

QUALITY EVALUATION OF GROUND WATER OF MORADABAD DISTRICT

Ahmad Ashfaq^{1*} and Faizan Ahmed²

¹Department of Civil Engineering, A.M.U., Aligarh,

²Department of Biochemistry, A.M.U., Aligarh

*Author for Correspondence

ABSTRACT

Water quality is an important criterion for the evaluation of the suitability of water for drinking and irrigation. The ground water samples were collected from fifteen different sampling stations for comprehensive physico-chemical analysis. The following parameters have been considered viz. pH, Alkalinity, Total hardness, Total Dissolved Solids, chloride and turbidity. On comparing the results against the drinking water quality standards, it was found that most of the water quality parameters were within the permissible limits. This study helped in understanding the potential threats to the ground water resources of the city. It was concluded that most water samples are potable for drinking purposes when compared to the standards.

Keywords: Water Quality, Qualitative Monitoring

INTRODUCTION

Water is essential to all forms of life and makes up 50-97% of the weight of all plants and animals and about 70% of human body. The safe portable water is absolutely essential for healthy living (Ramesh and Soorya, 2012). In the last few decades, there has been a tremendous increase in the demand for fresh water due to rapid growth of population and the accelerated pace of industrialization. Human health is threatened by unsanitary conditions through open drain carrying and disposing wastewater into natural water bodies (Shivasharanappa *et al.*, 2012).

While most people in urban cities of developing countries have to access to piped water, several others still use borehole for domestic and irrigation (Ramesh and Soorya, 2012). The ground water is important for the existence of human society. It is a liberal part of environment. Hence it cannot be looked in isolation especially where high degree of dependence is upon ground water for drinking purpose in Moradabad (Jain and Agarwal, 2012). Groundwater is an important source of water supply throughout the world (Mariappan, 2005). For many rural and small communities, groundwater is the only source of drinking water (Shahnawaz and Singh, 2009). The quality of water is vital concern for mankind since it is directly linked with human welfare (Patil and Patil, 2010).

But, at present, the quality of ground water in many parts of the country, particularly shallow ground water, is changing as a result of human activities. So there is urgent need to identify current sources of pollution and to develop low cost water purification technologies/system which is economically viable and adoptable to the community.

The most common and wide spread threat associated with water is contamination, either directly or indirectly, by sewage, by industrial effluents, by other wastes or by human or animal excrement. If such contamination is recent, and if among the contributors, there are carriers of communicable enteric diseases, some of the living casual agents may be present.

The drinking water so contaminated or its use in the preparation of certain foods may result in further cases of infection. Studies on different physico-chemical parameters of different groundwater yielded useful data for the understanding of the nature of the water environment and it throws light on the changes which have been brought about the intense of human interference (Tewari *et al.*, 2010).

The reason for elucidation of important parameters in water quality assessment may be attributed to the fact that in the overall potability of water. The present study deals with the physico-chemical characteristics of groundwater samples of selected locations in Moradabad district.

Study Area

Moradabad is a city in Uttar Pradesh state of India. Moradabad is situated at a distance of 167 km (104 miles) from the national capital, New Delhi, at the bank of River Ram Ganga (a tributary to the great Ganges). This city is situated in western U.P. between 28°-21' to 28°-16' Latitude North and 78°- 4' to 79 Longitude East. The district of Moradabad lies east of the Ganges and west of the native state of Rampur. It lies within the great Gangetic plain and is demarcated into three subdivisions by the rivers Ramganga and Sot. The eastern tract consists of a submontane country, with an elevation slightly greater than the plain below, and is traversed by numerous streams descending from the Himalayas. The central portion consists of a level central plain descending at each end into the valleys of the Ramganga and Sot. The western section has a gentle slope towards the Ganges, with a rapid dip into the lowlands a few miles from the bank of the great river (MSME, Govt of India). The average annual rainfall is 967.3 mm. The climate is sub-humid and it is characterized by hot summer, a bracing cold season and general dryness except in the south-west monsoon season. About 86% of rainfall takes place from June to September. During monsoon surplus water is available for deep percolation to ground water.

MATERIALS AND METHODS

The samples were collected from different areas Moradabad district that are- Karula, Rehmat Nagar, Laveena Restaurant, Miglani, Bus Stand, S. S. Inter College, Hindu College, Railway Hospital, Parkar College, District Jail, Hathala Railway Colony, Railway Stadium, P. M. S. Public School, U.P Police Academy and PTC Mandir. The locations were near the residential and agricultural area. Samples were collected in polythene bottles from various water sources. To avoid any kind of contamination during sampling extra care was taken and the bottles were rinsed several times with the water being collected or filled. For analysis all the chemicals used were AR grade. Double distilled water was used for the preparation of reagent and solution.

RESULTS AND DISCUSSION

pH

pH value of ground water samples in the study area varied between 6.1 to 8.5. They were found to be well within the permissible limits of 6.5- 8.5 as per the WHO standards.

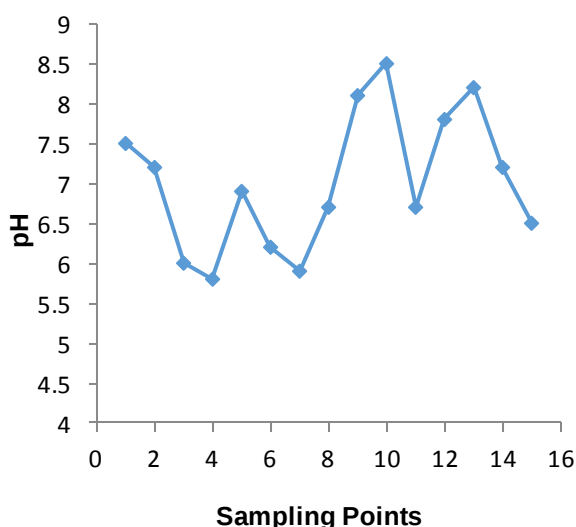


Figure 1: Variation of pH

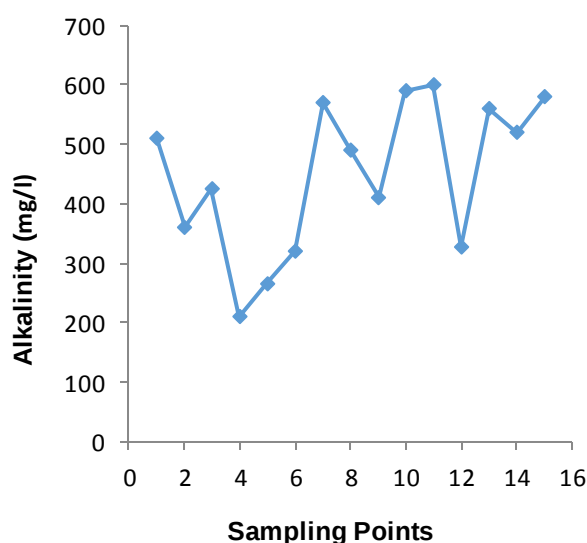


Figure 2: Variation of Alkalinity

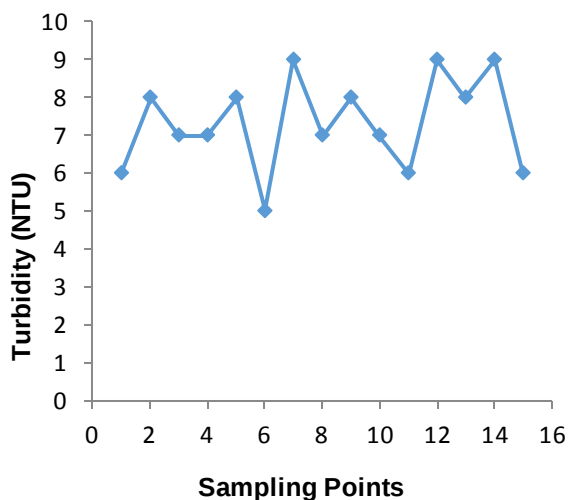


Figure 3: Variation of Turbidity

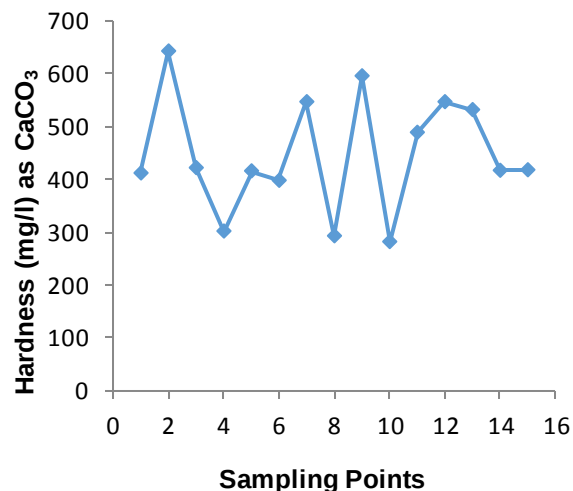


Figure 4: Variation of Hardness as CaCO₃

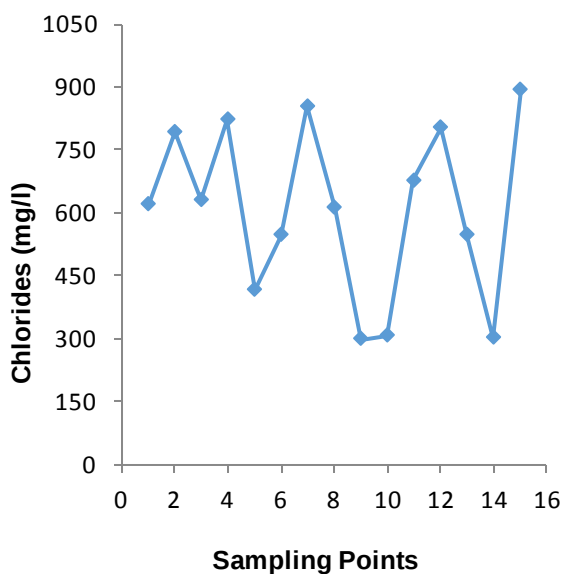


Figure 5: Variation of Chlorides

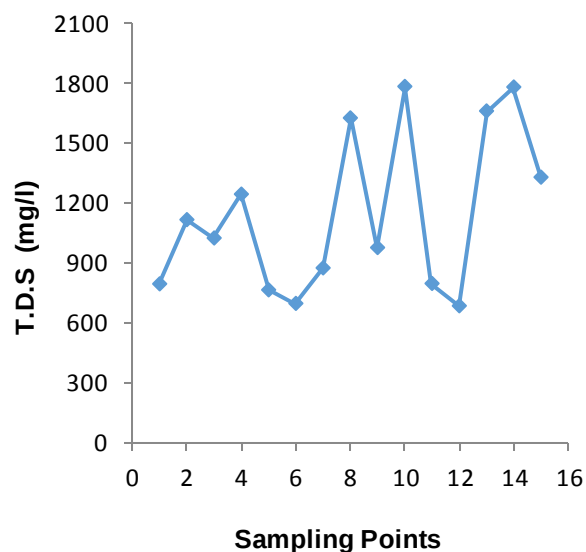


Figure 6: Variation of T.D.S

T.D.S.

The total dissolved solids (TDS) values of sampling area varied from 920- 1970 mg/L which are within the permissible limits of WHO (500- 2000 mg/L). High levels of TDS are usually found to be unsatisfactory for bathing and washing (Kumar and Kumar, 2013).

Total Hardness

The hardness of water is produced by the bicarbonates, sulphates and chlorides of the Ca²⁺ and Mg²⁺ salts (Jain and Agarwal, 2012). The recommended value of total hardness is 300- 600 mg/L. The graphs showed that the range of TH was between 320 to 546 mg/L.

Turbidity

The turbidity in the present area of study was found to be between 5- 9 NTU. It was well within the prescribed standards of 5- 10 NTU.

Total Alkalinity

Alkalinity value in water indicates the presence of natural salts in water. The alkalinity is mainly due to the bicarbonates. In the present study the alkalinity ranged from 210– 600 mg/L. The alkalinity values are under the reasonable limit of 200- 600 mg/L as per WHO standards (1993).

Chlorides

The graph shows that the range of Cl⁻ concentration is 280 mg/L to 950 mg/L. The water samples have concentration of Cl⁻ higher than 250 mg/L but it is not more than 1000 mg/L as per the standards.

Conclusion

The following conclusions were drawn after the careful analysis of the numerical data for the Moradabad city. The water analysis from almost all the sampling locations reveals that the water is potable and fit for drinking purposes.

Water is not found to contain excessive hardness in almost all the sampling points. Since there was no considerable increase in chlorides, it indicated that there was no percolation of polluted surface water. Also the pH, turbidity, alkalinity and total dissolved solids were found to be lying within the standard permissible limits.

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