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Physico-chemical Characteristics and Quality Assessment of some ground water samples from Amdapur in Warud Taluka in Vidarbha region of India.

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ABSTRACT

The environmental quality is greatly focused on water because of its importance in maintaining the human health and health of the ecosystem. Temperature, pH, electrical conductance, total dissolved solids, fluoride, sodium, potassium, chloride and Hardness calcium hardness, magnesium hardness etc. concentration in ground water was determined in Amdapur in Warud taluka of Amravati District in Vidarbha region of India. After examination and testing of different Physico-Chemical parameters the suitability of ground water for drinking and domestic purposes, could be found except some parameters of the sample from the ground water found above permissible limit of Indian Standards may be used for drinking purpose only after suitable treatment.

Keywords: Groundwater, physico-chemical characteristics, Amdapur.

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INTRODUCTION

Water is an essential component for life on the earth which contains minerals extremely important in human health. Supply of fresh and clean drinking water is the basic need for all human beings on earth. The quality of groundwater of any area is of great importance for human beings and irrigation. The public health depends to a greater extent on the quality of ground water, which should be clean and fresh. In India, most of the population is dependent on groundwater as it is the only source of drinking water supply. Groundwater plays a vital role in the development of arid and semi-arid zones. Water is extremely essential for survival of all living organisms. The quality of water is vital concern for mankind since it is directly linked with human welfare. The quality of public health depends to a greater extent on the quality of ground water, which should be clean and fresh. In India, most of the population is dependent on groundwater as it is the only source of drinking water supply. The groundwater is believed to be comparatively cleaner and free from pollution than surface water. The modern civilization, urbanization and prolonged discharge of industrial effluents, domestic sewage and solid waste dump cause the groundwater to become polluted and created health problems. Assessment of groundwater for domestic and agricultural purposes was carried out in Chityal area, Nalgonda district of Andhra Pradesh¹. As per World Health Organization (WHO), safe and wholesome drinking water is a basic need for human development, health and wellbeing, and it is an internationally accepted human right².

Murhekar Gopalkrushna H. has carried out³, Assessment of Physico-Chemical Status of Ground Water Samples in Akot city. In this study various parameters analyzed Of Open Well and Bore well was determined. It was found that the ground water was contaminated at few sites Whereas at other site the water quality standards and the quality of water is good and it is fit for drinking purpose. D. P. Guptaa, Sunitaa & J. P. Saharanb have carried out⁴, Physiochemical Analysis of Ground Water of Selected Area of Kaith City(Haryana)India.

M.R.Mahananda et.al. have carried out⁵ Physico-chemical analysis of surface and ground water of Bargarh district, orissa, India. Analysis of Ground Water of Rural Areas of Wardha-City Using Physico – Chemical and Biological parameters has been reported⁶. Analysis of Chloride, Sodium and Potassium in Groundwater Samples of Nanded City in Mahabharata, India have been reported⁷. Physico-chemical analysis of ground water taken from five blocks (Udwantnagar, Tarari, Charpokhar, Piro, Sahar) of southern Bhojpur (Bihar)⁸. Physico-chemical analysis of underground water of Harihara Talukof Davanagere District, Karnataka, India⁹.

Study of Some Physicochemical Parameters of Drinking Water Sources in Tembhurkheda and

Jarud Region Dist. Amravati, MS, India¹⁰

MATERIAL AND METHOD:-

The sampler and sample collector polythene bottles of capacity 1 liter which were used in collection water sample were sterilized by Hot water treatment and sunlight treatment and again washed with alcohol. Then samples were collected. Temperature was measured during whole process. The chemicals and reagent were used for analysis were of analar grade. The pH meter, conductivity meter, Spectrophotometer, flame photometer instruments were used to analyze these parameters.

Study Area:-

Amdapur is a Village in Warud Taluka in Amravati District of Maharashtra State, India. It belongs to Vidarbha region. It belongs to Amravati Division. It is located 89 KM towards North from District headquarters Amravati. 6 KM from Warud. 730 KM from State capital Mumbai. Total area of Amdapur is 355 hectares. Four water sample's Physico-chemical parameter was determined. The samples were collected from Amadapur region in first week of February 2013.

At the same time parameter like pH, EC, TDS, Sodium, Calcium, Magnesium, Chloride, Fluoride, Bicarbonate were measured within 15 days from sampling, the parameter were analyzed by prescribed standard method. The variation in concentration of the parameter is shown below.

Sampling point and place.

Sampling point	Place
RG-1 (Bore Water)	Amadapur
RG-2 (Well Water)	Amadapur
RG-3 (Well Water)	Amadapur
RG-4 (Well Water)	Amadapur

Table 1: Methods use for estimation of various parameters.

Sr. No.	Properties	Methods
1.	pH	pH Meter
2.	EC	EC Meter
3.	TDS (ppm)	Gravimetric Method
4	Na (mg/l)	Flame Photometer
Total Hardness		
1)	Calcium (mg/l)	Titration Method
2)	Magnesium(mg/l)	Titration Method
3)	Fluoride (mg/l)	Fluoride Electrode
4)	Cl (mg/l))	Titration Method
5)	HCo3 (mg/l)	Titration

RESULT AND DISCUSSION:-

Table 2: Physico-Chemical Parameters of Water Samples.

Sr. No.	Properties	RG-1	RG-2	RG-3	RG-4
1.	Temperature (^o C)	26	25	26	26
2.	pH	8.90	7.59	7.97	8.33
3.	EC	1.38	1.44	1.65	1.51
4.	TDS (ppm)	589.1	623.7	697.9	649.1
5.	Na (mg/l)	363.49	62.49	126.5	107.49
Total Hardness					
1.	Calcium (mg/l)	129.6	197.7	207.2	178.2
2.	Magnesium (mg/l)	47.18	74.78	66.88	59.09
3.	Fluoride (mg/l)	2.35	0.514	0.445	0.577
4.	Cl (mg/l))	497.0	284.0	326.6	397.6
5.	HCo ₃ (mg/l)	536.8	707.6	829.6	488.0

Temperature

Temperature is the important physical parameter which is directly related to chemical reaction in the aquatic ecosystem. In present investigation water temperature ranging between 25^o C to 26^o C. Temperature is an important biologically significant factor, which plays an important role in the metabolic activities of the organism. The temperature was ranging from 25.0^oC to 26.00^oC during the study period. A study increase in water temperature in the course was noticed i.e. 26.0 ^oC. This might be due to presence of the effluents. Our property of water is that with change in temperature, its density varies and it becomes less with warming up and more with cooling.

pH-

pH is a term used universally to express the intensity of the acid or alkaline condition of a solution. Most of the water samples are slightly alkaline due to presence of carbonates and bicarbonates. The pH values of water samples varied between 9.5 to 5.4 and were found above the limit prescribed by WHO. The pH of Amadapur region water is alkaline 7.59 to 8.90 and A number bases like Carbonate, Hydroxide contribute to Alkalinity. The pH of RG- 1 is 8.90, pH of RG- 2 is 7.59 , the pH of RG- 3 is 7.97 and the pH of RG- 4 is 8.33.

Electric Conductivity

Electrical conductivity (EC) is a measure of water capacity to convey electric current. It signifies the amount of total dissolved salts EC values were in the range of 1590 micro-ohms/cm to 450 micro-ohms/cm. High EC values were observed for four sampling points namely RG-1, RG-2, RG-3, and RG-4 indicating the presence of high amount of dissolved inorganic substances in ionized form in and around Amadapur region.

TOTAL DISSOLVED SOLID (TDS) in mg/L.

The permissible limit of TDS of drinking water is 500 mg/L (WHO). Total dissolved solids indicate the salinity behavior of groundwater. Water containing more than 500 mg/L of TDS is not considered desirable for drinking water supplies, but in unavoidable cases 1500 mg/L is also allowed. A TDS value varies from 449 mg/L to 1659 mg/L. The TDS of sample RG-1 is 589.1 gm/L, the TDS of sample RG-2 is 623.7 gm/L, the TDS of sample RG-3 is 697.9 gm/L and the TDS of sample RG-4 is 649.1 gm/L.

SODIUM (Na⁺) in mg/l

Sodium concentrations were found in between 362.49 mg/L to 62.49 mg/L. Sampling sites RG-2, RG-3 and RG-4 showed lower sodium concentration than the prescribed limit by WHO and ISI. The site RG-1 has higher value it is found as 362.49 mg/L.

Total Hardness (TH) in mg/L -

Hardness has no known adverse effect on health, however maximum permissible level has been prescribed for drinking water is 500 mg/L by WHO. Hardness is the property of water which prevents the lather formation with soap and increases the boiling points of water. Hardness of water mainly depends upon the amount of calcium or magnesium salts or both. The values for sample from point RG-1, RG-2, RG-3, RG-4. All parameters are comes in under total hardness of water are as follows,

Calcium (Ca²⁺) in mg/l

Calcium is directly related to hardness. Calcium concentration ranged between 129.6 mg/L to 207.2 mg/L and found above permissible limit of Indian Standards.

Magnesium (Mg²⁺) in mg/L

Magnesium are directly related to hardness. Magnesium content in the investigated water samples was ranging from 47.18 mg/L to 74.78 mg/L which were found above WHO limit.

Fluoride (F⁻) in mg/L

Fluoride is an important parameter of water, high concentration of fluoride causes dental fluorosis. Probable source of high fluoride in Indian waters seems to be that during weathering and circulation of water in rocks and soils, fluorine is leached out and dissolved in ground water. Excess intake of fluoride through drinking water causes fluorosis. In the present analysis, fluoride concentration was found in all samples sites in Amdapur region. The fluoride in RG-1 was found that 2.35 mg/L, in RG-2 was found that 0.514 mg/L, in RG-3 was found that 0.445 mg/L and in RG-4 was found that 0.577 mg/L

Chloride (Cl⁻) in mg/L -

The suitability of water resources for the irrigational use in agriculture is depending upon salt concentration, especially chloride content. In Amdapur region water reservoir chloride content was in the ranges of 45.65mg/L. According to WHO maximum permissible limit for chloride is 500 mg/L. The chloride concentration serves as an indicator of pollution by sewage. People accustomed to higher chloride in water are subjected to laxative effects²⁰. In the present analysis, chloride concentration was found in the range of 308.00 mg/L to 38.5 mg/L.

Bicarbonate

Sodium bicarbonate-rich mineral water in conjunction with a low-salt diet may have a beneficial effect on calcium homeostasis. Bicarbonated water is the healthiest water to drink. It is critical to see that alkalinity does not depend strictly on pH though. All sample show the range of bicarbonate.

CONCLUSIONS:-

Ground water quality in the Amdapur Village in Warud Taluka, Amravati District area has been analyzed in the present work. After the careful study of analysis, interpretation and discussions of the numerical data, it is conclude that the present investigation indicates that the quality of underground water parameters like chloride, total hardness and Magnesium Iye within the maximum permissible limit prescribed by WHO and Indian standards specification for drinking water . High concentration of fluoride from one sample which causes dental fluorosis, maximum limit may be extended if no better alternate source is available. After examination and testing of different Physico-Chemical parameters the suitability of ground water for drinking and domestic purposes could be found except some parameters of the sample from the ground water found above permissible limit of Indian Standards may be used for drinking purpose only after suitable treatment.

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REFERENCES:-

1. Narsimha A, Sudarshan V, Srinivasulu P, Vishnu B, Ramana Kumar M. and Niranjana Kumar S. Groundwater Quality and its Suitability for Drinking and Agricultural Purpose around Chityal Area, Nalgonda District, Andhra Pradesh, India. *Water. Res Development* 2012; 2(3): 68-75.

2. Simmons IG. The Ecology of Natural Resources, Edward Arnold Publishers Limited, London. 1974.
3. Murhekar GH, Assessment of Physico-Chemical Status of Ground Water Samples in Akot city. Res. J. Chem. Sci. 2010;1(4):117-124,
4. Gupta DP, Sunitaa & Saharanb J P. Physicochemical Analysis of Ground Water of Selected Area of Kaith City(Haryana)India. Research 2009;1, (2).
5. Mahananda MR, Mohanty BP and Behera NR. Physico-chemical analysis of surface and ground water of Bargarh district, Orissa, India. IJRRAS; 2010,2(3):284-295
6. Nagarnaik PB, Patil PN. Analysis of Ground Water of Rural Areas of Wardha-City Using Physico – Chemical and Biological parameters. Int. J. Engineering Res Applications 2012; 2 (3): 803-807.
7. Sayyed JA and Bhosle AB. Analysis of Chloride, Sodium and Potassium in Groundwater Samples of Nanded City in Mahabharata, India. Eur J Experimental Biology 2011; 1 (1)
8. Kalra N, Kumar R, Yadav SS. and Singh RT. Physico-chemical analysis of ground water taken from five blocks (Udwantnagar, Tarari, Charpokhar, Piro, Sahar) of southern Bhojpur (Bihar). J Chemical and Pharma Res 2012; 4(3):1827-1832.
9. Rajappa B, Manjappa S, Puttaiah ET, Nagarajappa DP. Physicochemical analysis of underground water of Harihara Taluk of Davanagere District, Karnataka, India. Advances in Applied Science Research 2011; 2 (5): 143-150.
10. Pund DA. and Ganorkar RP. Study of Some Physicochemical Parameters of Drinking Water Sources in Tembhurkheda and Jarud Region Dist. Amravati, MS, India. Int. Res. J. Environment Sci. 2013;2(10),93-95.

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