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ANALYSIS OF GROUND WATER OF DATAULI INDUTRIAL AREA OF GONDA (U.P)

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ABSTRACT

Ground water samples from handpumps of Datauli industrial area of Gonda (U.P.) were analyzed for evaluation of physico-chemical parameters. The result revealed that the values of many parameters are beyond their permissible limits and point out the need for proper treatment for disposal of effluents in that area.

Key Words: Ground water, physico-chemical analysis, Datauli.

1. Introduction

The present investigation is the first step in evaluating the size and extent of the groundwater quality problem in the Datuli Industrial Area. High values of physico-chemical parameters at some of the sampling locations could be due to unscientific disposal of urban solid waste and landfills. Where leachate seeps through solid wastes and contaminates groundwater and the depth of the water resource and the nature of the geological material with which the groundwater comes into contact can affect water quality. From this research study it has been found that the ground water of some areas of the study area is not suitable for drinking purpose.

2. Materials and Methods

In June 2012, samples of groundwater were taken. We used high-quality plastic bottles with a one-liter capacity that were thoroughly cleaned and washed before being filled. The water samples were analyzed using the standard method procedure of APHA (1995). A complete picture of the physico-chemical characteristics of ground water in the study area is provided by Table-1, which summarises the results of the current investigation and Table-2 of BIS (1998) drinking water standards.

Using a water analysis kit, the parameters pH, EC, and TDS were measured while collecting samples in the field. Using a nephelometer, the turbidity of the water samples was determined. Using the titrimetric method, measure total hardness, calcium, magnesium, and alkalinity. Sulphate and phosphate were estimated using the spectrophotometric method, while chloride was estimated using the urgent metric method (APHA, 1995).

3. Results and Discussion:

Total water samples were taken from different areas of Datuli i.e. two sampleswere taken from residential area (S1, S2), two samples were taken from marker area (S3, S4), two samples were taken from agricultural areas (S5, S6) and up to the solid waste dumping site (S7, S8).

At all of the sampling locations, the pH values of the study area, which ranged from 6.7 to 7.5, were found to be within the permitted limits for drinking water standards. The electrical conductivity values of the samples were found to be 463 to 1921 umhos/.com. This shows that all the samples fall within the permissible range (750-2000umhos/.com). The TDS values of the samples were found to be in the range of 292 to 1266 mg/I and were well within the desirable limit of 1000mg/I except for sample no. S8. This station represents a solid waste dumping area. Seepage from solid waste disposal sites may affect the water quality of the groundwater table during the seepage process. (Foster and Hirta, 1987) Olania and Saxena (1977) also reported that groundwater pollution caused by wastewater around dumping sites can be detected through increased TDS of water.

In this study, the turbidity values range from 1.55 to 38.5 NTU. Except for samples S7 and S8, which were found to be highly polluted and indicate seepage of suspended colloidal particulate matter into groundwater as a result of improper waste dumping at that site, all of the samples in this case were within the permitted limits.

The hardness values are generally found as 292-875mg/1, only 4 samples (S1, S2, S3, S4) were found within the extreme range. The calcium values, which ranged from 29.5 to 140.5 mg/l, showed that the water quality standards for drinking water were being met. The water quality results for magnesium ranged between 34.4-172.3mg/I, the prescribed drinking water standard for magnesium is 50-150mg/I. However, sample numbers S3, S5, and S7 were found to be within the permissible limits and sample numbers S1 and S6 exceeded their extreme limits.

Table-1: Physico-chemical characteristics of Ground water quality of Datauli Industrial area of Gonda.

S. No.	Variables	Samples							
		S_1	S_2	S_3	S_4	S_5	S_6	S_7	S_8
1.	pH	6.8	7.0	7.2	7.0	7.2	7.0	7.0	7.4
2.	BC	1240	830	462	480	1300	1583	1168	1921
3.	TDS	762	520	292	720	790	960	760	1265
4.	Turbidity	3.84	1.8	1.55	3.96	2.26	4.21	10.25	38.5
5.	Total Hardness	510	452	292	572	748	790	640	875
6.	Ca^{2+}	68.9	50.4	55.1	29.5	58.4	140.5	88.2	72.4
7.	Mg^{2+}	165.2	87.0	34.4	139.4	44.9	172.3	45.6	124.9
8.	Alkalinity	351	560	292	122	121	124	132	572
9.	Cl^-	110	82.2	115	48.6	125	160	697	262
10.	SO^{2-}_4	49	36	28	112	26	84.2	78.1	184
11.	PO_4^{3-}	0.1	0.16	0.14	0.15	0.08	0.12	0.11	0.16

- **NOTE:** All parameters except pH and electrical conductivity (umhos/cm) are expressed in mg/I (ppm).

Higher amount of total hardness and magnesium content may be due to depth of handpump boring and nature of geological material with which groundwater comes in contact may affect water quality. All the samples were found within the permissible limits and rest of the samples were found within the permissible limits.

Table-2

Comparison of ground water quality data with drinking water (BIS, 1998)

S.No.	Parameters	BIS, 1998		Observed values	
		P	E	Range	Mean
1.	pH	6.5-8.5	<6.5->8.5	6.8-7.4	7.1
2.	EC	750	2000	462-1921	1191
3.	TDS	500	1000	292-1266	777.5
4.	Turbidity	5	25	1.55-38.5	19.98
5.	TH	100	600	292-875 581	-
6.	Calcium	75	200	29.5-140.5	85.1
7.	Mg++	50	150	34.4-172.3	103.35
8.	Alkalinity	200	600	122-572346	-
9.	Choloride	200	600	48.6-697	373.35
10.	Suplhate	200	400	26-184	106
11-	Phosphate	0.25	0.40	0.1-0.22	0.16

NOTE: P=Permissible limit and E=Excessive limit. All parameters except pH and electrical conductivity (umhos/cm) are expressed in mg/I (ppm).

The chloride level in the tube was found to be 48.6 to 697 mg/l. Here all the samples are within the permissible limits except for samples S7 and S8. These two sampling stations should be put in place at landfills for solid waste and agricultural fields. Water with too much chloride has a salty taste, and those who are not used to it may experience a laxative effect (Ravi Prakash and Krishna Rao, 1989).

According to the results of the current investigation, the sulphate values were between 26 and 184 mg/I and were within the allowable ranges for drinking water standards. For an ecosystem to maintain its primary productivity, phosphorus is also crucial. Ortho-phosphate is the type of phosphorus that is being discussed here. The main sources of phosphorus in water are domestic waste, industrial waste, and agricultural runoff. Phosphorus content in natural water is very low. Its high concentration therefore signals pollution. The phosphate values in this study varied from 0.10 to 0.22 mg/I, which is well within the standards for

permissible levels in drinking water.

4. Conclusion:

This paper throws light on three major points. Firstly, to leach the suspended particles into the groundwater. Second, the value of magnesium in drinking water increases as a result of water quality. Excess of hard chloride value in ground water.

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