

# Study of Some Physico-chemical Parameters of borewell water in Mul Tehsil of Chandrapur District.(M.S.), India

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## **Abstract**

The water quality of bore well at Mul tehsil of Chandrapur district underwent analysis for key physico-chemical parameters, including temperature, pH, electrical conductivity, total dissolved solids (TDS), Total alkalinity, Total hardness, Calcium, Magnesium, chloride, nitrate, sulphate, and fluoride concentration. The analysis was conducted utilizing the methodologies outlined in established literature, specifically following the guidelines outlined in APHA (2005) and Kodarkar (1992). Subsequently, the results were compared against the specified limits delineated in the corresponding IS code. Then study reveals that the water is deemed suitable for all domestic and drinking purposes, posing no threat to health or safety concerns.

**Keywords:** Borewell water, Mul tehsil, Physico-chemical parameters, Chandrapur district, water quality.

## **INTRODUCTION**

Water is indeed a precious gift from nature, essential for the survival of all living beings, including plants, animals, and humans. With approximately 80% of the Earth's surface covered by water, it plays a vital role in sustaining life. However, it is noteworthy that a vast majority, around 97%, consists of seawater, which is unsuitable for drinking due to its high salinity. Further, about 2.4% of the Earth's water is locked in massive glaciers and polar ice caps, making it inaccessible for immediate use. Consequently, only around 1% of the total water on Earth is available for drinking purposes, primarily found in freshwater sources such as rivers, lakes, and groundwater reserves. This limited freshwater resource must serve multiple needs, including agriculture, domestic use, and industry, emphasizing the importance of responsible water management and conservation practices to ensure its sustainable availability for future generations [1,2]. Groundwater refers to water filling the voids within geological formations or fractured zones and is recognized to be more prevalent than surface water [3]. Improper waste disposal in rivers and non-engineered landfills is a major cause of water pollution. This contaminates both surface water and groundwater through leachate, posing significant environmental and public health risks [4-6]. It is imperative to conduct water quality assessments prior to utilizing water for potable purposes [7]. This paper endeavours to evaluate the physical and chemical characteristics of groundwater of borewell in Mul tehsil of Chandrapur district.

## MATERIALS AND METHODS

Mul tehsil is located in Chandrapur district of Maharashtra state is about 194 mt above mean sea level and is at 19°89'56.63' N latitude and 79°62'98.79' E longitude. During summer the depth of bore water decreases and in monsoon the depth of water increases. The study entails gathering water sample from the designated area. Plastic bottle was utilized for sampling groundwater quality analysis. Prior to collection, each bottle was rinsed with the water to be sampled. Sample was then drawn from the borewell and promptly transported to the laboratory for analysis. Some important parameters like temperature, pH, electrical conductivity, total dissolved solids(TDS), Total alkalinity, Total hardness, Calcium, Magnesium, chlorides, nitrate, sulphate, and fluoride concentration were determined using standard literature [8-9].

## RESULT & DISCUSSION

The results of the physicochemical parameters for water sample are presented in Table no.1.

**Table no. 1. :- Results of the physicochemical parameters**

Sr.no	Parameters	Test results	Acceptable limit	Permissible limit
1	Temperature	25.10	-	-
2	pH	7.10	6.8	8.5
3	Conductivity	412	-	-
4	TDS	305.66	500	1500
5	Alkalinity	425	200	600
6	Calcium	106.12	75	200
7	Magnesium	40.67	30	100
8	Total Hardness	148	200	600
9	Nitrate	23.93	45	-
10	Suphate	25.65	200	400
11	Fluoride	0.25	1	1.5
12	Chloride	91.60	250	1000

**pH :-** pH serves as a universal measure of a solution's acidity or alkalinity, representing the concentration of hydrogen ions present. The alkalinity of most waters is primarily attributed to the presence of carbonates and bicarbonates. The pH value of the water sample was found to be 7.10 which fell within the limit set by the World Health Organization (WHO).

**Electrical conductivity :-** Electrical conductivity indicates a water's ability to conduct electric current and reflects the total dissolved salt content [10]. This was noted as 412 $\mu$ S/cm.

**Total dissolved solids (TDS) :-** Total dissolved solids (TDS) reflect the salinity level of groundwater. Water with TDS exceeding 500 mg/L is generally deemed unsuitable for drinking; however, in unavoidable circumstances, levels up to 1500 mg/L are permitted [11]. TDS were 305.66 mg/L which found to be less than the acceptable limit.

**Alkalinity:-** Water's alkalinity is its ability to neutralize a strong acid, typically attributed to bicarbonate, carbonate, and hydroxide compounds of calcium, sodium, and potassium. Total alkalinity value for the investigated sample was found to be 425 and in the prescribed limit.

**Calcium and magnesium (Ca<sup>2+</sup>, Mg<sup>2+</sup>) :-** Calcium and magnesium are directly associated with water hardness. Calcium and Magnesium were 106.12 mg/L and 40.67 mg/L respectively.

**Total hardness :-** Hardness is a characteristic of water that inhibits lather formation with soap and elevates water's boiling point. It primarily stems from the presence of calcium, magnesium, or both salts [12]. Hardness value was 148 mg/L which confirmed that the sample was not hard water.

**Nitrate (NO<sub>3</sub><sup>-</sup>) and Sulphate (SO<sub>4</sub><sup>2-</sup>) :-** Groundwater typically contains nitrate due to the leaching of nitrates with percolating water. Additionally, contamination from sewage and other waste sources rich in nitrates can contribute to elevated nitrate levels. Sulphate occurs naturally in water through leaching from minerals like gypsum, with its concentration often heightened by the discharge of industrial effluents and domestic sewage. Nitrate content was 23.93mg/L and sulphate was 25.62 mg/L. Both the values were found to be in less quantity.

**Fluoride (F<sup>-</sup>) and chloride (Cl<sup>-</sup>) :-** Chloride concentration serves as an indicator of sewage pollution. Individuals accustomed to higher chloride levels in water may experience laxative effects. Fluoride and chloride were recorded as 0.25 mg/L and 91.60 mg/L respectively and were under the acceptable limit.

## CONCLUSION

The physicochemical parameters measured for the water sample were found to be within water quality standards, indicating good water quality suitable for drinking purposes. Therefore, based on the findings, the study recommends the use of this borewell water for drinking purposes.

## ACKNOWLEDGEMENT

The authors are thankful to Gondwana university, Gadchiroli and government laboratory for help in investigation.

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