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A Study on Variation in Total Dissolved Solids of Groundwater of Tendoli Village, Taluka Arni, District-Yavatmal (Ms) India

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Abstract:

Water is life. Groundwater is considered as purest and majorly available source of water. It is used to fulfill 50% urban and 80% ruler water demand in India besides irrigation. Total Dissolved Solids, also known as TDS, are inorganic compounds that are found in water such as salts, heavy metals and some traces of organic compounds that are dissolve in water. Total dissolved solids (TDS) are a measure of the combined total of organic and inorganic substances contained in a liquid. This includes anything present in water other than the pure H_2O molecules. These solids are primarily minerals, salts, and organic matter that can be a general indicator of water quality. Arni is a town (Taluka) with (Administrative Division) & Tahsil in Yavatmal district of Maharashtra State in India. As groundwater is prominently used to fulfill domestic demands hence quality of groundwater must be checked time to time in order to supply safe drinking water. In this paper, one attempt has been made to study of variation in total dissolved solids of water of Tendoli village Arni Town, District-Yavatmal (MS) India over a period of 1 year. TDS range of groundwater is found to be acceptable and fair.

Keyword- Tendoli groundwater TDS, variation in TDS, Tendoli, Period of 1 year.

Introduction-

Water is colourless, odourless and transparent substance. Water is the important, precious and indispensable natural resources of the earth, covering approximately three-forth of the earth surface. Water is life. Water is an essential element of human being. Approximately 60-65% of human body is composed of water (1). A man can survive for 20 days without food but cannot survive even for 20 hours without water. The earth has a reserve of 75% water of which 97% is of saline water and only 3% is fresh water. Out of the 3%, a little over 2% is tied up in ice caps and glaciers and along atmospheric and soil moisture, is not accessible and only 0.003% is readily available to us in the form of groundwater and surface water. Surface water is mostly polluted so it becomes unfit for use. Groundwater has excellent natural quality, usually free from pathogens, color and turbidity and can be consume directly without treatment. It does not require large storage, treatment and distribution system, can be frequently developed incrementally at point near water demand. Generally, groundwater is mostly chemically and microbiologically non-polluted so it is safe for drinking and cooking in addition to agriculture or industrial use. Groundwater is used to irrigate around two fifth of India's total agricultural land. Groundwater is considered as purest and majorly available source of water. It is used to fulfill 50% urban and 80% ruler water demand in India besides irrigation (2).

Total Dissolved Solids, also known as TDS, are inorganic compounds that are found in water such as salts, heavy metals and some traces of organic compounds that are dissolve in water. Excluding the organic matters that are sometimes naturally present in water and the environment, some of these compounds or

substances can be essential in life. But, it can be harmful when taken more than the desired amount needed by the body. The total dissolved solids present in water are one of the leading causes of turbidity and sediments in drinking water. When left unfiltered, total dissolved solids can be the cause of various diseases. Total dissolved solids (TDS) are a measure of the combined total of organic and inorganic substances contained in a liquid. This includes anything present in water other than the pure H_2O molecules. These solids are primarily minerals, salts, and organic matter that can be a general indicator of water quality.

Tendoli is about 3 km from Arni. Arni is a town (Taluka) with (Administrative Division) & Tahsil in Yavatmal district of Maharashtra State in India. It is situated on the banks of the Arunavati River. It Connected with National Highway-361. Nearest Railway Station is a Dhamangaon which is located 90 km approximately & Nearest Airport is a Dr. Babasaheb Ambedkar International Airport, Nagpur is around 187 km from Arni. Location of Arni in Maharashtra, India Coordinates: 20°07′40″N 77°55′39″E. In Arni town, main source of drinking water is groundwater. As groundwater is prominently used to fulfill domestic demands hence quality of groundwater must be checked time to time in order to supply safe drinking water (3).

Fig. - Yavatmal district map

In this paper, one attempt has been made to study of variation in total dissolved solids of water of Tendoli village Arni, District-Yavatmal (MS) India over a period of 1 year from July 2021 to June 2022.

Methodology – Water samples were collected from different location of Tendoli village during investigation period of July 2021 to June 2022. Sample is collected in polyethylene bottle. Within 1 hour, its temperature, pH, total hardness is measured. For measurement of hardness of the sample, used Tds meter whose details are as follows:

Brand	: HM
Model Number	: AP-1
Type	: Digital
Range	: 0-5000 ppm
Temperature Range	: -5+50 degree C degree C
Accuracy	: +-2%
Battery Life	: 1000

Power Features

Power Requirement	: 3v

Dimensions

Width	: 3 cm
Height	: 15 cm
Weight	: 0.1 kg

Manufacturer : HM DIGITAL PVT LTD SOUTH KOREA

Importer : HM DIGITAL INDIA PVT LTD DELHI

Source-www.Flipkart.com

For the study purpose, we had selected six different groundwater sources of Arni. Water samples are collected every month and Tds is measured with the help of digital Tds meter. Following table shows details of the water sample source:

Sr. No.	Sample	Groundwater source	Depth
1.	Sample 1	Borewell	110 ft
2.	Sample 2	Borewell	200 ft
3.	Sample 3	Borewell	125 ft
4.	Sample 4	Borewell	180 ft
5.	Sample 5	Borewell	150 ft
6.	Sample 6	well	30 ft

Sr. No.	Month	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Sample 6
		TDS (in ppm)	TDS (in ppm)	TDS (in ppm)	TDS (in ppm)	TDS (in ppm)	TDS (in ppm)
1	July 2021	245	299	541	498	444	393
2	August 2021	264	276	554	500	546	416
3	September 2021	270	320	574	580	520	394

4	October 2021	241	341	499	520	603	406
5	November 2021	278	301	513	536	499	394
6	December 2021	254	345	521	484	513	410
7	January 2022	267	259	531	502	521	419
8	February 2022	285	332	541	535	531	399
9	March 2022	221	278	510	504	558	409
10	April 2022	274	254	467	525	538	353
11	May 2022	240	267	450	500	481	349
12	June 2022	211	278	502	453	361	356

According to World Health Organization (WHO) and Bureau of Indian Standard some parameter are as follows:

Sr. No.	**Water quality parameter**	**Bureau of Indian Standard (IS-10500:1994)**	**WHO International Standard (1983)**
1.	pH	6.5-8.5	7.0-8.5
2.	Total Dissolved solids (ppm)	500-2000	500
3.	Total hardness (ppm)	300-600	100

TDS- The mineral constituents dissolved in water constitute total dissolved solids. The concentration of dissolved solids in natural water is usually <500 ppm while water with more than 500 ppm is undesirable for drinking and industrial use. It is reported that TDS value of 500 ppm is desirable limit and 2000 ppm is the maximum permissible limit and that water containing more than 500 ppm of TDS causes gastrointestinal irrigation (4). High value of TDS influences taste, hardness and corrosive property of water (5, 6). Drinking water should contain sufficient minerals to keep you healthy and should not contain excess minerals that become overloaded in the body. In this article, we will provide details about the acceptable minimum and maximum TDS (Total dissolved solids) Limits for drinking water.

Following table summarize portability of TDS amount of water:

TDS Level (ppm)	**Palatability of Water**
Less than 300	Excellent
300-500	Good
600-900	Fair
900-1200	Poor
Above 1200-2000	Unacceptable

Conclusion- From the variation of hardness table it is observed that the minimum TDS of groundwater Tendoli village is 211 ppm and maximum is 603 ppm. These samples have acceptable value according to Bureau of Indian Standard (IS-10500:1994) which has range 500-2000 ppm. TDS has acceptable value according to WHO International Standard (1983). TDS range of groundwater in Arni city is found to be acceptable and fair.

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