

STUDIES OF SOME PHYSICOCHEMICAL PARAMETERS OF GROUND WATER TAKEN FROM THREE VILLAGES (BOLUNDR, ISROL, JALODAR) OF NORTH GUJARAT

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ABSTRACT

Physicochemical parameters of the ground water quality are determined in three villages of North Gujarat i.e. Bolundra, Isrol and Jalodar. 10-12% Indian population has access to clean and safe drinking water while rest of the population has no access of safe drinking water. Physicochemical parameters of water at various places are changing with high pace due to anthropogenic activities. These water quality parameters were compared with ICMR standards. Some physicochemical parameters have been determined such as pH turbidity, electrical conductivity (EC), total dissolved solids (TDS), total hardness (TH), calcium (Ca^{2+}), magnesium (Mg^{2+}), chloride (Cl^-), sulphate (SO_4^{2-}), iron (Fe), DO, BOD, COD, total alkalinity (TA) and nitrate (NO_3^-) in ground water.

Key words: Ground water, Physico-chemical analysis, TH, TDS, North Gujarat.

INTRODUCTION

Water is a wonderful gift of nature to us, but now it is under threat from none other than man himself in its totality. Man is damaging the earth in various ways. The major one being water pollution. Products of erosion, sewages, industrial, wastage, deforestation, agricultural practices, and uses of pesticides, insecticides and chemical fertilization causes water pollution. In India only 10-12% peoples get clean drinking water while rest 88-90% peoples quench their thirst on polluted water. Ground water of three villages were studied by taking all these things into consideration i.e. the analysis of physicochemical parameters¹⁻⁵ viz, pH, turbidity, chlorides, calcium, Mg^{2+} , total hardness etc. The three villages is located in Modasa District of Gujarat State in India. Safe drinking water is one of the most important resources for the life of all the living being. It is very important for mankind as they depend upon it for cultural requirement food production, industrial and waste disposal. The quality of water is of vital concern for the mankind since it is directly linked with human welfare. It is a matter of history that facial pollution of drinking water caused water-borne diseases which wiped out entire population of the studied area⁶. Human and ecological use of ground water depends upon ambient water quality. Human alteration of the landscape has an extensive influence on watershed hydrology⁷. The present work is an attempt to measure the water quality of three villages of Modasa District, Gujarat State, India

EXPERIMENTAL

All the chemical used were of AR grade. The glass bottles were used for the collections of water samples. Before sampling, the bottles were treated with dilute mineral acid solution for two times. These were rinsed with distilled water (no acidic to litmus)^{1-5,8} before performing the physicochemical parameters of water using standard methods.

Method

Systronic pH meter Model No-361 was used for measurement of pH, and EC was measured using a Conductivity meter Model No. 304 and Ca²⁺, Mg²⁺, were measured by EDTA titration methods⁹. TA was measure volumetrically by silver nitrate titration method as determined nephelometrically using Spectrophotometer Model No. 166. The physico^{10,11} turbidity and TDS were observed measured by digital water kit¹². Iron was determined by spectrophotometrically¹³. Nitrate was measured by Phenol Di Sulphonic methos and DO, BOD, COD were measured by standards methods given by NEERI¹⁴.

Table 1: Physico-chemical analysis of ground water of Bolundra

pH	Turbidity	EC	TH	TA	TDS	F	DO	BOD	COD	Ca ²⁺	Mg ²⁺	Cl ⁻	SO ₄ ²⁻	NO ₃ ⁻	Fe
7.2	7	375	356	347	503	2.48	1.00	1.40	2.20	100	26	42	6	1.42	0.70
7.3	BDL	475	192	190	260	0.17	1.50	3.40	7.40	63	8	13	9	2.03	0.80
7.2	BDL	432	195	195	300	0.15	1.60	1.10	2.40	68	7	27	BDL	2.96	0.34
7.6	BDL	529	263	294	410	0.24	1.80	1.00	2.20	83	13	21	BDL	11.48	0.40
6.4	BDL	105	290	319	390	0.56	2.10	1.00	2.10	86	18	16	11	7.12	BDL
6.7	BDL	487	264	300	384	0.46	2.00	1.00	1.80	95	11	19	9	1.29	0.72
7.7	BDL	583	280	296	418	0.87	1.00	0.80	1.80	90	14	24	5	12.71	0.28
7.7	BDL	258	283	277	427	0.72	1.50	1.00	1.90	91	8	9	20	6.33	0.58
6.5	BDL	484	235	226	385	0.26	1.50	0.50	16.50	72	13	31	7	2.15	0.31
7.2	BDL	327	185	183	274	0.20	1.00	1.40	2.20	65	5	16	6	1.87	0.33

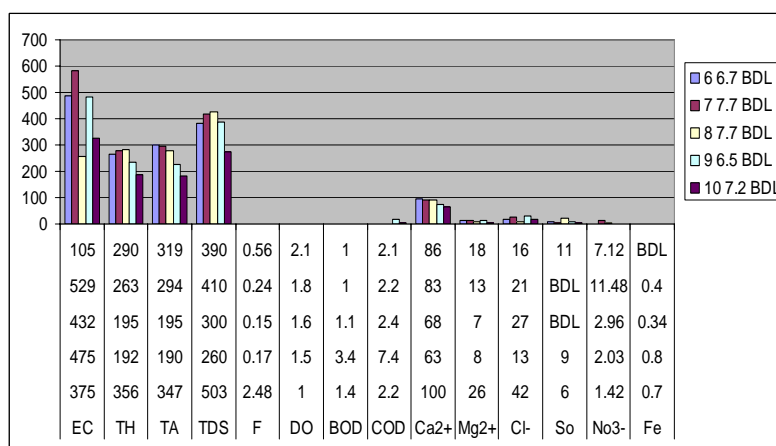
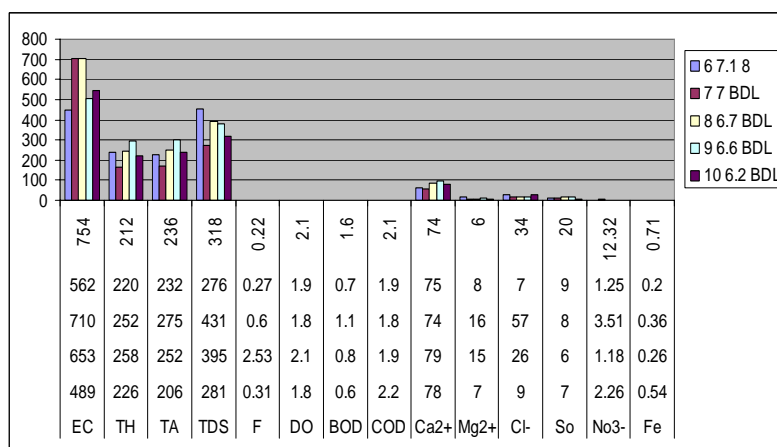


Fig. 1: Data for village Bolundra

Table 2: Physico-chemical analysis of ground water of Isrol

pH	Turbidity	EC	TH	TA	TDS	F	DO	BOD	COD	Ca ²⁺	Mg ²⁺	Cl ⁻	SO ₄ ²⁻	NO ₃ ⁻	Fe
7.4	BDL	489	226	206	281	0.31	1.80	0.60	2.20	78	7	9	7	2.26	0.54
7.8	BDL	653	258	252	395	2.53	2.10	0.80	1.90	79	15	26	6	1.18	0.26
7.4	BDL	710	252	275	431	0.60	1.80	1.10	1.80	74	16	57	8	3.51	0.36
6.2	BDL	562	220	232	276	0.27	1.90	0.70	1.90	75	8	7	9	1.25	0.20
6.5	BDL	754	212	236	318	0.22	2.10	1.60	2.10	74	6	34	20	12.32	0.71
7.1	8	451	236	226	453	0.25	1.90	1.10	1.90	63	19	29	14	1.06	0.21
7.0	BDL	701	166	168	270	BDL	2.10	1.20	1.80	58	5	15	13	3.35	BDL
6.7	BDL	701	245	251	389	0.13	2.40	1.60	1.80	85	8	15	19	0.84	0.13
6.6	BDL	505	293	301	379	0.40	1.80	1.50	1.60	97	12	18	18	1.53	0.40
6.2	BDL	546	221	239	318	BDL	1.22	1.80	1.30	77	7	31	6	0.61	BDL

**Fig. 2: Data for village of Isrol**

RESULTS AND DISCUSSION

Physicochemical parameters of the ground water of Boolundra, Isrol and Jalodar villages of Modasa district are shown in Tables 1-3. These parameters were compared with WHO standards. From the observations, it can be concluded that pH of water shows in ranges, EC of water shows wide variation in all three villages and Ca²⁺ also. TA is within the limits. Fluoride content in water is high than chloride.

Table 3: Physico-chemical analysis of ground water of Jalodar

pH	Turbidity	EC	TH	TA	TDS	F	DO	BOD	COD	Ca ²⁺	Mg ²⁺	Cl ⁻	SO ₄ ²⁻	NO ₃ ⁻	Fe
6.3	6	390	151	166	233	0.26	1.00	0.80	1.80	51	6	8	5	3.23	0.48
7.5	8	743	327	323	452	0.14	1.50	1.00	1.90	116	8	19	16	2.35	0.74
7.2	BDL	505	208	205	302	0.07	1.50	0.50	16.50	66	11	26	6	1.68	0.25
7.2	BDL	902	391	416	539	0.25	1.00	1.40	2.20	136	12	41	6	1.87	0.53

Cont...

pH	Turbidity	EC	TH	TA	TDS	F	DO	BOD	COD	Ca ²⁺	Mg ²⁺	Cl ⁻	SO ₄ ²⁻	NO ₃ ⁻	Fe
7.4	BDL	336	152	161	195	0.15	15.80	1.00	1.20	53	4	12	BDL	2.01	0.59
7.4	12	801	381	455	465	0.61	2.40	1.50	1.10	85	40	12	9	6.38	0.31
6.7	BDL	636	254	284	365	0.61	2.20	1.50	1.00	89	8	11	11	5.93	0.62
7.3	BDL	619	255	327	365	0.21	1.90	2.40	1.00	87	9	8	BDL	3.28	BDL
7.1	BDL	2380	575	579	1338	0.21	2.10	1.30	10.80	174	3	152	24	2.00	0.52
7.1	BDL	646	575	197	404	0.22	15.80	2.20	1.20	58	12	63	33	1.01	0.50

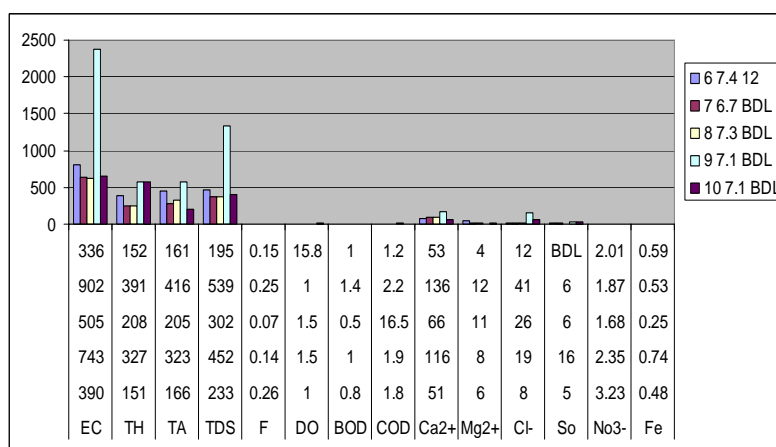


Fig. 3: Data for village of Jalodar

CONCLUSION

The ground water of the studied area of three villages of Modasa District found with considerable variation. Some of the water samples do not match with ICMR standards for drinking purpose. The water quality in the investigated area is found to be suitable for drinking only in few locations, while as out prior treatments. It is suggested that people required new wells in the new areas.

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