RJC
http://www.rasayanjournal.com

RASĀYAN ***J. Chem.***
Vol.2, No.4 (2009), 969-971
ISSN: 0974-1496
CODEN: RJCABP

STUDY OF PHYSICO-CHEMICAL PARAMETERS OF GROUNDWATER QUALITY OF DUDU TOWN IN RAJASTHAN

Ranjana Agrawal*
Birla Institute of Technology, Malviya Nagar Industrial Area, Jaipur
*E-mail ranjana1904@rediffmail.com

ABSTRACT

Studies of Physico-chemical parameters of groundwater quality based on Physic-chemical paratmeres at Dudu town of Rajasthan have been taken up to evaluate its suitability for domestics' purpose. 21 ground water samples were collected from different places of Dudu town of Jaipur district. The quality analysis has been made through the pH, EC, TDS, Dissolved Oxygen, BOD, COD, Total Hardness, Sodium, Pottassium, Calcium, Magnesium, Chloride, Sulphate, Nitrate, Fluoride and Alkanity. A systematic calculation of the correlation coffecient has also been carried out between different analysed parameters. Comparative studies of samples in different seasons were conducted and it was found that Electrical Conductivity and Total Dissoved Solids (TDS) were decreased. Alkanity and Total Hardness were increased after the rainfall.

Key Words : pH, EC, TDS, Dissolved Oxygen, BOD, COD, Total Hardness, Sodium, Potassium, Calcium, Magnesium.

INTRODUCTION

Groundwater forms a major source of drinking water. The modern civilization, industrialisation, urbanisation and increase in population have lead to fast degradation of our ground water quality. As the water is the most important component of eco-system, any imbalance created either in term of amount, which is presence of imputities added to it can hard the whole eco-system[1-3]. Excess of fluoride causes dental, skeletal and non skeletal fluorosis through continued use of fluoride contaminated water, air and agriculture produce[4]. Studies in the area of Khetri Nagar were done and analysed the water from the wells[5]. It was found that fluoride contents from the wells from different sites to vary from 0.87 to 1.01ppm.

Groundwater contains various types of pollutants and several other substances are dissolved in it. Concentration of which is useful for human body but in a specific limit. The study was conducted to know the physico chemical properties of ground water and in different seasons and its impact on human life.

EXPERIMENTAL

Water Samples were collected in Polythene bottles of 2.5 litres and 2.0 litres. The samples were collected from borewells as well as from deep handpumps at different seasons. It was ensured that the concentrations of various water quality parameters do not changes in time that elapses between drawing of samples and the analysis in the laboratory. For DO,BOD and COD separate 2 litres polythene bottles were used. The bottles were thoroghly cleaned with Hydrochloric acid and then washed with tape water rendered free of acid and than washed with distilled water twice and again rinsed with the water sample to be collected and then filled up the bottle with the sample leaving only a small air gap at the top, stoppered and sealed the bottle with parrafin wax. Some samples which were turbid or containing suspended matter were filtered at the time of collection[6-7]. All the galssware, casserole and other pepettes were first cleaned with tape water thoroghly and finally with deionised distilled water. The pipettes and burette were rinsed with solution before final use.

The the chemicals and reagent were used for analysis were of analar grade. The pH meter, conductivity meter, spectrophotometer, flame photometer instruments were used to analyze these parametres. The

procedure for calculating the different parameters were conducted in the laboratory.The samples collected from Dudu town were analyzed and results presented in Table-1.

Table-1:Sample Collected from Dudu town (Total Samples – 21)

Parameter and Unit	Within Maximum Permissible Limit			Out of Maximum Permissible Limit			Range (Min. to Max.)	Unit
	Value	No. of Samples	%	Value	No. of Samples	%		
pH	<=9	21	100.0	>9	0	0.0	7.3-9	
E.C.	<=2000	8	38.1	>2000	13	61.9	564-5870	µm/cm
Total hardness	<=600	15	71.4	>600	6	28.6	80-1850	mg/l
TDS	<=1500	13	61.9	>1500	8	38.1	301-3572	mg/l
Calcium	<=200	21	100.0	>200	0	0.0	12-88	mg/l
Potassium	<=10	15	71.4	>10	6	28.6	2-80	mg/l
Sodium	<=200	9	42.9	>200	12	57.1	24-736	mg/l
Sulphate	<=400	20	95.2	>400	1	4.8	5-900	mg/l
Nitrate	<=24	13	61.9	>24	8	38.1	10-539	mg/l
Chlorine	<=1000	19	90.5	>1000	2	9.5	35-1320	mg/l
Fluoride	<=1.5	14	66.7	>1.5	7	33.3	0.5-11.3	mg/l
Magnesium	<=100	17	81.0	>100	4	19.0	10-250	mg/l
Alkanity	<=600	20	95.2	>600	1	4.8	100-952	ppm
DO	<5	7	33.33	>5	17	67.67	2.8-12.5	ppm
BOD	<10	4	20.0	>10	17	80.0	6-20	ppm
COD	<10	0	0.0	>10	21	100	28-178	ppm

Maximum permissible limit or Highest relaxable limit or Maximum relaxable limit are set by W.H.O., I.S.I., I.C.M.R., Govt. of India

RESULTS AND DISCUSSION

The value of pH was within maximum permissible limit in all the 21 samples. The Electrical conductivity was ranging from 564 to 5870 µm/cm and in 61.9% samples the E.C. was out of maximum permissible limit. The Total Hardness(TH) of samples was ranging from 80 to 1850. 28.6% samples were out of maximum permissible limit. Total Dissolved Solids(T.D.S.) value were ranging from 301 to 3572 and 381.1 % of the samples were out of maximum permissible limit. Calcium values were ranging from 12 to 88 and Sulphate values were ranging from 5 to 900. In calcium all the samples were within maximum permissible limit and sulphate content was more in 4.8% samples. Value of Potassium were ranging from 24 to 736 and 57.1% samples were out of maximum permissible limit. Fluoride contents were ranging from 0.50 to 11 and in 33.3 % samples it was more than maximum permissible limit. Nitrate value was ranging from 10 to 159 and 38.1% samples were having value more than maximum permissible limit. Alkanity was ranging from 100 to 952 and in 4.8% samples it was more than maximum permissible limit. Chlorine content was ranging from 35 to 1320 and in 9.5% samples it was more than maximum permissible limit. Magnesium was more than 100 in 4(19%) samples. Biochemical Oxygen Demand(BOD) were ranging between 6 to 20, it was within the maximum permissible limit in 33.33%

samples. Chemical Oxygen Demand (COD) were ranging from 28-178. In all samples COD was more than maximum permissible limit. Dissolved Oxygen(DO) were ranging 2.8 to 12.5 on samples were measured. Only in 20% of the samples, it was within the permissible limit. Pre-monsoon and post monsoon samples were collected from different locations. It was found that there are no major changes in chemical properties of the samples. It was due to the fact that the rainfall in the state was less by 33.6% in 2000. Ground water recharge was very less. Although in summer seasonal concentration of solids were higher than rainy season and at the same time Alkanity of the samples shown down trend from summer season to rainy season.

CONCLUSION

The study carried out in the Dudu town on ground water samples conform that the pH level of ground water was within limit. In 13 samples were having Electrical Conductivity more than Maximum Permissible Limit. It is said that these water cannot be used for drinking purpose. The value of T.D.S. were more than maximum permissible limit in 8 samples, these sample water are not suitable for drinking but samples which are having TDS more that 3000 water cannot be used even for irrigation purposes, only 1 samples were found which are having TDS more than 3000. Excess fluoride may lead to tooth decay and kidney disease. In 7 samples the fluoride was found more than maximum permissible limit and it is very high. The need for new institutional economics approach to deal with current and emerging problems has become very crucial. In most of the states, the problem of ground water depletion and quality deterioration has appeared in last few years.

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(Received: 27 October 2009 Accepted: 27 November 2009 RJC-479)