

Analytical studies of some natural waters in Ambad tehsil of Jalna district

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ABSTRACT

Analytical studies of thirty surface and ground water samples from different sites in Ambad tehsil was carried out during the month of April 2007. The water quality parameters like temperature (T), pH, electrical conductivity (EC), total dissolved solids (TDS), total alkalinity (TA), total hardness (TH), chloride (Cl⁻), sulphate (SO₄²⁻), calcium (Ca²⁺), magnesium (Mg²⁺), sodium (Na⁺), potassium (K⁺), dissolved oxygen (DO) and turbidity (TUB) were studied and out come of the results were discussed.

Key words: Analytical studies, natural water, Ambad tehsil.

INTRODUCTION

Ambad is considered to be oldest and religious town in Jalna district of Marathwada region. A famous temple of "Godess Matsyodari" is situated in Ambad city.

The residents of Ambad Tehsil usually use water from public dug well and bore wells along with river water and dam water for drinking and domestic purposes. There is a huge variation in the concentration of different species due to factors like depth, different land, under ground water conditions, rain conditions etc. The present work attempts to evaluate the quality of ground water in Ambad Tehsil of Jalna district for potability.

MATERIAL AND METHODS

In the present study thirty ground water natural (borewell) samples were collected from different sites of Ambad Tehsil in brown glass bottles with necessary precautions and preserved as per the recommended procedures¹.

All the chemicals used were of AR grade,

glass ware used were of 'A' grade. Double distilled (DD) water was used through out the work to prepare standard solutions.²

The water quality parameters (WQPs) considered for the examination in this study are temperature by precision thermometer (110°C), pH³ by digital pH meter (Model No. LI 613 Elico digital pH meter), electrical conductivity by using Elico digital conductivity meter (Model No. LICM 180)⁴, total dissolved solids by evaporation method at 105-110°C⁵⁻⁶, total alkalinity by standard procedure⁷, total hardness by complexometric titration method⁸, chloride by argentometry⁹, sulphate by nephelometry, calcium and magnesium by complexometre method, sodium and potassium by flame photometer (systronics, mediflame, Model No. 127, India), dissolved oxygen by winkler's (Iodometric) method¹⁰ and turbidity by turbidimeter.

RESULTS AND DISCUSSION

Thirty ground and surface water samples were collected from different sites of Ambad Tehsil. The results indicates that the quality of ground water has wide variation which is reflected by the values

of electrical conductivity, chloride, sulphate, calcium and magnesium etc.

pH acts as index to determine the extent of pollution, chemical and biological reactions are directly dependent upon the pH of water system. In the present study pH ranged from 7.25 to 8.92 which lies in the range prescribed by WHO¹¹, electrical conductivity value, in present study ranged from 424 to 2368 mmhos/cm all were found to be well above the permissible limit and are quite unfit for drinking.

Drinking water quality is affected by the presence of soluble salts. Total dissolved solids (TDS) is an important parameter in drinking water quality standard. It develops a particular taste to the water and at higher concentration reduces its potability, plants are also severely affected by higher values of TDS in irrigation water. TDS value of study area ranges 254 to 422 ppm. The high TDS level (7500 ppm) will result in the excessive scaling in water distribution system¹². Total alkalinity (TA) were found to be in the ranges 130 to 692 ppm. All samples are above the permissible limit prescribed by ICMR¹³. The higher alkalinity of ground water owing to the presence of bicarbonates and trace amount of carbonate¹⁴ and hydroxide salts¹⁵. Water

hardness is traditional measure of the capacity of water to reacts with soap. Hard water causes horrific effects in digestive systems moreover, the possibility of forming calcium oxalate crystals in urinary track has been ascertained. The hardness value of ground water in the present study area ranges from 180.00 to 1000.00 ppm.

Chloride content were found to be ranging from 38.80 to 476.33 ppm. Chloride in the maximum sites was found to be well above the permissible limit which may be due to the absence of proper drainage system in the study area. According to ISI permissible limit of sulphate concentration is 150 ppm. Beyond this limit, sulphate causes gastro-intestinal irritation and can have laxative effect in presence of magnesium and sodium. Sulphate ranges from 12.00 to 94.00 ppm. In the present work calcium in present study varies from 62.02 to 980.50 ppm. High content of calcium may be due to leaching of soil deposit of limestone, dolomite, gypsum, gypsiferous materials, silicious sand into ground waters. Magnesium is an essential mineral for the living body. High concentration of magnesium causes nausea, muscular weakness and paralysis in human body, when it reaches upto the level of about 400 mg/L. In this area, magnesium

Table 1 : Analysis data of Natural and Ground Water Samples

WQP	1	2	3	4	5
T	29 ^o	29 ^o	30 ^o	29 ^o	28 ^o
pH	8.97	8.92	8.51	8.12	8.27
EC	431.00	426.00	499.00	626.00	449.00
TDS	259.00	256.00	300.00	376.00	270.00
TA	245.00	225.00	322.00	318.00	130.00
TH	182.00	212.00	260.00	352.00	180.00
Cl ⁻	61.55	195.35	72.25	155.21	107.04
SO ₄ ²⁻	12.00	13.00	94.00	48.00	16.00
Ca ²⁺	62.02	100.00	106.00	162.10	172.10
Mg ²⁺	29.27	27.32	37.57	46.33	10.92
Na ⁺	28.00	56.00	19.00	65.00	27.00
K ⁺	16.00	6.00	12.00	25.00	10.00
DO	4.35	4.83	6.85	6.12	6.69
TUB	1.20	1.50	1.00	1.10	1.50

Units : All the paramerters are given in ppm excluding pH, EC-mmhos/cm, Temperature-0C and Turbidity NTU.

Table 2: Analysis data of Natural and Ground Water Samples

WQP	6	7	8	9	10
T	28 ^o	27 ^o	28 ^o	29 ^o	28 ^o
pH	7.60	7.66	7.70	7.68	7.70
EC	2040.00	1755.00	633.00	1866.00	499.00
TDS	1225.00	1054.00	380.00	1120.00	300.00
TA	492.00	484.00	634.00	480.00	430.00
TH	770.00	694.00	460.00	532.00	336.00
Cl ⁻	314.40	270.20	280.90	168.50	70.91
SO ₄ ²⁻	39.00	67.00	54.00	57.00	39.00
Ca ²⁺	436.20	448.20	212.10	170.10	193.10
Mg ²⁺	81.44	59.97	50.48	88.30	34.86
Na ⁺	34.00	60.00	21.00	39.00	52.00
K ⁺	13.00	22.00	7.00	25.00	5.00
DO	6.04	6.37	6.61	5.40	5.56
TUB	1.60	2.50	2.00	1.10	1.50

Units : All the paramerters are given in ppm excluding pH, EC-mmhos/cm, Temperature-0C and Turbidity NTU.

Table 3: Analysis data of Natural and Ground Water Samples

WQP	11	12	13	14	15
T	27 ^o	28 ^o	27 ^o	28 ^o	29 ^o
pH	7.39	7.57	7.50	7.73	8.38
EC	1468.00	1474.00	1685.00	541.00	634.00
TDS	885.00	1010.00	1012.00	325.00	382.00
TA	692.00	372.00	385.00	482.00	404.00
TH	626.00	530.00	548.00	610.00	428.00
Cl ⁻	306.40	178.62	258.20	135.14	185.98
SO ₄ ²⁻	60.00	38.00	45.00	58.00	42.00
Ca ²⁺	506.30	340.00	264.10	318.10	214.10
Mg ²⁺	29.20	46.36	69.27	71.22	52.19
Na ⁺	62.00	28.00	46.00	33.00	74.00
K ⁺	28.00	8.00	1.00	1.00	3.00
DO	6.85	4.91	8.46	6.04	6.37
TUB	0.50	2.50	1.70	1.40	1.10

Units : All the paramerters are given in ppm excluding pH, EC-mmhos/cm, Temperature-0C and Turbidity NTU.

Table 4: Analysis data of Natural and Ground Water Samples

WQP	16	17	18	19	20
T	28 ^o	28 ^o	27 ^o	28 ^o	28 ^o
pH	7.80	7.42	7.60	7.74	7.61
EC	500.00	1857.00	630.00	433.00	583.00
TDS	300.00	1115.00	380.00	260.00	350.00
TA	420.00	508.00	282.00	442.00	290.00
TH	282.00	566.00	356.00	282.00	430.00
Cl ⁻	62.89	183.31	74.93	81.62	95.00
SO ₄ ²⁻	15.00	58.00	39.00	94.00	42.00
Ca ²⁺	164.10	298.10	216.10	172.10	208.10
Mg ²⁺	28.76	65.36	34.13	26.81	54.14
Na ⁺	16.00	60.00	29.00	24.00	30.00
K ⁺	3.00	4.00	2.00	8.00	2.00
DO	7.01	5.56	5.56	5.64	7.01
TUB	1.60	1.40	1.20	1.60	1.90

Units : All the paramerters are given in ppm excluding pH, EC-mmhos/cm, Temperature-0C and Turbidity NTU.

Table 5: Analysis data of Natural and Ground Water Samples

WQP	21	22	23	24	25
T	29 ^o	28 ^o	27 ^o	28 ^o	27 ^o
pH	7.73	7.78	8.23	7.62	7.43
EC	614.00	633.00	424.00	430.00	1682.00
TDS	370.00	380.00	254.00	258.00	1010.00
TA	230.00	348.00	322.00	340.00	348.00
TH	262.00	448.00	270.00	388.00	542.00
Cl ⁻	61.55	111.05	56.86	120.40	173.90
SO ₄ ²⁻	90.00	45.00	13.00	18.00	45.00
Ca ²⁺	170.10	328.10	270.10	258.10	328.10
Mg ²⁺	22.42	29.25	20.00	29.20	52.19
Na ⁺	12.00	19.00	14.00	18.00	21.00
K ⁺	1.00	2.00	7.00	2.00	2.00
DO	6.45	9.11	6.53	5.40	4.83
TUB	2.00	3.00	1.50	1.70	1.60

Units : All the paramerters are given in ppm excluding pH, EC-mmhos/cm, Temperature-0C and Turbidity NTU.

concentration ranged from 4.75 to 88.30 ppm. Sodium and potassium enters in drinking water from natural geological sources, detergents, domestic, industrial discharges and mining wastes. In the

Table 6: Analysis data of Natural and Ground Water Samples

WQP	26	27	28	29	30
T	28 ^o	28 ^o	29 ^o	29 ^o	28 ^o
pH	7.34	7.78	7.44	7.37	7.25
EC	1699.00	650.00	691.00	650.00	2368.00
TDS	1020.00	390.00	415.00	390.00	1422.00
TA	500.00	328.00	389.00	500.00	662.00
TH	568.00	254.00	270.00	498.00	1000.00
Cl ⁻	283.66	38.80	54.86	151.19	476.33
SO ₄ ²⁻	48.00	13.00	17.00	58.00	75.00
Ca ²⁺	428.20	128.00	246.10	310.10	980.50
Mg ²⁺	34.11	30.74	5.83	45.84	4.75
Na ⁺	61.00	20.00	31.00	20.00	103.00
K ⁺	5.00	2.00	8.00	10.00	5.00
DO	9.32	4.99	6.85	6.53	6.93
TUB	1.30	1.10	1.20	1.40	1.40

Units : All the paramerters are given in ppm excluding pH, EC-mmhos/cm, Temperature-0C and Turbidity NTU.

present work, sodium concentration varies from 12 to 103 ppm and potassium concentration varies from 1.00 to 57.00 ppm. Oxygen is dissolved in most waters in varying concentrations. Solubility of oxygen

depends on temperature, pressure and salinity of water. It is essential to the life of fish and other aquatic organisms. In the present study dissolved oxygen ranges from 4.35 to 9.32 ppm. Turbidity is an important parameter for characterising water quality. In the present study turbidity varies from 0.5 to 3.0 NTU. These values are well below the permissible limit, 5 NTU as per WHO.

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