Physico - Chemical Study of Groundwater near Holy Place Khuldabad Region of Aurangabad (M.S.)

B. R. Agrawal[c], Vidya Pradhan[b], Rashmi Pathrikar[b], Mohammad Mohsin[a]

[a]P. G. and Research Centre, Maulana Azad College, Aurangabad, Maharashtra, INDIA.

[b]Dr. Rafiq Zakaria College for Women, Navkhanda, Aurangabad, Maharashtra, INDIA.

[c]JES College, Jalna, Maharashtra, INDIA.

Corresponding Address:

mazahar_64@rediffmail.com

Research Article

Abstract: Physico-Chemical study of groundwater near Khuldabad area is carried out in the year 2009-10. For the study different five stations were selected. Different parameters like pH, Conductivity, TDS, Hardness, Sodium, Potassium, Iron, Total Alkalinity, Carbonate, Bicarbonate, Chloride, Flouride, Nitrate and Sulphate are analyzed. Mahismal station having the values within the permissible limit and good for human consumption.
Key Words: Khuldabad, Water parameters, Groundwater.

Introduction

Many different sources and processes are known to contribute to the deterioration in quality and contamination of surface water. Thus, a thorough understanding of the nature and extent of contamination in an area requires detailed hydrochemical data[1-2]. Multivariate statistical analyses are used to incorporate larger numbers of variables measured in water systems[3]. The application of different multivariate statistical techniques, such as cluster analysis (CA), principal component analysis (PCA) and factor analysis (FA), help in the interpretation of complex data matrices to better understand the water quality and ecological status of the studies systems, allows the identification of possible factors that influence water stems and offers a valuable tool for reliable management of water resources as well as rapid solution to pollution problems[4-5]. The shortage of rain and capillarity rise from shallow ground water or from sea water intrusion in coastal areas makes necessary the use of water of low quality for irrigation[6]. The use of saline water for irrigation purposes with the risk of salt accumulation in the root zone and consequent damage to crop production and soil fertility[7]. Nearby half of the irrigated surface increasing problem[8]. In coastal areas, seawater intrusion into the groundwater due to excessive withdrawals causes increasing salinity of both water resources and soils[9].

Material and Method

Almost care was taken, so that no bubbling should observe during sampling, which avoids influence of the dissolved oxygen. The temperature was recorded at the sample site. The chemicals used were of A. R. grade and was used without further purification. The solutions were prepared in distilled water. The pH of water sample was measured with the help of pH meter (Elico LI-120) with a glass electrode. The pH meter was calibrated using buffer of pH 4.0 and 7.0. The conductance of water samples was measured using conductometer (Elico CM 180). The chloride ions present in the sample was determined by Mohr's method. A known volume of sample was taken into conical flask. A 2% potassium chromate was used as indicator and resultant solution was titrated against standard silver nitrate solution. An average of replicates analysis was carried out. The sulphate concentration was determined by turbidometeric method. The sample was treated with $BaCl_2$ in presence of HCl and a small amount of ethanol was added. The resultant solution was stirred at for 1 hour and turbidity is measured. The concentration was determined from calibration curve. Nitrate was estimated using colorimeter. For determination of hardness, EDTA solution of its disodium salt was prepared in distilled water, it was standardize by using Zinc ion solution at pH 10 and using soluchrome black T indicator. A definite amount of sample water was taken in conical flask. It was buffered to pH 10. Few drops of indicator soluchrome Black T was added and titrated against standard EDTA Solution. Similar procedure as total hardness was used for the determination of calcium hardness the only difference is that instead of soluchrome Black T another indicator murexide was used. Potassium was determined by using flame photometer Toshniwal Pvt. Ltd. (model TMF-45). Standard solution containing 100 ppm potassium ion was prepared by dissolving appropriate amount of KCl in 500 ml of water. This solution was used to prepare a series of solution with different concentrations. All solutions were aspirated in the flame one by one and the corresponding readings were noted down. The calibration curve was

plotted. The concentration of potassium in the sample water was determined from calibration curve. Similarly concentration of sodium was determined by taking appropriate amount of NaCl[10-11].

Result and Discussion

The study reveals that the average pH value was found to be within permissible limit. The maximum value of pH was 8.5 at station Delana BK. Average total dissolved solids value was above the desirable limits of WHO of 500 ppm, at station Mahismal the TDS was 187 ppm and maximum value 2016 ppm at station Delana Bk. Turbidity of all stations are well satisfactory. The average total hardness value for all stations was found to be above the desirable limit of 300 ppm. The maximum value was observed at station Delana Bk and minimum value at Mahismal. Calcium as well as Magnesium hardness was observed above the permissible limit. Calcium hardness varies from 17 ppm to 415 ppm and that of magnesium hardness from 0.3 to 421 ppm. All stations having the iron content within the desired limit of WHO, it varies from 0 to 0.8 ppm. The maximum value of iron was observed at Wadod BK. Carbonated alkalinity was found negligible and bicarbonate alkalinity was observed at some stations. Alkalinity values were higher as compared to desirable limits. Average chloride values were found within the permissible limit. The maximum value of chloride was observed at station Wadod Bk i.e. 734 ppm and minimum at station Mahismal.

The fluoride value varies from 0 to 6 ppm. Nitrate values were having little higher values. The nitrate values from 1.1 to 142 ppm. The average value 52 ppm was observed for nitrate. The large values of nitrate at some station may be due to excess use of fertilizers. The average values of sulphate were 70.9 ppm which was found to be within the desirable limit. It varies from 10 to 302 ppm. The maximum value was observed at station Delana BK i.e 302 ppm and minimum value at station Mahismal.

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Parameter at different five stations from Jan 2009-Dec 2009

		pH	E.C. µS/cm	TDS	Tur	TH	Ca	Mg	Na	K	Fe	TA	CO3	HCO3	Cl	F	NO3	SO4
Golegaon	Avg	7.725	923.417	641.62	0.65	376.167	34.567	57.608	45.083	4.333	0.325	265.5	0	265.5	103.2	0.5	95.03	45.5
Delana BK	Avg	7.368	1708.25	999.25	0.525	877.917	174.17	191.63	76.833	13.1667	0.275	521.33	0	521.33	154.6	1.125	58.45	129.3
Verul	Avg	7.715	990.833	576.43	0.908	491.333	62.933	61.267	48.417	2.95	0.183	188.83	0	188.83	93.58	0.683	77.24	40.83
Mahismal	Avg	7.433	567.667	311.18	0.15	264.417	44.65	35.75	24.167	1.33333	0.183	207.5	0	207.5	40.33	0.408	29.6	30.67
Wadod BK	Avg	7.292	2181	1290.4	0.275	350	125.25	1.5417	223	2.94167	0.325	69.083	0	69.083	527.8	0.833	4.053	108.2
	Avg	7.507	1274.23	763.78	0.502	471.967	88.313	69.56	83.5	4.94493	0.258	250.45	0	250.45	183.9	0.71	52.87	70.9

		pH	E.C. µS/cm	TDS	Tur	TH	Ca	Mg	Na	K	Fe	TA	CO3	HCO3	Cl	F	NO3	SO4
Golegaon	Max	8.4	1200	810	1	500	69	112	80	8	0.6	310	0	310	150	1	142	71
Delana BK	Max	8.5	3150	2016	0.9	1687	415	421	180	25	0.7	905	0	905	340	1.8	106	302
Verul	Max	8.4	1287	814.1	6	745	96	78	70	6	0.6	468	0	468	120	1.4	102	66
Mahismal	Max	8.1	732	462.1	0.3	401	76.8	55	36	3	0.5	265	0	265	64	0.9	58	54
Wadod BK	Max	7.8	3158	1902	0.6	636	211	3.1	410	7	0.8	111	0	111	734	6	6.8	145
	Max	8.5	3158	2016	6	1687	415	421	410	25	0.8	905	0	905	734	6	142	302

		pH	E.C. µS/cm	TDS	Tur	TH	Ca	Mg	Na	K	Fe	TA	CO3	HCO3	Cl	F	NO3	SO4
Golegaon	Min	7.725	923.4	641.62	0.65	376.17	28	40	45	2	0.3	225	0	225	103	0.1	95	25
Delana BK	Min	5.1	880	473	0.1	376	22	77	12	1	0	110	0	110	65	0	17	25
Verul	Min	6.77	648	269	0	320	27	36	23	0.7	0	20	0	20	59	0	23	12
Mahismal	Min	6.9	369	187	0	126	17	17	11	0	0	124	0	124	12	0	4	10
Wadod BK	Min	6.5	1049	543	0	214	36	0.3	64	0	0	17	0	17	298	0	1.1	36
	Min	5.1	369	187	0	126	17	0.3	11	0	0	17	0	17	12	0	1.1	10