Sampling of water from different locations in Chandrapur district and its analysis.

Wakulkar AP[1], Dhawas KM[2] and Lanjewar MR[3]

[1,2]Department of Chemistry, Anand Niketan College, Warora
[3]Department of Chemistry, Nagpur University, Nagpur
Email: wakulkar.ashish@gmail.com

ABSTRACT

Different water samples were collected from Chandrapur district (Bhadrawati, talodhi, manoli, bailampur, nokari, bombezari, mines). Borewell samples intended for chemical analysis were collected during normal day time. Samples of water reservoir were collected in the month of November-December and analyzed for Physico-Chemical parameters like Ph, TDS, Total hardness, surface tension, density, viscosity, refractive index etc. By observing the results, it can be concluded that the water quality is above the pollution level for ground water.

Keywords: Water reservoir, Physico-Chemical, ground water, TDS.

INTRODUCTION

India is facing a serious problem of natural resource scarcity, especially that of water in view of population growth and economic development. Most of the fresh water bodies all over the world are getting polluted, thus decreasing the potability of water. For all practical purposes, pure water is considered to be the one which has low dissolved or suspended solids and obnoxious gases as well low in biological life. Such high-quality water may be used only for drinking purposes while for other uses like agriculture and industry, the quality of water can be quite flexible. Water is often called the universal solvent. [1]

Water is an important part of our environment all living things depends on water in one way or the other but there are instances that civilization have disappeared due to shortage of water or due to water-borne diseases today water has become essential commodity for the development of industries and agriculture. The quality of water is now the concern of scientists in all countries of world the resent decision of WHO emphasizes that water given to people should meet high requirements of modern hygiene and it must be free from toxic substances and pathogenic organisms. All precautions to be taken to check the addition of toxic substances into water bodies because there are no "National waters in the ocean or in another wards nation cannot divide waters running above it". Water is most important in shaping the land and regulating the climate. Once the groundwater is contaminated, its quality cannot be restored back easily and to device ways and means to protect it. The more common soluble constituents include calcium, sodium, bicarbonate and sulphate ions. Another common constituent is chloride ion derived from intruded sea water, connate water, and evaporation concentrating salts, and sewage wastes for example. Nitrate can be a natural constituent but high concentrations often suggest a source of pollution [2]. As of now, only earth has about 70 % of water. But due to increased human population, industrialization, the use of fertilizers in the agriculture and man-made activity, it is highly polluted with different harmful contaminants. It is difficult to understand the biological phenomenon fully because the chemistry of water revels much about the metabolism of the ecosystem and explain the general hydro-biological relationship. In many parts of the country available water is rendered non-potable because of the presence of heavy metal in excess. [3]

Many congenital diseases such as goiter and cancer have been associated with presence of high concentration of a chemical or its inadequate supply in water. Infants have been considered as a potential high risk group to the toxic effects of sodium from drinking water (smith, 1974). Currently, about 20% of the world's population lacks access to safe drinking water, and more than 5 million people die annually from illness associated with safe drinking water or inadequate sanitation[4]. Water plays an essential role in human life. Although statistics, the WHO reports that approximately 36% urban 65% of rural Indian were without access to safe drinking water . Fresh water is one of the most important resources crucial for the survival of all the living beings. It is even more important for the human being as they depend upon it for food production, industrial and waste disposal as well as cultural requirement. Human and ecological use of ground water depends upon ambient water quality. Human alteration of the landscape has an extensive influence on watershed hydrology[5]. Ground water plugs a vital role in human life. The consequences of urbanization and industrialization leads to spoil the water for agricultural purposes ground water is explored in rural especially in those areas where other sources of water like dam and river or a canal is not considerable. During last decade, this is observed that ground water got polluted drastically because of increased human activities. Consequently, number of cases of water borne diseases has been seen which causes health hazards. The quality of water is of vital concern for the mankind since it is directly linked with human welfare[6].

The most prominent factors that, elevates the level of water pollution are exploding population, increasing industrialization and urbanization. Various treatment methods are adopted to raise the quality of drinking water as the safe & potable drinking water is needed. Water should be free from the various contaminations viz. Organic and Inorganic pollutants, Heavy metals, Pesticides etc. as well as all its parameter like pH, Electrical Conductivity, Calcium, Magnesium, Total Hardness, Carbonate, Bicarbonate, Chloride, Total Dissolved Solid, Alkalinity, Sodium Potassium, Nitrate, DO should be within a permissible limit.[7] Different water samples were collected from Chandrapur district (Bhadrawati, talodhi, manoli, bailampur, nokari, bombezari, mines) from borewell. Sample intended for chemical analysis were collected during normal operating hours.

METHODOLOGY

Chemistry laboratory inside the college department was indentified for this work. Sterilized & disinfected

sample bottle were used for sampling purpose. Analysis of various parameters was carried out in the laboratory as per referred literature. Water quality parameters of collected water sample were compared with standard values of water parameter. Analysis of water sample will be done to investigate its utility in various sectors.

Following different physico-chemical parameter were tested for monitoring quality of water.
1. Temperature
2. pH
3. Electrical conductivity
4. Total hardness
5. TDS (Total dissolved solid)
6. Surface tension
7. Viscosity
8. Density
9. Refractive index.

Water samples were collected in sterile bottles from different sources and some preservative (citric acid) was added into it for maintaining the water quality of that environment for the further analysis till the experiment time.

RESULTS AND DISCUSSION

As water is very essential component of living beings. I desperately wanted to do project on water analysis of different location in Chandrapur district where I live. And I collected water samples from Bhadrawati, Talodhi, Manoli, Bailampur, Nokari, Bambezari, Mines, towns respectively from bore wells

I have studied various physico-chemical parameters which I could perform in our college laboratory. Different parameters, studied were density, pH, electric conductance, surface tension, viscosity, refractive index, total hardness permanent hardness and temporary hardness. It was found that the parameter shows slightly different values for each parameter which are as follow;

1.DENSITY:
The density values for Talodhi is (1.0005) and Bambezari is 1.000 are highest compared to other towns and distilled water. It means that the water from Talodhi and Bambezari is more denser than other towns. It is concluded that water from Talodhi and Bambezari contains the higher amount of dissolved salts. [8]

2. pH:
The pH value of water from Bhadrawati (6.3) was highest (approximately neutral). For other samples of water pH slightly differs and it was found that nature of water samples is acidic which can cause health problems if consumed. So, water from other places is not suitable for drinking purpose due to very high acidity. [9]

3.ELECTRIC CONDUCTANCE:
The conductance of water from Nokari (1.57 mho) Bambezari (1.55 mho) and Bhadravati (1.43 mho) are higher than other towns. It is concluded that water from these towns contains the higher amount of dissolved salts (ionized salts) compared to others. It means that if water contains more number of ions higher will be the conductance. [10]

INSTRUMENTS USED FOR PARAMETERS ANALYZED

Sr.no.	Studied Parameter	Method Used
01.	Density	Density Bottle
02.	pH	Potentiometer (Equitronic Mod.No.FQ 601)
03.	Electrical conductivity	Conductometer (304 systronic)
04.	Surface Tension	Stalagmometer
05.	Viscosity	Ostwald Viscometer
06.	Refractive Index	Abbe's Refractometer (Mod.AR-10, mvtex Ind.)
07.	Temporary Hardness	Titration
08.	Permanent Hardness	Titration
09.	Total Hardness	Titration

OBSERVATION TABLE :

Sr. No	Parameter	Bhadrawati	Talodhi	Manoli	Bailampur	Nokari	Bambezari	Mines	Distilled Water
1	Density(g/ml)	0.9993	1.0005	0.9992	0.9979	0.99990	1.0000	0.9996	0.9967
2	pH	6.3	4.1	4.6	4.4	4.8	4.5	4.6	6.9
3	Conductance(mho)	1.43	1.0	0.99	0.99	1.57	1.55	1.14	0.04
4	Surface tension(dyne/cm)	68.85	80.53	78.68	86.67	62.90	82.57	60.93	72.1
5	Viscosity(N/m^2)	1.228	1.243	1.204	1.246	1.279	1.261	1.252	1.009
6	Refractive Index	1.326	1.327	1.326	1.326	1.326	1.327	1.327	1.334
7	Temporary Hardness(ppm)	34	204	77	136	68	136	136	-
8	Permanent Hardness(ppm)	306	2856	467	884	2720	1224	1632	-
9	Total Hardness(ppm)	340	3060	544	1020	2788	1360	1768	-

4. SURFACE TENSION:

The surface tensions of water sample from Talodhi (80.53 dyne/cm) Manoli (78.68 dyne/cm) Bailampur (86.67 dyne/cm) and Bambezari (86.67 dyne/cm) are higher indicating less effectiveness in cleaning purposes. While water from Bhadravati (68.85 dyne/cm), Nokari (62.90 dyne/cm) and Mines (60.93 dyne/cm) having lower values of surface tensions indicates usefulness in cleaning purpose. [11]

5. VISCOSITY:

The viscosity of water sample of Manoli (1.204N/m^2) is lowest but water samples from all remaining towns shows negligible variation indicating less amount of impurities present in water from Manoli compared to other samples. Higher the viscosity higher will be the dissolved salts and its inter molecular forces. [12]

6. REFRACTIVE INDEX:

The refractive index values of water samples shows no significant variation compared to others but are slightly lower than value for distilled water indicating presence of dissolved impurities in water. [13]

7. TOTAL HARDNESS:

It is the main part of our analysis and it is observed that the total hardness of water sample of Talodhi (3060 ppm) and Nokari (2788 ppm) are highest. Also water samples from Bailampur (1020 ppm) Bambezari (1360 ppm) and mines (1768 ppm) are high too. It shows that the ware from these places is not good drinking as well as cleaning purposes due to very high total hardness. But water from Bhadravati (340 ppm) and Manoli (544 ppm) shows lowest value of total hardness so it can be used for drinking and other purposes too. [14,15]

CONCLUSION

From the results obtained it can be concluded that the water sample of all towns except Bhadravati and Manoli is not potable for drinking purposes. As every parameter shows highest reading for all remaining towns which are above the standard values of potable water for drinking and other domestic purposes and that of Bhadrawati and Manoli town are most potable water sample for every kind of purposes including drinking.

Conflicts of interest: The authors stated that no conflicts of interest.

REFERENCES

1. APHA. Standard Methods for Examination of Water and Wastewater, 20th Edition, American Association, Washington D. C.1985.Public Health .

2. O.A.Ojo,S.B.Bakare and A.O.Babatunde; microbial and chemical analysis of potable water in public-water supply within lagos university, ojo; Department of microbiology,lagos university, Badagry 2.Expressway,P.M.B.1087APAPA,Lagos-Nigeria.

3. Neerja Kalra,Rajesh Kumar,S.S.Yadav and R.T.Singh;Physico-chemical analysis of ground water taken from five blocks (Udwantnagar,Tarari,Charpokhar,Piro,Sahar)of southern Bhojpur (Bihar);Journal of Chemical and pharmaceutical Research,2012,4(3):1827-1832

4. Biswajeet Pradhan and Pirasteh; Hydro –Chemical Analysis Of The Ground Water Of The Basaltic Catchmemts:Upper Bhatsai Region,Maharashtra; The Open Hydrology Journal,2011,5,51-57.

5. Shweta Chauhan,and K.C.Gupta,Jyoti Singh: Purification of drinking water with the Application of Natural Extracts,Journal of Global Biosciences ,ISSN 2320-1355,Volume 4,special issue 1,2015,pp.1861-1866

6. Soni Chaubey and Mohan Kumar Patil: correlation study and regression analysis of water quality assessment of Nagpur city,India, International Journal of Scientific and research publication, Volume 5,Issue 11,November 2015. .

7. B.Kotaiah,N. Kumaraswamy, Environmental Engg.Lab.Manual,5th Edition , Charotar Publishing House , India ,1994.

8. Ahluwalia A.A. 1994 : Limnological Study of wetland under Sardar Sarovar command area . ph.D. Thesis . Gujarat University , Ahmedabad

9. Hydrology Project ; Government of India and Government of the Netherlands; Standard Analytical Procedures for water analysis may 1999. .

10. Raymond Chang Williams college: Physical chemistry with application to biological systems, second edition ; MACMILLAN PUBLISHING CO .,INC. Newyork ,Collier Macmillan publisher, London. Kumar and Kakrani ; Water Environment and Population publish by ; Agrobios (INDIA) . V. P. Kudesia ; Water Pollution ; Pragati Prakashan , Meerut.

11. Warner, T.B., " fluoride analysis in sea water and in other complex natural waters using an ion selective electrode". Prog. Anal. Chem. ,5,229(1973).

12. Steiner, J.,IV and Edward, S.J.," Mithoxychlor removal from potable water", Jour. Am .Water Wks. Assn.,71,284(1979).

13. Saxena,K.L.and Chakravarti,T., "Organic pesticides and their removal from aqueous system" , Ind. J. Env. Hlth., 20, 334 (1979).

14. Gupta, D. P., Sunita and J. P. Saharan, (2009), Physiochemical Analysis of Ground Water of Selected Area of Kaithal City (Haryana) India, Researcher, 1(2), pp 1-5.

15. ChavanRP, Lokhande RS, Rajput SI. Monitoring of organic pollutants in Thane creek water, Nature Environment and Pollution Technology 2005; 4(4):633- 636.