

## Physico-Chemical Analysis of Underground Water from Meghraj Taluka Area, Sabarkantha district, Gujarat, India.



Chemistry

**KEYWORDS:** Physicochemical parameters, drinking water, ICMR, WHO, Meghraj.

Sanjay J. Parmar

Assistant Professor, Department of Chemistry, Gujarat Arts and Science College, Ahmedabad

### ABSTRACT

Water samples were collected from different sample sources of Meghraj taluka area of Sabarkantha district, Gujarat, India. Physico chemical parameter such as EC, pH, Hardness, TDS, Chloride, Fluorides, Iron were studied for fifteen water samples from different sampling places of this taluka villages. The analysis results were compared with drinking water quality standards according to Indian Council of Medical Research (ICMR) and World Health Organization (WHO) and it was found that only some water samples are not in the standard range for drinking and other domestic purposes. However all the ground water is clear, soft and odourless. Even few samples contain fluoride ion but the values are much below the permissible limits.

### 1. Introduction:

Water is one of the prominent needs of life and incumbent for survival. All the living lives have required fresh water for the survival, there is one of the most important aspects. Even more it is also an important for the human being as they are depending upon it for industrial and waste disposal, and food production. Water quality is of vital concern for the mankind since it is directly connected with human amiable. There are several states where more than 90% populations are depending on groundwater for drinking and other purpose in India. As per WHO data, about 80% of all the diseases in human beings are water cause diseases. Once the groundwater is perverted, its quality as near as per standard cannot be restored back easily and not much ways have to protect it. There are many reasons get contaminated underground water some of primarily due to uncontrolled use of pesticides, fertilizers, herbicides and unplanned management of industrial and urban wastes. The basic purpose of our study is to check some of physico-chemical parameter of the underground drinking water in around the Meghraj taluka area and make consciousness about the impairment effect of these parameters present in excess of permissible limit as per WHO and Indian Standard.

### 2. Materials and Method:

#### 2.1 Study Area:

Meghraj is located near on Aravalli hillock area near the bank of Vatrak river in Sabarkantha district, Gujarat, India. The geographical coordinates are 23° 29' North, 73° 30' East. The Vatrak reservoir is constructed on the Vatrak river located near village maydi in Meghraj taluka. The district is bounded by the Rajasthan State to the north-east, Mehsana district to the north, Gandhinagar, Kheda, and Panchmahal districts to the south. The district consist of 13 talukas some of them Modasa, Bayad, Bhiloda, Dhansura, Malpur are near to Meghraj. The Vatrak reservoir is constructed on the Vatrak river located near village maydi in Meghraj taluka.

#### 2.2. Sampling:

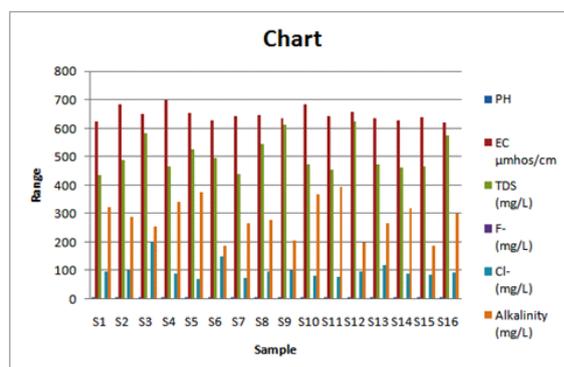
The plastic bottle of 1L capacity with stopper was used for water sample collection and stored. Each and every bottle was washed with 2% nitric acid and then rinsed 3 times with distilled water. The bottles were then kept in a clean place. The bottles were filled with water closed tightly and sealed to prevent any leakage.

#### 2.2. Experimental:

Electrical conductivity was standardized with KCl solution and measured using digital conductometer. The water pH was standardized through different buffer tablets and determined by Digital pH meter. Electrical conductivity was standardized with KCl solution and measured using digital conductometer. Total Dissolved Solids, Chlorides, Ca<sup>2+</sup> and Total Alkalinity were analyzed by different titrimetric method.

**Table 1: Physico-chemical parameters of different water samples.**

Sample Nos.	Village	PH	EC $\mu\text{mhos/cm}$	TDS (mg/L)	F <sup>-</sup> (mg/L)	Cl <sup>-</sup> (mg/L)	Alkalinity (mg/L)
S1	Bhatkota	7.4	623	436	0.78	98	324
S2	Chhitadara	7.1	685	489	0.85	103	289
S3	Dachka	7.9	648	584	0.72	198	254
S4	Dhanivada	8.1	698	465	0.84	90	341
S5	Futa	7.4	654	524	0.68	73	374
S6	Ged	8.6	627	495	0.81	149	189
S7	Godha	7.3	642	439	0.87	76	268
S8	Intva	7.5	645	544	0.79	98	278
S9	Isari	7.1	636	611	0.91	101	207
S10	Jitpur	8.5	684	475	0.81	82	368
S11	Kadvadi	7.5	643	453	0.84	79	394
S12	Kantalu	7.4	659	623	0.76	96	199
S13	Kasana	7.2	635	473	0.81	122	266
S14	Nesda	8.6	627	462	0.92	91	321
S15	Odha	7.6	639	465	0.86	88	186
S16	Rakhapur	7.4	621	574	0.74	95	299
<b>Maximum</b>		<b>8.6</b>	<b>698</b>	<b>623</b>	<b>0.92</b>	<b>198</b>	<b>394</b>
<b>Minimum</b>		<b>7.1</b>	<b>621</b>	<b>436</b>	<b>0.68</b>	<b>73</b>	<b>186</b>
<b>Average</b>		<b>7.66</b>	<b>647.88</b>	<b>507.00</b>	<b>0.81</b>		<b>284.81</b>



**Table 2: Comparison of groundwater quality with drinking water standards, Indian, WHO and ICMR**

Parameters	Minimum	Maximum	Average	ICMR (Desirable Limits)	WHO Standard	INDIAN Standard
<b>pH</b>	7.1	8.6	7.66	7.0-8.5	7.0-8.0	6.5-8.5
<b>EC</b>	621	698	647.88	-	-	-
<b>TDS</b>	436	623	507	500	100	300
<b>F</b>	0.68	0.92	0.81	1	1	1
<b>Cl</b>	73	198	102.44	200	250	250
<b>Alkalinity</b>	186	394	284.81	200	600	600

### 3. Result and Discussion:

The physico-chemical data of the water samples are mentioned in the table 1. In table 2 has physico-chemical data of the groundwater samples comparison with Indian, WHO and ICMR drinking water standards. In the present analysis of pH was found to be basic in nature at all the sites ranged from 7.1-8.6 some of them are out of the standards. The pH limit is 6.5 – 8.5 as per standard. The EC of water samples reveals a variation in all the samples. Purity of water is also evaluated through electrical Conductivity. The TDS values of the samples were in the range of 436- 623mg/L. Some of TDS values were exceed compare to WHO and Indian standards, TDS value should be less than 500 mg/L for drinking water. Aesthetic quality also measured by total hardness of water and it is the indicator of hydrogeology too. All the samples of water have been seen fluorides data in the range of permissible as per set by both Indian standard

and WHO out of 16 samples in the present analysis chloride ranged from 73 to 198 mg/L the values are lower than permissible values. High chloride contents in water are harmful for metallic pipes and agricultural crops however in the level of permissible range chloride in drinking water is harmless. The alkalinity range are obtained from these samples in between 186-394 mg/L some of samples values are above the ICMR desirable limits, however they are in the range of WHO and Indian standard.

### 4. Conclusion:

From the above analysis the conclusion is most of the samples collected from various locations of Meghraj taluka were found near as per WHO and Indian standards. Some of the samples which are high in pH, in TDS values almost cross the ranges are not suitable for drinking purposes, and the range should be maintained through treatment, overall all the ground water is clear and odourless and soft. Even some samples contain fluoride ion but the values are below the permissible range.

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