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GROUND WATER QUALITY ASSESSMENT OF RAJNANDGAON TOWN OF CHHATTISGARH

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A systematic study is attempted to investigate ground water quality of Rajnandgaon town of Chhattisgarh. (India), used for drinking and domestic purpose. Water sample were collected from different borewells located in Rajnandgaon (town). The sampling sites are Lakholi Nandai, Vardhaman Nagar, Choukhadiyapara, Shantinagar, Stationpara, chikhali, Kilapara Ramnagar and Shristy colony. The sample collection was done from 7.00 am to 10.00 am monthly season wise from June-15 to May 16. Physico Chemical Parameters viz temperature, pH total dissolved solids (TDS) electric conductivity (EC), dissolved oxygen Hardness were analysed. These parameters were compared with standard values which are recommended by world health organization. It was found that temperature pH, D.O. are within permissible limit but TDS, EC and hardness of all water samples except ground water of Kilapara have hardness greater than 500 ppm. Hard water causes bad effect on digestive system it can lead to renal stone more fuel and time are required when hard water is used for cooking. It depresses cleaning quality of soap hence hard water needs pretreatment before use.

KEYWORDS : Ground Water, pH Electric Total dissolved solid, Hardness conductivities.

INTRODUCTION

Safe drinking water is necessary for good health and it is also basic right to human health. Due to urbanization and industrialization ground water is also getting polluted. People are dying from poor quality of water per year than from other violence or war. Diarrhea is water born disease which is due to pathogenic bacteria of polluted water according to WHO [1]. It is necessary to asses quality of ground water used for drinking and other domestic purpose. The pH of pure water is 7.0. Its range must be 6.5 to 8.5 [2], [3]. The hardness of water is that property which prevents lathering of soap. Calcium and Magnesium ions are the principal ions causing hardness of water. Iron also contributes to hardness. Hardness depresses cleaning quality of soap. Human skin becomes dry and dark by use of hard water more fuel and time are required when hard water is used for cooking. Hardness causes bad effect on

digestive system. Kidney or bladder accumulates calcium oxalate crystals leading to formation of kidney stones.

Schroreder [4] and Morries *et. al.* [5] showed inverse correlation between cardiovascular disease and hardness of water. It has been proved that people living in hard water area tend to be protected from cardiovascular disease (C.V.D.) and those living in soft water area are more susceptible to the development of C.V.D. [6] Goldsmith and Goldsmith [7] implied the elevated level of Magnesium present in hard water may have positive effect against coronary heart disease by preventing blood clot formation. According to WHO hardness of water should be in the range. It Hardness is above 500 ppm. It must be pretreated.

Methodology

Twelve water samples were collected from twelve different wards of Rajnandgaon town viz Lakholi, Nandai, Vardhaman Nagar, Chaukhadiapara, Shantinagar, Stationpara, Chikhli, Kilapara, Baldeobagh, Shankarpur, Ramnagar and Shristi Coloney. In Precleaned sterlised Polythene bottles between 8.00 Am to 10.00 am. These samples were analysed for different parameters in accordance with standard methods os americal public health association (APHA) [8] and National Engineering institute Nagpur (NEERI) [9] A.R. grade chemicals were used for preparation of all the solutions. pH of the samples was measure with systronic pH meter type 321. Conductivity was measured by systronic conductivity bridge.

The hardness was determined by EDTA titration [10] and dissolved oxygen [DO] as measured by Winklor's method [11] and total alkalinity was found by titrometric method.

Result and dissuction

The results obtained by physiochemical analysis are given in table 1.

Temperature : The temperature of water is one parameter that influences the chemical reaction in aquatic system [12]. The minimum temperature in winter season was 22°C and in summer it was maximum 28.3°C High temperature increases the rate of evaporation of water which causes increase in total hardness of solid also increases which make the drinking water less portable. Khalaf N. and Mac. Donald observed that rise of temperature [13] decrease the concentration of dissolved oxygen.

pH of Water : The pH of water samples varies between 6.8 to 8.1 which is permissible. The ground water pHs of Nandai, Shantinagar were high 7.9 and 8.1 respectively. This indicates that water is slightly alkaline of Nandai and Shantinagar.

Electrical Conductivity : Electric conductivity varies from 601 to 1220 and 540 to 980 micro mhos per cm. in summer and winter respectively. The amount of dissolved solid determines the electric conductivity of the solution. According to WHO the standard values should not exceed 500 us/cm. The high value of EC indicate that ground water contains high concentration of ions.

Dissolved Oxygen : Quality of water sample depends upon dissolved oxygen process of decomposition of organic matter in water uses oxygen hence concentration of dissolved oxygen decreases if water is polluted. The dissolved oxygen in selected water samples was within permissible limit.

Results of Water Analysis of Ground Water of Rajnandgaon Town of Chhattisgarh (India)

Sample Site	Temperature			pH			TDS (ppm)			EC			DO			Alkalinity			Total Hardness		
	prc mansoon	mansoon	post mansoon	prc mansoon	mansoon	post mansoon	prc mansoon	mansoon	post mansoon	prc mansoon	mansoon	post mansoon	prc mansoon	mansoon	post mansoon	prc mansoon	mansoon	post mansoon	prc mansoon	mansoon	post mansoon
Lakholi	26.1°	26.0°	27.1°	7.2°	7.4°	7.1°	900	930	910	450	470	420	5.4	5.2	5.3	360	354	342	1100	1120	1210
Nandai	23.6°	25.4°	27.0°	7.1°	7.2°	7.1°	850	910	890	480	460	470	6.1	6.0	6.2	410	380	365	7160	1120	1180
Vardhaman Nagar	27.0°	26.5°	27.8°	7.4°	7.6°	7.3°	900	940	910	470	430	430	7.52	7.2	7.6	390	370	365	2250	2200	2310
Shanti Nagar	26.1°	26.0°	26.9°	8.0°	8.2°	8.2°	3200	3310	3310	470	420	410	5.6	5.2	5.4	419	400	392	1130	1140	1120
Stationpara	25.9°	25.8°	26.8°	6.9°	7.1°	7.1°	2900	2990	2960	390	350	360	5.8	5.6	6.1	370	360	355	720	708	726
Chikhali	25.4°	25.1°	26.0°	7.1°	7.2°	7.0°	710	716	720	353	350	350	5.5	5.6	5.3	402	392	380	790	780	810
Kilapara	25.6°	25.1°	26.0°	7.2°	7.3°	7.2°	400	410	490	350	340	345	5.2	5.4	5.0	310	304	300	410	400	434
Baldeo bag	26.1°	26.0°	27.8°	7.1°	7.2°	7.1°	310	300	320	410	390	400	7.0	7.2	6.8	410	380	375	720	705	730
Shankarpur	26.3°	26.3°	27.0°	7.6°	7.4°	7.3°	1800	1810	1820	430	410	430	5.6	5.8	5.4	420	400	390	810	800	830
Rammagar	26.8°	26.5°	27.1°	7.9°	7.0°	7.6°	900	920	930	440	440	450	4.3	4.5	4.1	410	400	380	900	910	930
Shristi Colony	26.5°	26.4°	27.0°	7.1°	7.2°	7.1°	600	610	620	350	340	356	7.2	7.4	7.0	400	385	370	1050	1030	1080

Total Alkalinity : In the selected water samples the total alkalinity was in the range 185 to 341 ppm which is permissible.

Total Hardness : The ground water samples under study have high hardness value greater than 500 ppm except for Kilapara it was 340 ppm. The water samples of Nandai, Shantinagar, Basantpur were found to be very hard (Hardness greater than 900 ppm). The Salty taste is predemorient in tea and coffee prepared in hard water. The continued use of Such a hard water can be lead to Kedney stone. It is advisable to pretreat the hard water before using it for drinking and domestic purpose.

Conclusion

Ground water of main areas of Rajnandgaon town is very hard. The EC conductivity of water samples was very high from permissible limit. The pH values were above neutral point (greater than 7.0). The TDS and hardness values are also very high to avoid health related problems these ground water need pretreatment before use for drinking and other domestic purposes.

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