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Quality of Water in the Different Areas of Anand District, Gujarat, India

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Abstract – *This research is the study about quality of water in the different areas of Anand district considering the quality and grade for its usage for drinking consumption, regular household use and irrigation in the Anand district, Gujarat, India. This research was followed by the development of the industrial areas around the district and also increasing incoming students eventually resulting into heavy vehicle usage. I myself being a student from the chemical sciences or chemistry in the other words, my major concern is the contamination of the water, resulting into many other problems leading to indigestion, skin disease, hair fall problems and other human health problems. The assessment was done with the help of physicochemical parameters like temperature, electrical conductance (E.C.), pH, Total dissolved solids (TDS), Total alkalinity (T.A.) and concentrations of ions. The results were there after compared to the water guidelines of Indian Council of Medical Research (ICMR) and World Health Organization (WHO).*

Key Words: **Water**, **physicochemical parameters**, **drinking**, **irrigation**, **ICMR**, **WHO**, **Chemical sciences**.

1. INTRODUCTION

Pollution can be defined as, anything that acts as a contaminant in the naturally built environment and eventually results as poisonous and hazardous to the environment is known as Pollution. Pollution when comes to the chief source and a reason for the inception of life on Earth i.e. Water it becomes serious matter of concern and life threatening for all the life forms including human beings, wild life and marine life. Perhaps, If the groundwater used for drinking and other domestic activities is contaminated it will intimidate human and animal health. If groundwater is not appropriate for irrigation purposes, this will impact farming. Therefore, regular water quality assessment needs significant attention.

1.1 AREA OF SURVEY

The area of the survey is Anand district. The total of 8 samples were collected from the various regions of the Anand district they are: Vallabh Vidhyanagar, Anand city, Bakrol, Karamsad, Samarkha, Lambhvel, Petlad and Borsad. The samples were collected during the month of February 2020.

Collected samples were preserved in sterilized and clean polyethylene bottles and transported to laboratory and subjected to analysis of the physicochemical parameters.

1.2 SURVEY METHODS

The present survey was therefore undertaken to assess the parameters of groundwater for assessing the suitability and purpose of drinking and irrigation. Ground water samples from bore and dug wells were collected from eight regions of the Anand district. From the each of the eight regions multiple samples from the different sites were collected so as to get results more accurate.

2. ANALYSIS AND RESULTS

The analysis of the water samples was carried out according to the standard process and analytical methods. All the chemicals used were of analytical grade and double distilled water was used for the preparation of reagents and solutions. Water samples were immediately brought to the laboratory for the estimation of physicochemical parameters, such as temperature of the water was recorded at the time of sample collection using standard thermometer and pH was also noted at the collection site. Other parameters were noted by complexometric titration method.

Table-1: Observational values of physicochemical parameters

Area name	pH	EC (µs/cm)	TDS (mg/l)	SO_4^{-2} (mg/l)	Temp. (°C)	T.A. (mg/l)
Bakrol	7.49	1113	850	19.05	25.4	234
Karamsad	6.14	2214	736	18.99	26.1	149
Samarkha	7.16	2330	698	28.36	25.4	102
Lambhvel	8.09	2024	1470	27.98	26.9	289
Petlad	7.07	1255	754	21.81	24.6	365
Borsad	6.25	2117	779	29.91	25.79	259

The importance of the TDS is the general consistency of the water. Total dissolved solids in water derive from a number of causes, such as minerals, waste, natural sources, the design of the pipes used to transport water, agricultural runoff, etc. In water, many dissolved substances are undesirable. The TDS values for the samples ranged from 698 to 1470 mg / l. In the case of TDS, ICMR proposes 500 mg / l as the desirable limit, while 1500-3000 mg / l as the maximum permissible limit. Here, all samples showed TDS values that exceeded the desired limit but fulfilling maximum permissible limits. Therefore, high TDS value reduces the quality and influences the taste of water. If drinking water contains high TDS, delectableness decreases and may cause unintentional gastrointestinal irritation. The presence of high rates of TDS

may also be unacceptable to consumers as a result of too much scaling and clumping in water pipes, boilers and household appliances.

The pH value of the water is an indicator of how acidic or basic the water is at a scale of 0 to 14. The pH below 4 will produce a sour taste and a higher value above 8.5 will produce an acrimonious taste. Higher pH accelerates the formation of scales in water heaters. PH below 6.5 begins corrosion in pipes, eventually resulting into extraction of metals such as Zn, Cd, Cu, etc. pH values of water samples were found in the range of 6.14 to 8.09. ICMR suggests desired pH range should be (7.0-8.5), this states that water samples from Karamsad and Borsad shows deviation from the desired range suggested by ICMR.

The Electrical conductivity (E.C.) of contaminated water is high. Therefore, it gives the total amount of salts dissolved in the water. As a result, this calculation is also used as a pollution index because this kind of property is not ideal because it renders water and making it entirely unsuitable for drinking, hence leading to sever health problems. Electrical conductivity values in the collected water samples ranged from 1113 to 2330. All the values observed in the collected water samples satisfies the maximum permissible range.

Sulphates in drinking water have effects such as strong pungent odor and execrable taste. Furthermore, it has laxative and purgative effects on the living beings mostly observed in humans. For sulfates, ICMR suggests 200mg/l as desirable limit. The observation made from the water samples collected shows the range from 19-29 mg/l. Henceforth, the suggested range by the ICMR is fulfilled.

Total alkalinity (T.A.) in drinking water Upto 200mg/l as $CaCO_3$ is must so as to neutralize acids such as lactic acid and citric acid which are generally produced in the human body. This roughly gives the probability of the number of bases in the water sample that can be converted into uncharged species by a stronger acid. Total alkalinity can be measured by titrating a sample against strong acid. The observations made from the collected water samples shows the range of total alkalinity (T.A.) from 102 to 365 mg/l. Three out of total 8 samples shows abnormality in the results, sample from Samarkha and Karamsad shows immensely low results of 102 mg/l and 149mg/l respectively which would result into inability of the water to neutralize the acids. Whereas, the sample from Petlad shows distinctly high results of 365mg/l which would also result in to exceeding basic pH level in the human body.

3. CONCLUSIONS

The present research has led to the assumption that the content and readings observed from the collected water samples tested was appropriate based on the physicochemical parameters, but as some of the values of the few samples exceeded the desirable limits indicated by the ICMR, Hence, the water should be adequately handled as drinking water prior to its use in order to avoid potentially undesirable results, health risks in the human body as well as in the wild life. Furthermore, in my opinion, this type of study and research should be always allowed and promoted by the Universities and colleges resulting into increasing awareness of water pollution, water quality and as well as practical working expertise of the students. This type of activities not only promote awareness but also result in the capital saving for the government and municipalities as they will not have pay extra for the testing of the water samples.

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