

Investigation of Physico-chemical parameters from ground water of some villages' Murtizapur tahesil region of Akola district, Maharashtra, India

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Manuscript details:

Available online on <http://www.ijlsci.in>
ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)

Cite this article as:

Waghmare SA, Suradkar SW, Deshmukh SS, Padhen SS (2021) Investigation of Physico-chemical parameters from ground water of some villages' Murtizapur tahesil region of Akola district, Maharashtra, India, *Int. J. of. Life Sciences*, Special Issue, A16: 99-102.

Article published in Special issue of National Conference on "Recent Trends in Science and Technology-2021 (RTST-2021)" organized by Department of Environmental Science, Shri. Dnyaneshwar Maskuji Burungale Science & Arts College, Shegaon, Bhuldhana, and Department of Botany Indraraj Commerce and Science College Shillod, Dist. Aurangabad, Maharashtra, India date, February 22, 2021.



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ABSTRACT

This investigation determines ground water quality in of some Murtizapur Tahesil region of Akola District in Maharashtra. Samples collected from various bore wells used as drinking water. Use of pesticides for forming in this region has resulted in the contamination of ground water. The physico-chemical parameters such as Electrical conductivity, pH, Total hardness, Mg hardness, Ca hardness, Mg⁺⁺ ions, Ca⁺⁺ ions and Chloride ion were investigated to determine the present condition of the groundwater quality during the periods of three months from December 2019to Jan 2021.

Keywords: Physico-chemical parameters, Ground water, water quality, Murtizapur, etc.

INTRODUCTION

Water is also called as life due to their percent abundance on Earth and almost all life processes on require water. 71% area of the Earth is occupied by water and 97% of water on Earth is present in the oceans. Water occur on the Earth in three states viz., solid (ice), liquid and gaseous (water vapors). The earth has an abundance of water, but unfortunately, only 0.3 percent percentage is even usable by humans (Nikoladze and Akastal, 1989, Altman et al, 1995). The other 99.7 percent is in the oceans, soils, icecaps, and floating in the atmosphere. The majority of fresh water is actually found underground as soil moisture and in aquifers (Lemo, 2002, Asano T, 2007). Ground water is also frequently using as the alternative source for agricultural and industrial sector. Various ways as ground water is contaminated such as use of fertilizer in farming, seepage from effluent bearing water body (Ramachandraiah, 2004, Altman and Parizek, 1995, Adekunle, 2009, Jinwal and Dixit, 2008).

Most of the industries discharge their effluent without proper treatment into nearby open pits or pass them through unlined channels, resulting in the contamination of ground water (Rao and Mamatha, 2004, Mahanta et. al., 2004, Pande et. al., 2009).

Water analysis it is very important to decide the source of water to be taken as sample. It is generally chosen around the industry which is affected by the industry waste. Sometime water in agricultural areas also get affect by the use of harmful fertilizers and pesticides. These are important locations for water analysis. To determine the sufficient water quality to maintain the ecosystem, it is very demanding to analyze the water. It helps to sustain aquatic environment for fish hatcheries and wildlife habitats. This research work makes an attempt to carry out qualitative analysis of some physico-chemical parameters of ground water in study area.

Study Area:

Murtizapur is Sub-Division for Revenue of the Akola district. Total area of Murtijapur is 820 km² including 814.89 km² rural area and 5.50 km² urban area. and consists of 158 villages, totaling a population of around 1,74,650 approximately Male- 89,689 and Female- 84,961, according to information of census-2011. Avarage rain fall is 740-860 mm.

MATERIAL AND METHODS

The Water Samples from Murtizapur Tahasil were collected from bore wells of ten different villages in the afternoon between 1300hrs to 1420hrs. Water samples were collected in polythene bottle regularly alternate

month. The water samples were immediately transferred to laboratory for the estimation of various physico-chemical parameters like Water temperature, transparency and pH were recorded at the time of sample collection by using thermometer and portable digital pH meter. Transparency was measured with the help of Secchi Disc. While other Parameters Such as TDS, Hardness and Chlorides were estimated in the Laboratory By using Standard Methods as Prescribed by APHA.

Sample collection:

Ground water samples were collected from ten (10) bore wells at various locations within study area during pre and post monsoon season. Details of sampling locations are along with their co-ordinates illustrated in Table1.

Physico-chemical analysis of ground water:

The collected samples were analyzed for different physico-chemical parameters such as pH, Electrical conductivity, Turbidity, TDS, Total hardness, Ca hardness, Mg hardness, Ca ion, Mg ion, Chloride, and Temperature as per the standard methods (APHA, 1998) and the results were compared with the Indian Standards (IS: 10500) for potable water.

RESULTS AND DISCUSSION

The water quality analysis of different ground water samples have been carried out for pH, Electrical conductivity, TDS, Total hardness, Ca hardness, Mg hardness, Ca ion, Mg ion, Chloride, and Temperature. The status of water quality of these ground water sources are presented in table 2.

Table 1: Sampling lacion and their coordinates

Sampling Location Area Code	Location	Co-ordinates
GW1	Sonori	20.712456143738706, 77.33332084311317
GW2	Dalambi	20.68551080440507, 77.28415745445525
GW3	Kolambi	20.66665352430127, 77.26849081027495
GW4	Bopori	20.832091807227958, 77.54483280013577
GW5	Hendaj	20.730045082938673, 77.40464930994077
GW6	Kanzara	20.661896622185274, 77.35548933777481
GW7	Dudhalam	20.654725881961383, 77.30289139251323
GW8	Kurankhed	20.69445287187666, 77.2545998922805
GW9	Pailpada	20.709671344295117, 77.23465554601295
GW10	Anbhora	20.700926549271838, 77.32166948833141

Table 2 : Showing status of water quality of these ground water sources

Area code	pH		Turbidity (cm)		Conductance (µmhos/cm)		Total Hardness (mg/l)		TDS (mg/l)		Ca Ion (mg/l)		Mg Ion (mg/l)		Chloride (mg/l)		Temp °C	
	Pr	Po	Pr	Po	Pr	Po	Pr	Po	Pr	Po	Pr	Po	Pr	Po	Pr	Po	Pr	Po
GW1	7.3	8.0	11.2	16.5	120	180	170	210	468	450	80	180	72	54	120	140	26	22
GW2	6.7	7.2	5.6	6.5	170	210	180	215	450	509	72	250	74	62	160	164	27	24
GW3	6.9	7.1	3.2	5.2	160	230	210	284	480	450	78	260	68	81	142	155	24	27
GW4	7.3	6.8	4.1	5.6	133	270	210	246	502	457	97	240	87	46	155	190	25	21
GW5	7.2	7.2	2.8	4.3	125	166	240	246	350	605	68	210	72	72	86	120	28	23
GW6	6.3	7.4	3.5	7.1	125	188	250	290	498	544	65	150	64	64	182	20	29	24
GW7	7.2	6.9	3.5	4.7	142	200	270	285	609	807	54	168	68	52	163	190	25	24
GW8	7.1	7.8	8.2	13.2	126	198	286	290	568	402	80	125	64	45	54	144	24	26
GW9	7.5	7.6	4.9	6.1	146	210	244	302	390	512	61	230	81	65	144	203	26	24
GW10	7.4	7.6	7.9	9.5	180	234	246	325	480	562	60	200	54	45	200	256	24	22
Mean	7.225		6.68		175.65		269.3		267.05		136.4		64.5		149.4		23.5	
IS: 10500	6.5- 8.5		5.0-10*		-----		300-600		500-2000*		75-200*		30-100*		250-1000*		--	

Pr- Pre Mansoon, Po-Post Mansoon

Finding of the present investigation is as follows-

1. The pH value found permissible limit as per IS: 10500 of all samles.
2. Turbidity of samples Sonori (GW1) & Kurankhed (GW8) found 16.5 &13.6 respectively which is the not permissible limits as per IS: 10500.
3. Electrical conductivity varied between 120 to 180 µmhos/cm to 180 to 270µmhos/cm in pre and post monsoon season.
4. The same trend was observed in the case of total hardness of various ground water sources. It varied from 170 to280 mg/l and 210 to 325 mg/l in pre and post monsoon respectively.
5. TDS in all the samples were found to be within standard limits (IS:10500) . In few samples the ions of calcium have crossed the standard limit (IS: 10500) during post monsoon season.
6. Chloride content of the ground water samples of hand pump were found to be within limit during in the range pre and post monsoon season respectively.
7. Temperature of the various ground water samples were noted to be from 24-29 °C and 21-26 °C during pre and post monsoon season respectively.

CONCLUSIONS

Overall ground water quality of Murtizapur tahesil region is not unsafe to human beings. Apart from a small number of occurrence where some parameters such as Turbidity at Sonori & Kurankhed Village, bore well water were beyond prescribed limits of drinking water (IS: 10500). These two villages have high erosion of soil. High erosion of soil causes increase in the values of physio-chemical parameters in post monsoon. Sometimes advanced farming use of chemical & fertilizer affects the quality of drinking water.

Conflicts of interest: The authors stated that no conflicts of interest.

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