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Section D: General Section



Research Article

Nitrate contamination in ground water samples of Gangapurcity town (Sawai Madhopur District) Rajasthan

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ABSTRACT

Ground water samples analysis of Gangapurcity town were collected during April 2008 to November 2008. 30 ground water samples were collected from different places of Gangapurcity town of Sawai Madhopur district. The quality analysis has been made through the pH, EC, TDS, Total Hardness, Sodium, Pottassium, Calcium, Magnesium, Chloride, Sulphate, Nitrate, Fluoride and Alkalinity. It was found that nitrate concentration was ranging from 5 to 300 mg/l. The concentration remains same throughout the period, irrespective of rain/flood period. The permissible limit by WHO of Nitrate is 40-50 mg/L. High Nitrate concentration may cause blue baby syndrome or methemoglobinemia¹.

Keywords: pH, EC, TDS, Total Hardness, Sodium, Potassium, Calcium, Magnesium, Chloride, Sulphate, Nitrate, Fluoride, Alkanity & Ground Water.

INTRODUCTION

The modern civilization, industrialisation, urbanisation and increase in population have lead to fast degradation of our ground water quality. Water contamination is due to settlement, agriculture and industrial activities². 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-system³.

The quality of public health depends to a greater extent on the quality of ground water, which should be clean and fresh. Chemical analysis of ground water samples from Nagpur showed that fluoride and nitrate concentration increases with increase in salinity⁴. It was found that alkanity and fluoride donot exhibit any significant effect on nitrate⁵.

Groundwater contains various types of pollutants and several other substances are dissolved in it. Concentration of these pollutants which is useful for human body but in a specific limit. According to World Health Organization (WHO) permissible limit of nitrate value is 40-50 mg/L⁶. The Indian Council of Medical Research has recommended desirable limit of 20mg/L⁷ of nitrate for drinking water. High Nitrate concentration was observed in ground water 50% samples⁸⁻¹³.

MATERIALS AND METHODS

Polythene bottles of 2.5 litres and 2.0 litres were used to collect the water samples from different locations of the town. The samples were collected from borewells as well as from deep handpumps. The samples were also

collected in 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. Some samples which were turbid or containing suspended matter were filtered at the time of collection¹⁴. The samples were collected from Month April to November 2008 and analyzed (**Table-1**) according to standard methods¹⁵.

Table – 1: Ground water samples analysis of Gangapurcity town (Total Samples – 30)

Parameter and Unit	Within Maximum Permissible Limit		No. of Samples	Out of Maximum Permissible Limit	Range (Min. to Max.)	Unit
	No. of Samples	%	No. of Samples	%		
pH	30	100.0	0	0.0	7.2-8.65	
E.C.	11	36.7	19	63.3	596-4893	µm/cm
Total Hardness	28	93.3	2	6.7	50-720	mg/l
TDS	12	40.0	18	60.0	305-3172	mg/l
Calcium	30	100.0	0	0.0	18-96	mg/l
Potassium	24	80.0	6	20.0	2-40	mg/l
Sodium	9	30.0	21	70.0	32-720	mg/l
Sulphate	30	100.0	0	0.0	10-365	mg/l
Nitrate	15	50.0	15	50.0	5-300	mg/l
Chlorine	28	93.3	2	6.7	40-1400	mg/l
Fluoride	16	53.3	14	46.7	0.1-3.6	mg/l
Magnesium	16	53.3	14	46.7	12-240	mg/l
Alkalinity	21	70.0	9	30.0	150-1300	ppm

Maximum permissible limit or Highest relax able 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 30 samples. The Electrical conductivity was ranging from 596 to 4893µm/cm and in 63.3% samples the E.C. was out of maximum permissible limit. The Total Hardness (TH) of samples was ranging from 50 to 720. 6.7 % samples were out of maximum permissible limit. Total Dissolved Solids (T.D.S.) value was ranging from 305 to 3172. Calcium values were ranging from 18 to 96 and Sulphate values were ranging from 10 to 365. In calcium and sulphate both all the samples were within maximum permissible limit. Value of Potassium were ranging from 2 to 40 and 20 % samples were out of maximum permissible limit. Fluoride contents were ranging from 0.10 to 3.6 and in 46.7 % samples it was more than maximum permissible limit. Nitrate value was ranging from 5 to 300 and 50 % samples were having value more than maximum permissible limit. Alkanity was ranging from 150 to 1300 and in 30% samples it was more than maximum permissible limit. Chlorine content was ranging from 40 to 1400 and in 6.7 % samples it was more than maximum permissible limit. Magnesium was more than 100 in 14(46.7%) samples.

CONCLUSION

The ground water samples analysis conform that the pH level of ground water was within limit. In 19 samples were having Electrical Conductivity more than Maximum Permissible Limit. It is said that these water cannot be used for drinking as well as for irrigation purposes. The value of T.D.S. were more than maximum permissible limit in 18 samples, these sample water are not suitable for drinking but samples which are having TDS more that 3000water 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 14 samples the fluoride was found more than maximum permissible limit and it is very high.

Nitrate concentration was higher in 15 samples which is total of 50% samples. High Nitrate concentration may cause blue baby syndrome or methemoglobinemia. The concentration of Nitrate was ranging from 5-300 mg/L. The concentration remains same through out the period, irrespective of rain/flood period. Reverse Osmosis, ion exchange and biological denitrification method can be used to reduce nitrate concentration.

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