|---|---|---|---|---|---|---|---|
| S1 | Adhera | 8.1 | 645 | 254 | 174 | 561 | 212 |
| S2 | Bhetali | 7.6 | 711 | 198 | 158 | 542 | 198 |
| S3 | Chiboda | 7.9 | 731 | 169 | 168 | 861 | 342 |
| S4 | Dev ni Mori | 7.9 | 687 | 214 | 165 | 532 | 221 |
| S5 | Dholvani | 7.4 | 647 | 302 | 214 | 559 | 277 |
| S6 | Dhuleta | 8.1 | 708 | 237 | 234 | 978 | 210 |
| S7 | Karanpur | 7.6 | 634 | 321 | 186 | 587 | 259 |
| S8 | Kherancha | 7.7 | 694 | 163 | 236 | 789 | 242 |
| S9 | Kheradi | 7.8 | 639 | 311 | 184 | 554 | 240 |
| S10 | Khodamba | 7.4 | 728 | 257 | 98 | 789 | 249 |
| S11 | Kuski | 8.1 | 622 | 297 | 175 | 597 | 232 |
| S12 | Mota Samera | 8.1 | 637 | 218 | 179 | 739 | 198 |
| S13 | Napda | 7.3 | 679 | 308 | 158 | 541 | 239 |
| S14 | Palla | 7.6 | 723 | 348 | 249 | 947 | 239 |
| S15 | Siholi | 7.1 | 614 | 269 | 174 | 789 | 252 |
| S16 | Sunokh | 7.5 | 646 | 274 | 189 | 529 | 188 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| S17 | Virpur | 7.4 | 619 | 341 | 124 | 627 | 259 |
| **Maximum** | | 8.1 | 731 | 348 | 249 | 978 | 342 |
| **Minimum** | | 7.1 | 614 | 163 | 98 | 529 | 188 |
| **Average** | | 7.7 | 668.5 | 263.6 | 180.3 | 677.7 | 238.6 |

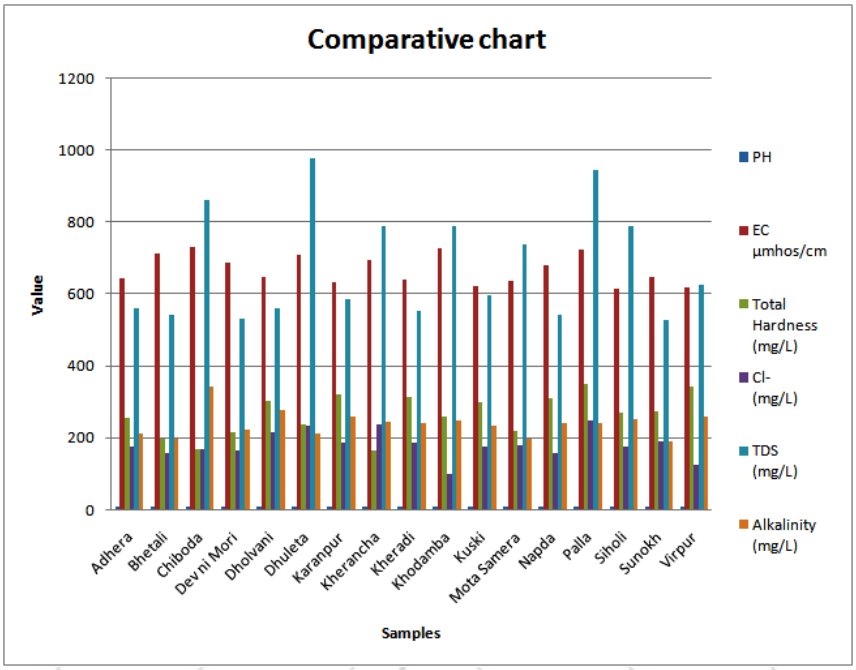


**Table 3:** Comparison of groundwater quality with drinking water standards, Indian, WHO and ICMR

| Parameters | Minimum | Maximum | Average | ICMR (Desirable Limits) | WHO Standard | INDIAN Standard |
|---|---|---|---|---|---|---|
| PH | 7.1 | 8.1 | 7.7 | 7.0-8.5 | 7.0-8.0 | 6.5-8.5 |
| EC | 614 | 731 | 668.5 | - | - | - |
| Total Hardness | 163 | 348 | 263.6 | 300 | 100 | 600 |
| $Cl^-$ | 98 | 249 | 180.3 | 200 | 250 | 250 |
| TDS | 529 | 978 | 677.7 | 500 | 100 | 300 |
| Alkalinity | 188 | 342 | 238.6 | 200 | 600 | 600 |

## 4. Results and Discussion

The **pH** value of a water source is a measure of its acidity or alkalinity. The pH level is a measurement of the activity of the hydrogen atom, because the hydrogen activity is a good representation of the acidity or alkalinity of the water. 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 7.1 to 8.1. The specified limit of pH for drinking water is 6.5 to 8.5. So the results revealed that the samples lie in alkaline region.

The **Conductivity** of the ground water samples range from 614 to 731µmhos/cm. Conductivity is a measure of water's ability to conduct an electrical current. It is related to the amount of dissolved minerals in water, but it does not give an indication of which minerals are present. If it is much greater than two times the hardness, it may indicate the presence of contaminants such as sodium, chloride, nitrate, or sulfate, which may occur naturally or be influenced by human activity. Changes in conductivity over time may indicate changing water quality.

The **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 163-348 mg/L as CaCO3. 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 except sample numbers 5, 7, 9, 13, 14 and 17 fall in very hard class.

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

| *Hardness as $CaCO_3$ (mg/L)* | *Water quality* |
|---|---|
| 0-75 | soft |
| 75-150 | moderately hard |
| 150-300 | hard |
| >300 | very hard |

**Alkalinity** of the samples is in the range of 188 to 342 mg/L. The alkalinity levels of all the most water samples are above the desirable limit. Alkalinity and total hardness are

usually nearly equal in concentration when both are reported in mg/L CaCO3 (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.

**Chloride** present in ground water samples are in the range of 98-249 mg/L, which are 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 wastes. Chloride is not toxic, but some people can detect a salty taste at 250 mg/L.

**TDS** stands for total dissolved solids, and represents the total concentration of dissolved substances in water. TDS is made up of inorganic salts, as well as a small amount of organic matter. Common inorganic salts that can be found in water include calcium, magnesium, potassium and sodium, which are all cations, and carbonates, nitrates, bicarbonates, chlorides and sulfates, which are all anions. Cations are positively charged ions and anions are negatively charged ions. Total dissolved solids level in these ground water samples are 578-929 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.

## 5. 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. All EC values are not in normal range reveal contamination of different ions. 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 in permissible limit. TDS values of all samples are greater than the desired limit; they are harmful for using as potable water. Rest of the samples has TDS values in normal range. Most of all samples have near to above values of alkalinity desirable limits. Such water required to be softening treatment to make them drinkable.

## 6. Acknowledgment

The Author is thank full to Principal of college, head of chemistry department and other staff for supporting me in my analysis work in department laboratory.

## References

[1] Subhadradevi, G., S.B. Barbuddhe, D. Hazel and C. Dolly: Physicochemical characteristics of drinking water at Velseo, (Goa). J. Ecotoxicol. Environ. Monit., 13(3), 203-209 (2003).
[2] Chauhan, M. L., Vyas, N. N. Pandya, R. N., Patel V. R., & Vohrab, Nikhat. (2012). Physico-chemical studies on bore wells water of Godhra Taluka territory (Gujarat) Archives of Applied Science Research, 4(1), 426-432.
[3] Patil, P.R., K.S. Patil and A. D. Dhande: Studies on drinking water quality in Bhusawal corporation water supply. Ind. J. Environ. Protec., 22(2), 161-164 (2002).
[4] Acharya, G. D. Hathi M. V., Patel, A. D., & Paramar. K. C. (2008). Chemical properties of Groundwater in Bhiloda Taluka Region, North Gujarat, India. E-Journal of Chemistry, 5(4), 792-796.
[5] Moharir, A., D.S. Ramteke, C.A. Moghe, S.R. Wate and R. Sarin: Surface and ground water quality assessment in Bina region. Ind. J. Environ. Protec., 22(9), 961-969 (2002).
[6] WHO. Guidelines for drinking water supply quantity (2nd edn). Geneva, vol2., 1999.
[7] G. D. Acharya, M.V. Hathi, A.D. Patel, and , K.C. Parmar, Chemical properties of groundwater in Bhiloda Taluka Region,North Gujarat, India. E-Journal of Chemistry, 5 (4), 2008, 792-796.
[8] Dasgupta, A. and K.M. Purohit: Status of the surface water quality of Mandiakudar. Pollut. Res., 20(1), 103 - 110 (2001).
[9] Garg, V.K., R. Gupta, S. Goel, M. Taneja and B. Khurana: Assessment of underground drinking water quality in eastern part of Hisar. Ind. J. Environ. Protec., 20(6), 407-412 (1999).
[10] S. A. Makwana, C. G. Patel and T. J. Patel, Physico-Chemical analysis of drinking water of Gandhinagar District Arch. Appl. Sci. Res., 4 (1), 2012, 461-464.
[11] ISI, Indian Standard specification for drinking water, IS10500, ISI, New Delhi, (1983).
[12] ASTM International, (2003), Annual Book of ASTM Standards, Water and Environmental Technology v. 11.01, West Conshohocken, Pennsylvania, pp 6-7.
[13] Indian council of Medial Research. Manual of standards of quality for drinking water
[14] supplies, Special Report No.44, New Delhi (1975).
[15] Maiti T.C., The dangerous acid rain, Science Reporter, CSIR, New Delhi, (19) 360-361(1982).
[16] Ellis, K.V., (1989), Surface water pollution and its control" Macmillan press Ltd, Hound mill, Basingstoke, Hampshire RG 21 2xs and London, 3-18, pp 97,100,101 and 208.
[17] Tyagi, P., D. Buddi, R. Chowdary and R. Sawhney: Physicochemical quality of ground water in industrial areas of India. Pollut. Res., 19, 443-445 (2000).