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WATER QUALITY ANALYSIS OF NORTH- EAST REGION OF JHUNJHUNU, RAJASTHAN

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ABSTRACT

The ground water is polluted due to increasing human population and industrial activities. Now a day polluted ground water is a major problem for all livings. Thus the analysis of water quality is very important to preserve the ground water in nature. There are fifteen physico-chemical parameters such as ammonia, pH, EC, turbidity, TDS, TA, and concentration of ion such as chloride, fluoride, nitrate, sulphate, potassium, phosphorus some heavy metal like as Iron and Mn. All water samples collected from 42 different location of North-East Tehsil of Jhunjhunu district. In this study the water samples were found good quality compared to BIS (10500-2012) but fluoride, potassium and sodium values are higher compared to WHO. The interesting point is that Phosphorus, Fe and Mn were not found in any ground water samples. Only fluoride, potassium & sodium are making ground water unfit for drinking.

KEYWORDS: Physico-chemical, Ground water, Fluoride, Water quality.

INTRODUCTION

Ground water is a life line of all living animal and human beings. The modern civilization, rapid industrialization, urbanization and increased population have lead to fast degradation of ground water quality. Ground water is an important source of water supply through the world. It is used in irrigation, industries and domestic purpose and continue to uses the level of ground water rapidly fall down. The peoples of North-East Tehsil of Jhunjhunu are depends only ground water for domestic, industrial and agriculture purpose, so the ground water acts as a life line of the people. Geographical areas of these tehsil are 1961.60 sq.km. out of Jhunjhunu district. These tehsil have dry climate and the temperature variation of seasons is 1^{o}C to 48^{o}C. The major areas of these tehsils ground water are affected by fluoride and others

parameters. Thus the human beings suffered from many water borne disease such as fluorosis, arthritis, dental carries in children and knee problems in old men and women. Hence the author has chosen these areas for this research.

MATERIALS AND STUDY AREA

In the present study North-East tehsils of Jhunjhunu district were selected. Forty two ground water samples were collected from different location of these tehsils. These samples were collected from tube well, Hand pumps and water tanks. The samples were collected in wide mouth plastics bottles. Before collection of water samples, bottles were washed with water and detergent after that soaked in 1%Nitric acid for 24 hours and then again washed with clean water. After collecting samples were analyzed by the following methods.

Methods

Table 1: Parameters and methods employed in the physico-chemical examination of water samples.

S.No	Parameters	Method Employed	Unit
1.	Electrical Conductance	Conductometric method	Micromhos/cm
2.	Fluoride	Ion-selective method	Mg/L
3.	Sulphate	Spectrophotometric method	Mg/L
4.	Phosphorus	Vanadomolybdophosphoric acid method	Mg/L
5.	Ammonia	ammonia selective method	Mg/L
6.	Iron and Mn.	AAS and ICP method	Mg/L
7.	Nitrate	UV spectrophotometric method	Mg/L
8.	Chloride	argentometric method	Mg/L
9.	pH	pH metric method	--------
10.	TDS	titration method	Mg/L
11.	Turbidity	Nephlo-meter	NTU.
12.	Total Hardness	titration method	Mg/L
13.	Sodium	Flame photo meter	--------
14.	Potassium	Flame photo meter	--------
15	Total Alkalinity	Titration method	Mg/L

RESULT AND DISCUSSION

The results obtained for North-East tehsil of Jhunjhunu areas are reported in Table -2. Forty two water samples were

Analyzed for following parameters-EC, Fluoride, Sulphate, Phosphorus, Ammonia, Fe and Mn, Nitrate, Chloride, pH, TDS, Turbidity, TH, Sodium and Potassium and Total alkalinity.

Table 2: Physico-chemical parameters of the groundwater quality parameters for North-East tehsil of Jhunjhunu district, Rajasthan.

Samples	Places of Samples	EC	F^{-1}	$SO4^{-2}$	$N03^{-1}$	Cl^{-1}	pH	TDS	TH	Na	K	TA
S1	Pilani Water Box	568	0.7	28.5	4.8	152	7.61	426	120	128	132	296
S2	Pilani Bus Stand	616	0.8	29.6	4.9	160	7.63	462	126	132	120	286
S3	Pilani Birla Hospital	605	0.9	32.2	5.1	148	7.65	454	122	124	140	280
S4	Jherli	580	0.8	31.2	5.3	156	7.70	435	128	134	140	286
S5	Hameenpur	624	0.9	32.4	4.9	160	7.61	468	148	134	130	290
S6	Bangothari Kalan	680	0.8	30.6	5.5	148	7.63	510	168	148	152	300
S7	Beri	710	1.0	33.5	5.2	160	7.65	532	148	150	140	290
S8	Dulania	596	0.8	35.6	5.0	150	7.75	450	142	152	155	302
S9	Dheendhwa Aguna	624	0.9	29.8	5.2	162	7.61	468	158	148	136	290
S10	Morwa	590	0.7	28.5	4.9	152	7.61	442	138	160	158	278
S11	Kherla	620	0.9	30.5	5.3	156	7.68	465	160	120	126	194
S12	Narhar	640	0.8	30.5	5.3	168	7.70	480	180	126	116	225
S13	Devrod	660	0.9	30.5	5.3	156	7.68	465	166	126	132	202
S14	Ojtu	702	1.0	35.6	5.5	162	7.68	520	180	145	126	190
S15	Chirawa Water Box	710	0.8	31.5	4.5	160	7.80	530	166	142	136	190
S16	Chirawa CHC	670	0.7	39.8	5.3	156	7.68	510	152	124	105	236
S17	Chirawa Station	720	1.2	32.6	5.3	68	7.68	540	196	116	100	230
S18	Ardawata	720	1.2	33.8	5.3	168	7.68	580	210	126	105	210
S19	Chirawa RIICO	620	0.9	30.5	5.3	156	7.68	465	160	117	105	212
S20	Lakhu	690	0.9	30.5	5.3	186	7.68	522	240	107	91	212
S21	Gadakhera	710	1.2	30.5	5.6	192	7.68	532	232	112	95	220
S22	Bhasawata Kalan	710	0.9	36.5	5.3	186	7.80	540	226	126	98	226
S23	Singhana	740	0.8	38.4	6.2	196	7.71	512	252	112	92	236
S24	Pacheri khurd	896	0.9	30.5	6.2	360	7.68	692	264	142	120	280
S25	Pacheri Bari	912	1.1	39.6	6.5	400	7.90	726	270	170	152	320
S26	Bhirr	1013	1.3	42.5	5.8	426	7.68	760	286	176	148	326
S27	Buhana	1026	1.2	44.8	5.8	442	7.68	780	290	180	160	340
S28	Dhaka Mandi	1060	1.3	50.1	6.9	460	7.70	800	286	180	158	326
S29	Badbar	1216	1.3	55.9	6.8	460	7.68	912	290	186	170	380
S30	Chorodi Auguni	1180	1.3	58.8	6.9	486	7.68	926	296	186	170	380
S31	Khedaro ki Dhani	1060	1.3	49.8	6.3	390	7.72	856	280	186	170	390
S32	Kakoda	1048	1.4	53.9	5.9	460	7.68	786	270	176	146	342
S33	Surajgarh R. Station	1068	1.2	48.9	6.3	420	7.73	801	276	168	148	350
S34	R.K.J.K. College	980	1.1	53.6	6.4	490	7.68	842	290	162	142	330
S35	Surajgarh Mandi	980	1.2	48.7	6.3	420	7.68	780	276	182	152	296
S36	Jakhod	960	1.3	45.9	6.8	412	7.72	720	226	168	148	290
S37	Farat	940	1.2	48.7	6.3	326	7.70	705	186	152	130	260
S38	Pilod	962	1.2	43.9	6.4	302	7.68	720	190	162	126	268
S39	Bhavthari	920	1.3	49.6	6.8	296	7.71	690	142	148	152	268
S40	Bijoli	920	1.3	50.9	6.8	268	7.70	690	180	152	148	275
S41	Kajara	912	1.3	45.2	7.1	252	7.52	684	140	152	160	290
S42	Jeeni	896	1.2	48.6	7.4	242	7.46	672	134	148	152	276

Note: Iron, Manganese, Phosphorus are not detective in all ground water sample.

Solubility of ammonia in ground water is <0.2. & Turbidity of water sample is<1.0.

RESULT

All water quality parameters are illustrated in Table -1. All the result compared with standard permissible limit recommended by the Bureau of Indian Standard (BIS) and World Health Organization (WHO).

Electrical Conductivity: The electrical conductivity of water depends up on the concentration of ions. In the present study the maximum conductivity 1216 Microsimens /cm. was observed at S29 in village Badbar and minimum electrical conductivity 568 Microsimens /cm. was observed at S1 in village Pilani Water Box. The maximum limit of EC in drinking water is prescribed as1400 micro mhos/cm (WHO, 2012).

Nitrate: The minimum concentration of nitrate is 4.5 mg/L. at sample S15 in village Chirawa Water Box near bus stand and maximum concentration of nitrate is 7.4 mg/L. at sample S42 in village Jeeni. The permissible limit of Bureau of Indian Standard (BIS – 2012) is 4.8 mg/L. to 7.4 mg/L. The study of analysis shows that all values of water sample in desirable limits.

Chloride: Chloride ions are generally more toxic compared to sulphate most of the plant and are best pollution indicator. Chloride ranged of the study areas from 68 mg/L.to 490 mg/L. Minimum value was observed at samples S17 in Chirawa Railway Station and maximum value was observed at Sample S34 in Campus of R.K.J.K. Barasia College Surajgarh. As per guide line of BSI, the highest desirable limit of chloride for drinking water is kept at 250 mg/L. and maximum permissible limit is 1000mg/L.

pH: pH is measure of intensity of acidity or alkalinity of water. All chemical and biological reactions are directly affected by power of hydrogen. The pH range of Indian Standard is 6.5 to 8.5 are normally acceptable. All water samples were found in the pH range 7.46 to 7.9. On the basis of current study all water sample were safe for drinking.

Fluoride: Fluoride is an important element of our human body because it is very necessary to developing bones of human and child but excess amount of fluoride is lethal for human body. The permissible limit of fluoride is 1.0 to 1.5 mg/L. in water. The range of fluoride concentration is 0.7 mg/L. to 1.4mg/L. in ground water samples. I don't find any water sample which exceed permissible limit according to BIS or WHO.

Sulphate: The minimum sulphate values is 28.5 mg/L. at sample S1 in village Pilani Water Box and maximum sulphate values is 58.8 mg/L. at sample S30 in village Chorodi Auguni.

But permissible limit of sulphate is 200 to 400mg/L. According to Bureau of Indian Standard. The analysis shows that the drinking ground water is completely safe from sulphate.

Ammonia: The maximum upper limit of dissolve ammonia in drinking water is 0.5 mg/ L., According to BIS. All water samples shows below <0.2 mg/L. Analysis shows that the ground water under investigated area was found to be potable and desirable limits.

TDS: For drinking water, the desirable concentration of TDS is <500 mg/L. and maximum permissible limit is 2000 mg/L. The minimum TDS value is 426 mg/L. and maximum TDS limit is 926 mg/ L. The analysis shows that all ground water samples are in permissible limits.

Turbidity: For potable drinking water, the desirable limit of turbidity is less than 1NTU and maximum allowable limit is 5NTU. If the turbidity value exceeds 1NTU, then the water is not potable for humans. Turbidity has no health effects, but it can interfere with disinfection and provide a medium for microbial growth. Turbidity indicates the presence of disease-causing organisms. Investigated report shows that all water samples are safe for drinking because the range of turbidity is <1NTU.

Total Hardness: The investigated report shows that all water samples were found in the range of 120 mg/L. to296mg/L. The hardness of water is due to presence of alkaline earths such as ca^{+2} and mg^{+2}. The higher value of hardness is responsible for incrustation and scaling in pipelines.

Na^{+} & K^{+}: Sodium and potassium ions play an important role in our bodies. These ions generate Na-K pump in our bodies' cells and regulate water balance in our body. Sodium range for all water samples are 107mg/L. to186mg/L. and potassium range in water samples are varies 91mg/L. to 170mg/L.

Total Alkalinity: All 42 water samples varies from 190mg/L. to 390mg/L. and the desirable limit for TH is 200mg/L. to 600mg/L.as per Bureau of Indian Standard(IS 10500 -2012). All values vary in permissible limit.

Iron and Manganese: The maximum permissible limit of iron in water as per BSI is 0.3mg/L. and permissible limit of manganese in potable water is 0.1 mg/L.to 0.3 mg/L. as per BSI. Both ions were not calculated in all water samples.

Phosphorus: phosphorus was not detected in all water samples.

CONCLUSION

The study of all parameters shows that Phosphorus, Iron and Manganese were not found. Only three parameters as like Fluoride, Potassium & Sodium are making ground water unfit for human beings.

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