



HYDRO-GEOCHEMICAL EVALUATION OF GROUND WATER OF TULJAPUR, DIST. OSMANABAD

**J. G. MULLA^b, VIDYA PRADHAN, SYED ASIF^a, SAYYED HUSSAIN^c and
MAZHAR FAROOQUI^{*a}**

Dr. Rafiq Zakaria College for Women, AURANGABAD (M.S.) INDIA

^aPost Graduate and Research Centre, Maulana Azad College, AURANGABAD (M.S.) INDIA

^bAdarsh College, Omerga, Dist.- OSMANABAD (M.S.) INDIA

^cSir Sayyed College, AURANGABAD (M.S.) INDIA

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ABSTRACT

The ground water quality of Tuljapur Taluka of Osmanabad district from Maharashtra (India) was evaluated during 2009-10. The parameters like temp, pH, TDS, conductivity, NO₂, SO₄, PO₄²⁻, D.O., Cl⁻, CO₂, MPN, Na⁺, K⁺, COD etc. were measured. The seasonal variation in these parameters is discussed here. All parameter were found to be within permissible limit. The MPN count was observed to be high in rainy season at two stations and in winter at S₃.

Key words: Hydro-geochemical, Tuljapur, Groundwater quality, Parameters.

INTRODUCTION

The Osmanabad district is a part of economically backward Marathwada region of Maharashtra (India). Though this area does not have any major industrial zone, but some sugar factories are located in this district. The town Tuljapur is a famous holy place, well known for Tulja Bhavani Temple. The population of this area mainly depends on agriculture. The ground is mostly used for irrigation purpose. Because of modern trend in using chemical fertilizers, pesticides etc. the water sources may get polluted. The pathogenic bacteria and viruses present in water bodies may pose a serious threat to the health of the surrounding human settlement as well as outside visitors¹.

In order to continue our work related with assessment of water quality and water quality parameters of different places from Marathwada region,²⁻⁵ we herein present the assessment of groundwater quality of Tuljapur district. Osmanabad.

EXPERIMENTAL

The water samples from three different bore-wells near to Tuljapur town were collected from Feb-2009 to Jan-2011. The temperature was recorded at the spot. Remaining parameters were determined in the laboratory. The standard methods available in the literature⁶ were used. All chemicals used were of analytical grade and solutions were prepared in double distilled water.

RESULTS AND DISCUSSION

The season for present study was considered as summer (Feb., March, April, May); rainy (June, July, August, Sept.) and winter (Oct., Nov., Dec. and Jan.). Water samples were collected at 1st and 3rd Sunday of each month. Samples were analyzed in laboratory, except temperature. Each measurement was carried out in triplicate. The season wise average of all values is taken and represented in Table 1. We have discussed the variation of each parameters season wise average of all values are taken. We will discuss the variation of each parameters season wise in the following section.

Temperature

The temperature of ground water from the study area varies 23.0°C to 30.7°C. The maximum average was observed at S₃ during summer and minimum average was at S₂ in winter. The overall trend indicate S > R > W. In the earlier work, the temperature of bore-well from nearby area was reported as 32.3°C and 32.1°C for pre-post monsoon season of 2007.⁷

pH

The pH of the study area varies from 7.07 to 7.64 Almost at all centres it was slightly basic. This may be due to presence of the stable carbonates, bicarbonates and hydroxide of certain metals, like Ca & Mg.

TDS

The total dissolved solid of the area varies from 0.667 g/ L to 2.19 g/L. The generation trend was R > S > W. The high value of TDS in rainy may be due to percolation of rain or surface water. In summer slight excess may be due to evaporation of water. In the ground water of Nanded city reveals earlier that the TDS was maximum in summer⁸.

Conductivity

There was no regular trend in the conductivity of three stations. This might be due to difference in the geochemical structure.

Nitrate

The main source of nitrate in water is oxidation of ammonia. The nitrate concentration greater than 5.0 mg/Lit generally indicates contamination by fertilizers, animal waste and effluents. The diffusion of nitrogen from agricultural fields is a major cause of excessive nitrate concentration in ground and surface water. The nitrate nitrogen of study area varies from 0.0010 to 0.0025 mg/L. The water samples shows within permissible limit of nitrate.

Sulphate (SO₄²⁻)

The variation in sulphate content represents the pollution status. The decrease in sulphate indicates deterioration and increase in sulphate indicate improvement of water quality. In our case, the main reason for sulphate might be sugar factory discharge of sulphur compounds and sulphate from sedimentary rocks. In the present study the sulphate varies from 0.5392 to 0.9314 mg/L.

Phosphate (PO₄³⁻)

The main source of phosphate is fertilizers from the surrounding agriculture fields, detergents used for domestic purpose and phosphate from sedimentary rocks.

In our study, the phosphate content in the ground water is found to vary from 0.00027 to 0.00056 mg/L.

Table 1: Physico-chemical parameter of groundwater of Tuljapur Dist. Osmanabad

Parameter	Average values of S ₁			Average values of S ₂			Average values of S ₃			Average values of S ₄		
	Winter	Summer	Rainy	Winter	Summer	Rainy	Winter	Summer	Rainy	Winter	Summer	Rainy
Temperature(°C)	22.33	31.00	25.67	22.67	31.00	25.00	22.33	30.67	24.33	22.67	31.00	25.00
pH	7.21	7.27	7.53	7.34	6.88	7.25	7.00	7.34	7.21	7.30	7.38	7.42
TDS g/L	0.727	1.237	0.975	2.367	1.405	1.017	1.143	1.690	3.140	1.523	1.237	1.104
Conductivity milimhos/cm	0.917	1.035	0.911	0.618	0.373	0.458	0.344	0.571	0.508	0.349	0.291	0.363
NO ₂ g/L	0.0021	0.0019	0.0030	0.0011	0.0026	0.0022	0.0019	0.0019	0.0016	0.0023	0.0019	0.0026
SO ₄ g/L	0.7843	0.8334	0.8333	0.1961	0.2941	0.5882	0.9314	0.3431	0.3432	0.3431	0.0981	0.0981
PO ₄ g/L	0.00028	0.00075	0.00038	0.00062	0.00043	0.00047	0.00040	0.00047	0.00061	0.00047	0.00036	0.00047
DO g/L	3.48	3.90	4.25	3.81	4.10	4.51	4.17	6.09	4.09	4.29	4.27	4.54
Hardness (as CaCO ₃) g/L	214.00	185.33	172.67	177.33	134.00	147.33	191.33	187.50	166.67	192.00	98.67	130.00
Chloridesg/L	347.05	444.04	317.68	120.13	92.10	96.11	118.80	130.64	94.10	82.09	86.74	121.47
CO ₂ mL/L	8.251	7.131	13.141	3.323	8.120	5.525	6.197	11.676	3.211	6.981	7.915	8.549
MPN per 100mL	44.33	78.33	29.00	50.00	52.00	46.67	142.33	131.00	118.00	72.00	68.67	71.33
Na ⁺ g/L	179.67	96.33	252.33	314.33	214.00	232.00	266.67	377.00	256.67	180.67	187.33	208.67
K ⁺ g/L	0.00	2.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.33	0.33	0.00
CODg/L	16.00	40.00	13.33	33.33	32.00	25.33	20.00	48.00	37.33	26.67	16.00	18.67

DO

The dissolved oxygen of the present areas varies from 3.77 to 4.46 mg/L.

Hardness

The hardness of water is due the presence of carbonate and bicarbonate of calcium and magnesium. The lowest hardness was observed at S₃ during summer season. The highest hardness is observed at S₂ during winter season. The high value of hardness is due to the impact of industrialization but since in the study area industries are not located. The hardness is within limit.

Chloride

The lowest value of chloride was observed at S₂ during summer. The highest value is observed at S₃ during winter.

CO₂

The lowest value of CO₂ is 4.8.72 mL/L at S₂ during summer. The highest CO₂ 8.699 mg/L was observed at S₃ during rainy season.

MPN

The minimum MPN was observed at S₃ during summer season and maximum at S₂ during rainy season.

Sodium

The water having high value of sodium can decrease the crop yield significantly and a long term use of such water can cause increasing damage to soil properties. The sources of sodium in groundwater may be chemical fertilizer, salt for road deicing and the soil itself. In the present work, the amount of sodium varies from 157.67 mg/L at S₃. The average maximum value of sodium is found to 361.33 in rainy season at S₁.

Potassium

About 1.1% potassium is present in the earth crust. Potassium is present in form of sylvinite and carnalite. The common source of potassium in water is excessive fertilization of soil. In the present work, the potassium ion varies from 0.00 to 3.33 mg/L.

Chemical oxygen demand

COD depends on presence of organic matter, nitrates, sulphate, reduced metal ions etc. COD represent the oxidisable material, particularly organic matter in the water table. High value of COD represent pollution in water. The minimum COD in the present work is found to be 16 mg/L and the maximum COD reported is 45.33 mg/L.

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