International Journal of Chemistry Studies
www.chemistryjournal.in
ISSN: 2581-348X
Received: 19-05-2022, Accepted: 03-06-2022, Published: 20-06-2022
Volume 6, Issue 1, 2022, Page No. 80-82

Physicochemical study of ground water quality of different regions of Aurangabad District

Momin Nishat Parveen[1*], Shalini Dengle[2]
[1] Associate Professor, Department of Chemistry, Sir Sayyed College of Arts, Commerce and Science, Aurangabad, Maharashtra, India
[2] Assistant Professor, Department Chemistry, Vivekanand Arts, S.D Commerce and Science College, Aurangabad, Maharashtra, India

Abstract
Water samples of four different bore wells from Khuldabad, Paithan, Waluj area, were collected, and its physicochemical and microbiological investigations of the collected water samples were carried out, to check the potability of water, as a number of families consume this water due to shortage of water received from municipal water supply. We carried out this analysis in the rainy season as there were too many out breaks of intestinal diseases during these days. A large count of coliforms was obtained indicting faecal contamination and also the physicochemical, analysis showed high concentration of metal carbonates and total dissolved solids (TDS) values. The results implicate that water is not fit for drinking purpose as compared with standard values as prescribe by WHO but certain positive aspects like high Ca content can be considered for health purpose.

Keywords: potability, contamination, physicochemical analysis, metal carbonates, TDS

Introduction
Surface water is the main resource for drinking and domestic purposes, its scarcity because of industrial development and population growth; it makes people by forcing to use groundwater for the portable and domestic uses in different regions of Aurangabad district. Therefore the establishment of numbers illegal wells and the lack of means to protect groundwater wells from different pollutants lead to reduce of groundwater storage and its pollution by pollutants and contaminations which is coming from various sources like industrial effluent and sewage water of household before use groundwater we have to assess its quality to decide that the water suitable for drinking and domestic purpose, so we have been Selected randomly samples from different regions of Aurangabad to study physicochemical parameters and comparing the obtained values with the standard value on the basis of WHO, and ICMR guidelines. Potable water is the water of sufficiently high quality that can be consumed or used at low risk and it has to comply with certain physical, chemical and microbiological standards designed to ensure that water is palatable and safe for drinking purpose (Tebut 1983). Most of the people have to use ground water for domestic purpose. There are a variety of trace elements present in all potable water. However, excess of such minerals leads to degradation of the quality of water. It makes the water unpalatable. A number of metals like As, Bi, Cd, Mg, Pb have no apparent chemical function and are very toxic (Jarup et.al. 2003) [2]. On the other hand, the underground water suppliers are usually considered safe provided they are properly constructed and operated. The water we collected from tube wells is that which is used by many of the residents from the different regions of Aurangabad district that is Khuldabad, Paithan, and waluj area of Aurangabad. Domestic pollution often involves seepage from broken septic tank, damaged pipeline infiltrating into the borewell, runoff water from rains often carrying fertilizers, pesticides, herbicides and faecal matter (parsek m&p singh 2003) [3]. The WHO recommends that boreholes should be located at least 30m away from latrines and 17m from septic tanks (WHO, guidelines 1984). A number of microbes contaminate water presence of faecal coliforms or E.Coli indicates the presence of water borne pathogens (Grass et.al. 2002) [6] About 80% of diseases in developing countries occur due to contamination of water by inadequate sanitation and poor hygiene (WHO, 1985). The central ground water board (Govt. of India) is monitoring the ground water quality of Aurangabad district through its established monitoring wells to assess the ground water quality (CGWB 2010). In this study we selected the ground water from tube wells in these regions where a large number of people depend upon this water due to shortage of municipal water supply. So as to check its potability.

Materials and Methods
Collections of water samples
Water samples were collected from tube wells which were most used for consumption and house hold purpose. The samples were collected in triplicates and in sterilized bottles pH and temperature of water was immediately noted down and then transferred to laboratory for bio-chemical investigations.

Sample Analysis

Analysis of the water sample was carried out using standard methods and protocols. pH was checked using pH meter (Elico L1 120). Temperature was noted by using standardized mercury thermometer.coductivity was determined using conductometer (Equiptronics), also different tests were carried out to observe presence of metal ions such as chloride, nitrates, carbonates, Bicarbonates, carbonates. Qualitative and quantitative analysis of water samples were carried out qualitative analysis was carried out following the standard method viz. Presumptive, confirmed and completed test using bacteriological media whereas quantitative analysis was carried out by performing most probable number of coliforms (MPN) test referring Mac. Cardy's table.

Results and Discussion

The potability of ground water for drinking purpose is determined keeping in view the effectsof various chemical constituents in water on the biological system of human being. Water quality is being assessd based on the desirable and permissible limits as given for the parameters for TDS, Ca, Mg, SO4, NO3. The samples collected from tube wells were analyzed for the selected physicochemical and microbiological parameters.

Table 1: Physico chemical Analysis of water

S. No.	Parameters	Desirable limits	Sample(A) Paithan	Sample(B) Waluj	Sample(C) Khuldabad
		1510500, 1991			
1.	Temperature C^0		26.2	24.9	27.1
2.	PH	6.5-8.5	6.81	6.96	7.5
3.	Turbidity (NTU)	5 NTU	3.24	2.56	3.01
4.	Conductivity: milli mhos	-	21.2	16.6	22.0
5.	Total Suspended Solids mg/L	-	3	2	2
6.	Chlorides mg/L	250 Max.	171	123	181
7.	Alkalinity mg/L	200 Max.	477	297	541
8.	Total Hardness (caco3) mg/L	300 Max.	481	343	611
9.	Nitrates	45 Max.	2.85	11.43	11.12
10.	Carbonates mg/L	-	0	0	0
11.	Bicarbonates mg/L	-	476	296	540
12.	Calcium mg/L	75		90	116
13.	Magniciom mg/L	30 Max.	56	42	
14.	Flourides mg/L	1 Max.	0.27	0.31	0.40

pH: from the above table chemical analysis of water it has been observed that the pH of all the ground water samples in the range of 6.88 to 7.5 The maximum pH recorded is 7.5 that is from khuldabad. All the samples have been found to have pH values well within the limits which is permissible limit of WHO (2004) Ne – 6.5 to 8.5.

Turbidity: Turbidity of water sample analyzed was found to be between 0-5 NTU which is also in the permissible limits that means pH and turbidity is suitable for domestic use whereas conductivity of water samples is in the range 1.67 milli mhos to 2.3 m mhos indicating higher values then the standard limits of WHO 187.9 μs/cum to 725 μs/cum.

Alkalinity: Alkalinity of the water sample is 297-571 it shows highest value at khuldabad which is higher than the permissible limits prescribed by WHO its permissible limit is 200mg/l indicating improper chlorination of water.

Total Hardness: Total hardness of water ranges from 343-611 which also highest at khuldabad much higher than the permissible limits are again a problem for the use for domestic purposes.

On the contrary this hardness of water is not health hazard in fact it can contribute a small amount towards the total calcium and magnesium needed in human diet water sample is also tested for fluoride concentration and it is observe that it is also within the limit of international standards, it is found as 0.27 to 0.4 which is less than +one.

Bacteriological Examinations

Bacteriological analysis of water samples was carried out on the basis of the presence of indicator bacteria i.e. E-coli which indicate the faecal contamination along with health associated risk. To our concern we found positive results for coliforms and also high load of microbial contamination in water sample taken from two tube wells our result clearly implicates that water is not fit for drinking purpose.

Qualitative analysis of the samples

A loopful of sample from positive presumptive test when streaked on EMB agar showed colony with metallic sheen. The colony characteristics and biochemical tests confirms E-coli i.e. faecal contamination of water.

Table 2: Quantitative analysis using MPN Technique

S. No.	Water Sample	MPN index of coliform/100ml	Inference
		Water	
1.		08	Satisfactory
2.	A(Paithan)	09	Satisfactory
3.		13	unsatisfactory
1.	B(waluj)	03	Satisfactory
2.		03	Satisfactory
3.		10	unSatisfactory
1.	C(Khuldabad)	12	unsatisfactory
2.		14	unsatisfactory
3.		13	unsatisfactory

Results of MPN technique shoes that two water samples are having unsatisfactory values for the presence of coliforms it should be zero/100ml.

Conclusion

It has been concluded that sample shows presence of high concentrate of alkalinity in water indicating improper chlorination value is high indicating concentration presence of ions in the sample $caco_3$, Mg is also higher contributing to increase in hardness of water which can be taken as positive that means contributing to the daily requirement of calcium magnesium for the human diet.

Whereas bacteriological examination both Qualitative and quantitative analysis indicates faecal contamination which indicates that the tube well is not within the prescribed standards of WHO i.e. it should be 30m away from the selected samples are not in the limits therefore it is posting health risk but can be used after proper purification.

References

1. THY. Principles of quality control pergaman England, 1983, 235.
2. Jarup L. Hazard of heavy metal contamination Br. Med, Bull,2003:68:67-82.
3. Parsek M, P singh. bacterial biofilms and emerging to diseases pathogenesis Annu.Rev microbial,2003:57:677-701.
4. Brown SS, Y Kodama. 0Toxicology of metals, clinical and experimental research Ellis Howard Ltd. Chichester, 1986.
5. WHO guidelines for drinking water quality in Health criteria and other Supporting Information,1986:12:336.
6. Grassi et.al. "Possibilities of thermal medicine in gastro intestinal functional disorder.", Clinicatherapeutica,2002:153:195-206.
7. CGWB. report ground water information of Aurangabad district Maharashtra, 2010.
8. APHA. standard methods for examination of water (waste water) 15th Ed. American Publication Health Asso. Washington D.C, 1915.
9. Chavan BL, Zambare NS. Assessment of ground water quality from wells located near Municipal solid waste. Dumping sites of Solapur city Maharashtra International Journal of Research in see,2014:2:01-07.
10. Shinde SD, Patil KA, Sadgir PA River and Groundwater Quality Assessment using GIS. International Journal of Innovative Research in science, Engineering and Technology, 2015, 4(11). DOI: 10.15680/IJIRSET2015.0411118.
11. Shinde SD, Patil KA, Sadgir PA. GIS based Groundwater quality Mapping in Southern part of Aurangabad City, Maharshatra, India. International Journal of Advances in Engineering & Technology,9(1):129-134