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"ANALYSIS OF WATER QUALITY PARAMETERS OF GROUND WATER NEAR KHARA, BIKANER"

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ABSTRACT

This study examines the quality of water samples taken from wells to determine the severity of health issues in Bikaner's industrial sector. Human activities often cause ground water's natural quality to decline. For the study, Khara Industrial Locations were chosen. pH, total alkalinity, total hardness, calcium, magnesium, carbonate and non-carbonate hardness, total acidity, free CO2, chloride, sulphate, fluoride, total dissolved solids, iron (Fe), manganese (Mn), zinc (Zn), copper (Cu), and cadmium were the variables examined (Cd) In mg/L, the ion concentrations are given..

Key words: Ground water, Analytical techniques.

INTRODUCTION

When waste products or other contaminants alter the chemical or biological makeup of the water and deteriorate its quality, ground water pollution develops, having an impact on aquatic life, plant life, and human uses of the water. Due to contamination, the water quality changes drastically over time. As a result of both natural and human activity, the quality of ground water is continuously changing. Various factors lead to water pollution. The physical, chemical, and biological characteristics of groundwater make up its quality. The list of physical water quality parameters includes temperature, turbidity, colour, taste, and odour. Water pollution refers to the contaminating of water by foreign substances such as microorganisms, chemicals, industrial or other pollutants, or sewage. Since most groundwater is colourless, odourless, and without a distinctive flavour

All ground water sources are not always safe. Physico-chemical characteristics of ground water of different parts of countries have been studied. As regards the Bikaner city, it has two major industrial areas, viz. Bichhwal and Khara, housing a large number of small scales woolen and food industries including tile, manufacturing, milk product and packaging. The Bikaner city is located at 28˚1'E latitude and 73˚19' N latitude with both the industrial areas lying on the north of the city. Under ground water is the only source of water for the industrial areas of Bichhwal and Khara. The reason is that in this area, all the above mentioned industries are passing out their waste and wastewater. The water quality of this Nalah is continuously degrading and the soils of the nearby fields are also being affected. Therefore, we have decided to analyze the water of this Nalah and find out some remedies for the improvement of the water quality of this area.

MATERIAL AND METHOD

In the current study, ground water quality was surveyed and samples of water were taken from twelve different locations in Khara. One-liter sterilized screw-capped polyethylene bottles were used to collect samples, which were then put through a physico-chemical analysis in a lab. All the samples were properly labeled as B_1, B_2, B_3, B_4, B_5, B_6, B_7, B_8, B_9, B_{10}, $B_{11}$and B_{12} and a record was prepared, which is given in Table 1.

Water sample were collected during May 2019 to December 2019 from Khara, Bikaner. The sample will be analyzed for their Physico-chemical, biological characteristics at each harvest following the methods described by APHA (1989), Golterman(1969) and Trivedy (1984).

RESULTS AND DISCUSSION

The samples collected from Khara was analyzed. The discharge from various industries may increase the pH of water, where as in monsoon, addition of rain water diluted the effect and resulted in increase pH value.

Total alkalinities of the water samples were determined by titrating with N/50 H_2SO_4 using phenolphthalein and methyl orange as indicators. The total hardness of the water samples was determined by complexometric titration with EDTA using eriochrome black-T as an indicator. Sulphate and fluoride of the water samples were estimated by UV-Visible spectrophotometer. TDS of water sample were measured using gravimetric method.

Table 1: Parameters, methods, standard values and unit employed in physico-chemical analysis of the samples

Parameters of water analysis	Methods	Standard values as guided by ICMR		Unit
		Desirable concentration	Maximum permissible concentration	
Colour	By sight	-	-	Hazen Units
Odour	Smelling	-	-	-
Temperature	Thermometric	-	-	°C
pH	pH Meter	7.0-8.5	6.5-9.2	-
Dissolved oxygen (DO)	Axide Modification	7 mg/L at 35 °C	-	mg/L
Total alkalinity	Titrimetric	200	600	mg/L
Total hardness	Titrimetric	300	600	mg/L
Cacium hardness	Titrimetric	75	200	mg/L
Magnesium hardness	Titrimetric	50	150	mg/L
Carbonate hardness	Titrimetric	300	600	mg/L
Non-carbonate hardness	Titrimetric	300	600	mg/L
Chloride	Argentometric	200	600	mg/L
Sulphate	Turbidity meter	200	400	mg/L
Nitrate	Ionometric	20	50	mg/L
Total dissolved solids	Conductivity meter	500	1500	mg/L

Table 2: Parameters for water quality characterization and standards (Domestic water supplies)

No.	1	2	3
1.	Colour,odour, taste	Colourless, odourless,tasteless	-
2.	pH	6.0-8.5	5.0-9.0
3.	Specificconductance	300 mmhocm^{-1}	-
4.	Dissolvedoxygen(DO)	4.0-6.0(ppm)	3.0
5.	Totaldissolvedsolids	500	-
6.	Suspendedsolid	5.0	-
7.	Chloride	250mg/L	600
8.	Sulphate	250	1000
9.	Cyanide	0.05	0.01
10.	Nitrate+Nitrite	<10	-
11.	Fluoride	1.5	3.0
12.	Phosphate	0.1	-
13.	Sulphide	0.1mgL^{-1}(ppb)	-
14.	Ammonia	0.5	-
15.	Boron	1.0	-
16.	Calcium	100	-
17.	Magnesium	30	-
18.	Arsenic	0.05	0.2
19.	Barium	1.0	-
20.	Cadmium	0.01	-
21.	Chromium(VI)	0.05	0.05
22.	Copper	1.0	-

Table 3(a): Analyzed data of well water samples from different locations (Khara Industrial area)

SamplesParameters	B_1	B_2	B_3	B_4	B_5	B_6
Temperature	26℃	27.5℃	28℃	24.1℃	24.3℃	26.2℃
pH	7.2	7.6	7.8	7.7	8.0	8.1
Total alkalinityas ($CaCO_3$)	282	302	308	307	88	312
Totalhardness($CaCO_3$)	332	382	312	292	122	322
Calciumhardness($CaCO_3$)	58	66	51	24	28	56
Magnesiumhardness($CaCO_3$)	276	318	264	276	98	266
Carbonatehardness($CaCO_3$)	280	300	300	290	80	310
Non-carbonatehardness ($CaCO_3$)	290	280	210	260	200	210
Total acidityas ($CaCO_3$)	44	44	22	44	66	44
FreeCO_2	514	622	631	641	42	551
Chloride	150	180	200	220	40	180
Sulphate	1.3	1.3	1.5	1.3	0.3	1.2
Fluoride	1261	1520	1530	1612	236	1460
Totaldissolved solids	0.175	0.008	0.018	ND	0.041	ND
Iron(Fe)	0.024	ND	0.003	0.000	0.002	0.001
Manganese(Mn)	0.048	0.028	0.357	ND	0.360	ND
Zinc(Zn)	0.032	ND	ND	0.010	0.008	0.005
Copper (Cu)	0.024	0.010	0.011	0.009	0.008	0.011
Cadmium(Cd)						

Table 3(b): Analysis data of well water samples from different locations (Near RNB Khara)

Samples parameters	B_7	B_8	B_9	B_{10}	B_{11}	B_{12}
Temperature	25.2° C	26.8° C	24.4° C	24.7° C	25.2°C	28° C
pH	8.4	7.6	7.9	7.7	7.4	7.7
Total alkalinity as ($CaCO_3$)	307	310	96	292	284	290
Total hardness ($CaCO_3$)	356	424	194	382	412	352
Calcium hardness ($CaCO_3$)	40	76	36	68	80	60
Magnesium hardness ($CaCO_3$)	310	344	154	212	330	290
Carbonate hardness ($CaCO_3$)	300	310	90	290	280	290
Non-carbonate hardness ($CaCO_3$)	50	120	100	90	130	60
Total acidity as ($CaCO_3$)	230	252	124	194	220	280
Free CO_2	66	66	22	44	66	66
Chloride	500	580	40	460	480	480
Sulphate	180	200	60	160	170	170
Fluoride	1.1	1.2	0.3	0.9	1.0	1.2
Total dissolved solids	1330	1470	273	1260	1260	1260
Iron (Fe)	ND	0.175	ND	0.509	ND	0.021
Manganese (Mn)	ND	0.001	0.001	ND	ND	0.005
Zinc (Zn)	ND	ND	ND	ND	ND	ND
Copper (Cu)	ND	ND	ND	ND	ND	ND
Cadmium (Cd)	0.011	0.011	0.010	0.012	0.014	0.014

CONCLUSION

The present results of water investigation show that the waters of study area are highly contaminated with total dissolved solids. Because of high concentration of TDS water loses its potability and high concentration of TDS also reduces the solubility of oxygen in water. Water of almost all study points are hard and because of this, people of khara area are facing many problems like stomach diseases, gastric troubles etc.

It is recommended that water should be used after boiling by the people of Khara because after boiling the water, temporary hardness (carbonate hardness) can be removed and concentration of total dissolved solids can also be decreased. Alum treatment is also a good option to make the water potable.

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