A Study on Physiochemical Analysis of Ground Water Quality of Firozabad District and its Adjoining Villages (U.P.)

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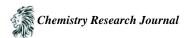*E-mail: drgayatri.chem@gmail.com

Abstract

Ground water is one of the most valuable and indispensable natural resource and is essential for the well-being of all human being. With the increase of population and its necessities, consumption and contamination of water is increasing day by day. This contamination is a big problem for human health. In the present paper, we have collected groundwater samples from different areas of Firozabad district and its adjoining villages (U.P.) and analyzed for various physio-chemical parameters such as pH, TDS, alkalinity, turbidity, total hardness and chloride. This study was restricted to assess the suitability of the ground water for domestic and drinking purpose of people of these areas.

Keywords: physiochemical analysis, water quality, drinking water etc.

1. Introduction

Water is one of the most valuable and indispensable natural resource of our environment and its contamination is the reason of major public health and environmental threats almost all around the world[1]. As we know, water is essential for our whole body mechanism and we cannot survive without it, hence, its quality should be maintained. Tragically, our modern life style, industrialization, soil erosions, unscientific management, urbanization and increased population are polluting our drinkable water day by day[2]. Ground water is the major source of drinking water both in urban and rural areas and its depletion is not the result of natural factors but actually it has been caused by the human activities. Prolonged discharge of industrial waste, domestic wastes and solid dump making the groundwater polluted[3]. From the survey of WHO organization, it was cleared that, 80% diseases in human beings are caused by water[4]. Hence, quality of water is as important as its quantity and it can be maintained by regularly monitoring the quality of groundwater. In India, there are several states, where more than 90% of populations are depending on ground water for their drinking needs and other purposes[5-6]. During the last decades, it had been observed that fresh quality of ground water is depleting very rapidly while its contamination is increasing drastically.

Firozabad city is the class one city of Uttar Pradesh and is known for their glass bangles work. It is also known as "Suhag nagri" as in this city bangles of unique varieties are manufactured. The quality of ground water of this city and its adjoining villages is the area of interest due to the uncontrolled disposal of industrial waste coming from bangle industries. The present work is an attempt to measure the water quality of various groundwater sources of Firozabad city and its adjoining villages, Uttar Pradesh, India.

2. Purpose of the Study

The specific purpose of this study is the assessment of physio-chemical analysis of different samples of ground water collected from different areas of Firozabad district and its adjoining villages.

3. Materials and Methods

The samples were collected from different nine areas such as Vijay Nagar, Mahavir Nagar, Jain Nagar, Arya Nagar, Durga Nagar, Hanuman Ganj, Mirza Nagla, Nagla Bari and Nagla Karan Singh in plastic bottles of two litre without any air bubbles as per standard procedure. The samples were kept in refrigerator maintained at 4^0C. Analysis was carried out for various water quality parameters such as pH, total dissolved solids (TDS), alkalinity, turbidity, total hardness and chloride, using standard method.

4. Results and Discussion

The average results of the physio-chemical parameters of our water samples is represented in Table:1. In our studies, total hardness of samples were measured in laboratory by using EDTA titrimetric method using EBT (Eriochrom Black T) indicator respectively. Total alkalinity was determined by visual titration method using methyl orange and phenolphthalein as indicator. The pH and TDS of water samples were determined on the spot using pH-meter and TDS meter. The reagents used for this analysis were AR grade.

pH

pH is considered as an important ecological factor and provides very important information about many types of geochemical equilibrium or solubility calculation[7]. The pH value in our water samples ranges between 5.8 – 9.0 against the standard of WHO and IS10400:1991 that are 6.5-8.5.

TDS

Total dissolved solids is basically related to conductivity. Water having more than 500mg/l of TDS is not considered good for drinking water supplies, though water which is highly mineralized may be used where better quality water is not available[8]. The TDS above the permissible limit causes gastro intestinal irritation[9]. In our water samples, the range of TDS observed from 150 to 450mg/l.

Total Hardness

Hardness is a very important parameter of measuring the capacity of water to precipitate soap. Basically, hardness is not harmful to our health but it has been observed to play some role in heart diseases. In our water samples, the total hardness were found to be within the permissible range of 300-500 mg/l for drinking water.

Chlorides

In our present studies, the level of chloride has been found to be 90.5 – 268 mg/l. One of the best method to know the quality of water is chloride, which enters in water by anthropogenic source like fertilizers, sewage, human and animal waste[10]. Water containing high percentage of chloride content caused bad maintenance of environment around the sources.

Alkalinity

Alkalinity level which is desirable for domestic use is less than 100 mg/l. However, beyond this range, it imparts bitter taste to water. In other words, alkalinity gives an idea of natural salts present in water. Its level varies in accordance with the fluctuation in pollution level. In our water samples, the range of alkalinity was found to be in the range of 178.50 mg/l to 215.7 mg/l.

Table: 1

S. No.	Parameters	Desirable Limit mg/l	S1 Vijay Nagar	S2 Maharvir Nagar	S3 Jain Nagar	S4 Arya Nagar	S5 Durga Nagar	S6 Hanuman Ganj	S7 Mirja Nagar	S8 Nagla bari	S9 Nagla Karan
1.	pH	6.5-8.5	6.5	6.8	8.2	8.0	9.0	7.6	9.0	8,1	6.8
2.	TDS	500	270	150	412	369	425	310	450	410	180
3.	TH	300	200	170	140	280	450	350	389	380	287
4.	Alkalinity	120	193.8	178.5	161.8	215.7	205.5	168	210	198	211
5.	chloride	250	100.5	96.7	90.5	201.5	207	150.6	268	190	110

5. Conclusion

The data revealed from the various water samples collected from various sites indicated that the ground water of these areas studied in Firozabad District and its adjoining villages is not good to use for drinking purposes. It is very unhygienic and unfit to use. From the above researched data, it is suggested that the water of these areas should be monitored regularly and people of these areas should drink only treated water for their being to be healthy.

Acknowledgement

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