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Physico-Chemical Analysis of Ground Water of Jaipur City during Monsoon Period 2016

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Abstract

The purpose of present investigation is to analyse the Physico-Chemical parameters of ground water of different areas of Jaipur City during monsoon season 2016 and to compare with the standard results to make it suitable for drinking purposes. It has been noticed that pH value (7.4-8.00) is within the acceptable range¹⁴. The parameters viz. nitrate, sulphate, phosphate, chloride and fluoride usually determine the quality of ground water, are marginally high but are in acceptable range. However, it needs some degree of treatment before consumption. The alkanity and total hardness are marginally high but are within acceptable range (BIS 1991). The B.O.D. and C.O.D. are under standard limits in different parts of Jaipur city.

Key words: Jaipur City, pH, alkanity, total hardness, monsoon period.

Introduction

The sources of water for domestic and industrial purposes are the surface and ground water in the study area. In general, surface water sources are not acceptable for drinking purposes as these are often encumbered by several organic, inorganic and biological constituents as investigated by Kumar *et al.*¹. Ground water that occurs beneath the water table in the soil, constitute upto 90% of the total fresh water for drinking purposes in the study area. Ground water in the area is mainly due to accumulation of water below

the ground surface caused by rainfall and its subsequent percolation through pores. In the study of water pollution, Bhatnagar² has revealed that hardness of water is due to the presence of high dissolved minerals usually calcium and magnesium. Kulshrestha and Singh³ have reported that water pollution is due to rise in nitrate level in some parts of Jaipur City. Prajapati and Singh⁴ have systematically analysed physico-chemical characteristics of ground water of different localities of Jaipur City during Moonsoon period.

Ground water is also used for industrial water supply and irrigation all over the world. There has been an incredible increase in the demand for fresh water due to rapid growth of population and accelerated pace of industrialization⁵. According to WHO, about 80% of all the diseases in human beings are caused by water. It is, therefore becomes imperative to regularly monitor the quality of water and to devise ways and means to protect it⁶. Dash *et al.*⁷ analysed Physico-Chemical Analysis of Drinking Water of Balsore area (Odisha) by collecting water samples from different locations of Balsore area. Singh and Singh⁸ has given the survey of physico-chemical quality of drinking water of Lucknow City. Mann *et al.*⁹ have attempted to describe various causes and remedies for water pollution. Alrumman *et al.*¹⁰ have explained the main sources of water pollution and to protect sustainable use of water. Recently Woodford¹¹ has discussed water pollution – an introduction to causes, effects and solutions.

Knowing the importance of drinking water for a healthy society, we have analysed the Physico-Chemical analysis of Ground water of Jaipur City during Monsoon period 2016 by collecting water samples of different locations of Jaipur City. Some

precautionary measures are suggested to make the ground water for drinking purposes.

Material and Methods

Physico-Chemical characteristics of water samples of Monsoon period 2016 of different parts of Jaipur City were systematically analysed. Samples were collected in sterilized bottles using the standard procedures as per method of American Public Health Association (1995). Fluoride and Nitrate were determined by using orion meter (Model No. 720A) and UV-Spectrophotometer-601 (at 220 nm wavelength) respectively. Calcium, magnesium and carbonate hardness were determined by titrimetric method. pH determination was carried out by using digital pH meter of ELICO. Details of other analysis are given in Table 1.

Results and Discussion

The results obtained for different parameters for the analysis of ground water of different locations of Jaipur City during Monsoon period (July-September, 2016) are shown in Table 2. The pH value found during Monsoon period is within the acceptable range (7.4-8.0)¹⁴. The parameters that usually determine the quality of ground water are Nitrate,

Table 1 Parameters and methods employed in the chemical examination of samples

S.No.	Parameters of Water Analysis	Methods
1.	pH	pH meter
2.	Total alkalinity	Titrimetric
3.	Chloride	Titrimetric
4.	Total hardness (as CaCO ₃)	Titrimetric
5.	Calcium (as CaCO ₃)	Titrimetric
6.	Magnesium (as MgCO ₃)	Titrimetric
7.	Dissolved Oxygen	Winkler's method
8.	Nitrate	Spectrophotometric
9.	Phosphate	Spectrophotometric
10.	Sulphate	Titrimetric
11.	Fluoride	Orion ion meter
12.	Conductivity (mmhos)	Conductometer

Table 2. Characteristic of the Ground Water of different locations of Jaipur City

S. No.	Parameters	Mansarovar	Malviya Nagar	Jawahar Nagar	Shastri Nagar
1	pH	7.5	7.9	7.9	7.6
2	Total alkanity (mg/L)	168	176	168	160
3	Chloride (mg/L)	210	250	220	42
4	Total hardness (mg/L)	230	270	260	290
5	Calcium (mg/L)	110	120	110	80
6	Magnesium (mg/L)	160	150	170	170
7	Dissolved Oxygen (mg/L)	6.2	7.2	6.6	6.4
8	Nitrate (mg atomN/L)	10	30	36	35
9	Phosphate (mg atom P/L)	9	10	10	12
10	Sulphate (mg/L)	6	8	12	6
11	Fluoride (mg/L)	0.2	0.3	0.3	0.2
12	Conductivity (mmhos)	0.076	0.070	0.078	0.090
13	B.O.D. (mg/L)	1.6	1.8	1.8	1.6
14	C.O.D. (mg/L)	10.6	11.4	12.4	12.0

sulphate, phosphate, chloride and Fluoride. The value of Fluoride (0.3-0.8 mg/L), chloride (42-250 mg/L), nitrate (10-36 mg/L), sulphate (6-12 mg/L) may be due to urbanization and pollution. But these are in within the acceptable range (WHO). The low value of Fluoride (≤ 0.3) may cause substantial reduction of dental cavities particularly among children. The chloride values except Shastri Nagar (42 mg/L) is high but are in acceptable range (WHO). The B.O.D. (Biological Oxygen Demand) varies from (1.6 mg/L to 1.8 mg/L) and C.O.D. (Chemical Oxygen Demand) varies from (10.2 mg/L to 12.4 mg/L) which are in excellent permissible range (BIS 1991).

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