A Physico Chemical Study of Ground Water from Few Selected Areas of Secunderabad in Telangana State

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Abstract

Physicochemical analysis of ground water was carried out by collection of samples of water from Secunderabad district of Telangana state in the month of November 2016.Various parameters like pH, acidity, alkalinity, total dissolved solids ,dissolved oxygen, conductivity, chlorides, calcium, magnesium, turbidity, nitrate , total hardness of water have been investigated and compared with WHO standards of water quality. Analytical grade chemicals of high purity are used for the preparation standard reagents and solutions.

Keywords

Water sample, Physico chemical analysis, acidity, alkalinity, conductivity, chlorides ,calcium, magnesium, turbidity, nitrate, total hardness.

I. INTRODUCTION

Water is the most common liquid on our planet, vital to all life forms. It is the dispersion medium for all biochemical reactions of the living process and takes part in many of these reactions. In spite of the chemical simplicity of the water molecule, its physical properties are quite remarkable -- one might say weird! -- and have been a major research topic for many years. Many experiments give great insight into the structure and dynamics of water, but these often require the resources of a major research laboratory.

Groundwater is defined as water that is found beneath the water table under Earth's surface. Urbanization likely to impact ground water quality and quantity leading to higher uncertainty and difficulties in management of pollution. Results yielding a good indication but the scenario demands continuous surveillance

A. Experimental

Mostly in Secunderabad, the people commonly use open well water, tube-well water, pump water as well as municipal water for their daily use. The present Physico Chemical analysis reveals the water quality in few selected regions of secunderabad city, keeping the importance of water quality and to bring the awareness the attempt has been made to investigate the Physico Chemical parameters of water for this, we have collected different water samples from the wells, hand pumps and bore-well. The various parameters analysed are alkalinity, acidity, hardness of water , total dissolved solid, dissolved O_2, conductivity, turbidity, P^H, nitrates, Ca and Mg.

B. Preparation of Water samples

For Physico-Chemical analysis the various samples were collected from 15 different selected research areas in the plastic bottles of 1 litre capacity without air bubbles at room temperature as per the standard procedures. The selected samples of the different sources are given in table (1).

C. Analysis of P^H

The term P^H is used to express the concentration of Hydrogen ion. The pH of most of the H_2O samples were between 7.0 – 8.1 and were found within the prescribed limits given by WHO 6.5-8.5

D. Turbidity

It is an expression of optical property that causes light to be scattered and observed by the water sample. In most of the water samples which we have collected from different areas shows the turbidity values in between 0.1 – 0.11 NTU,which is again in the prescribed limits of WHO

E. Electrical Conductivity (EC)

Elico-based digital conductivity meter is used for the study of conductance i.e., the amount of electric charge in aqueous solution. The conductivity of our selected water samples ranged between 340 μ_s - 1540μ_s i.e., few samples are exceeding the limits of conductivity prescribed by WHO. The high conductivity values are an indication of the presence of high amount of dissolved inorganic substance in ionic forms.

F. Total dissolved solid

Total dissolved solid indicates the salinity of ground water containing more than 500 PPM. Total dissolved solid is not desirable for drinking water. The range of total hardness in our study is between 7.12 – 110 mg/lit.

G. Alkalinity

Alkalinity of water is a measure of its capacity to neutralise acids and major contributors for alkalinity water are dissolved bicarbonates, carbonates and hydroxides of Ca, Na and K. The total alkalinity values of the various collected water samples were found within the limit prescribed by WHO.

H. Acidity

The acidity of H_2o due to the presence of CO_2, salts of strong acids and bases weak bases and mineral acids. the acidity is found in between 8-36 mg/lit and were found within prescribed limits given by WHO.

I. Dissolved O_2

Dissolved oxygen is one of the most important parameter to find the quality of water. Dissolved O_2 is needed for aquatic life to maintain their biological process.Our experimental results of Dissolved O_2 ranged between 2.5302 – 4.101mg/lit i.e., under sustainable limits.

J. Chloride

Chloride is invariably present in small amount in almost all natural water and its content goes up appreciably with increasing salinity. In the present study the chloride ion is estimated using Mohr's method. For the public health the chloride upto 250 gm are not harmful. Our studies reveals that the Chloride Concentration is below 250 mg i.e., in accordance to WHO limits.

K. Magnesium

Magnesium hardness is calculated by using standard procedure that is with EDTA Titration. The values are represented in table (3) ranges between 12.8-41.07 mg/lit

L. Calcium

Calcium hardness determination was done by titrating with EDTA by using EBT as an indicator. The values of different samples are reported in table (3) which are within the limits of WHO.

M. Nitrate

The nitrate quality in the given water samples was measured, the value ranged between 0.016-0.023mg/lit.

Table (01)

| Sample No.	Sampling Location	Sources
01	James Street	Bore well
02	Musheerabad	Hand pump
03	Narayanaguda	Bore well
04	Bhoiguda	Hand pump
05	Begumpet	Bore well
06	Chilkalguda	Bore well
07	Prakashnagar	Bore well
08	Monda Market	Bore well
09	Marred Pally	Bore well
10	Gandhinagar	Bore well

Table (02) : Methods Used for estimation of Physico Chemical Parameters.

| S.No.	Parameter	Methods
01	P^H	P^H meter
02	Turbidity	Nephlometer
03	EC	Conductivity meter
04	TDS	Filtration Method
05	TH	Complexometric Method
06	Alkalinity	Indicator Method
07	Acidity	Indicator Method
08	DO	Winkler's Method
09	Cl^-	Silver Nitrate Method
10	Mg^{2+}	Complexometric Method
11	Ca^{2+}	Complexometric Method
12	No_3^-	Colorimetric Method

Table (03) : Reading Physico Chemical Parameters at different locations in Secunderabad District.

Parameters	Locations										WHO limit
	1	2	3	4	5	6	7	8	9	10	
P^H	7.0	7.2	7	7.1	7.1	7.01	7.4	8.1	7.3	7.01	6.5-8.5
Turbidity	0.1	0.1	0.1	0.13	0.12	0.11	0.432	0.5	0.21	0.11	5 NTU
EC	1240	600	1460	560	580	1540	420	770	340	1160	1000
TDS	60	10	110	13	13	11	12	7.12	12.1	13.1	500
TH	150	126	213	115	109	212	121	146	216	227	500
Alkalinity	280	250	237	222	211	259	214	253	237	281	200
Acidity	36	10	35	20	14	16	08	16	13	12	4-37
DO	2.530	2.850	2.940	3.000	2.950	3.230	3.160	2.810	3.011	4.101	05
Cl^-	35.9	40.47	41.74	42.60	41.89	35.92	41.60	37.39	43.18	34.12	250
Mg^{2+}	28.1	22.1	25.3	12.8	30.03	15.85	41.07	13.06	25.13	16.13	150
Ca^{2+}	15.6	23.01	40.13	28.1	25.03	15.06	20.13	36.42	27.08	21.13	200
No_3^-	0.021	0.021	0.023	0.018	0.023	0.0163	0.0186	0.021	0.021	0.018	50

EC = Electrical Conductivity , TDS = Total Dissolved Solid , TH = Total Hardness , DO = Dissolved Oxygen.
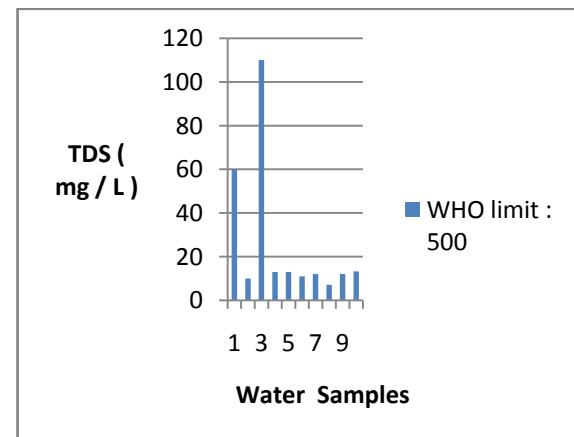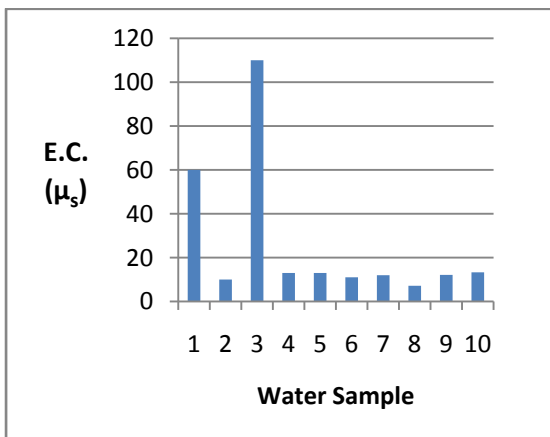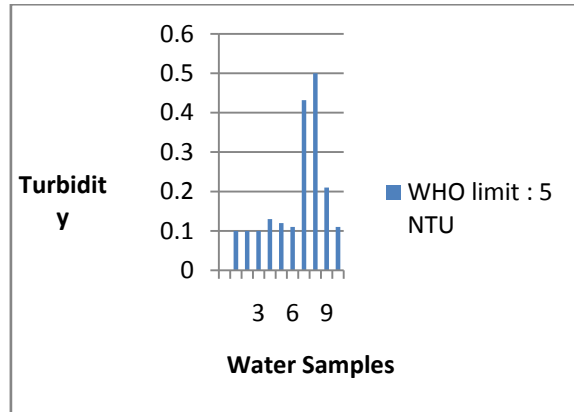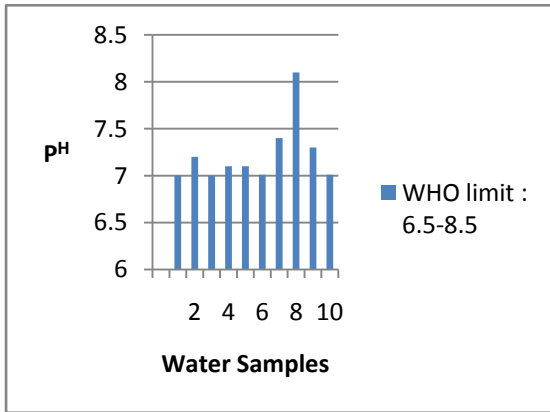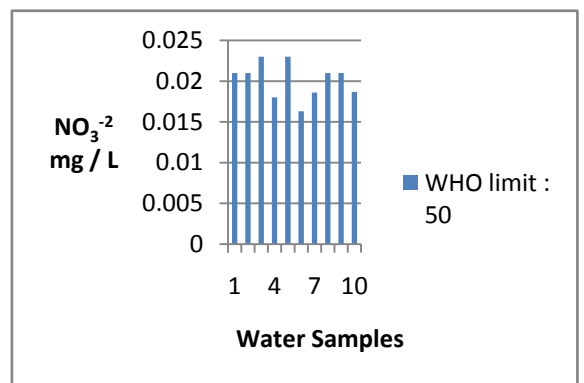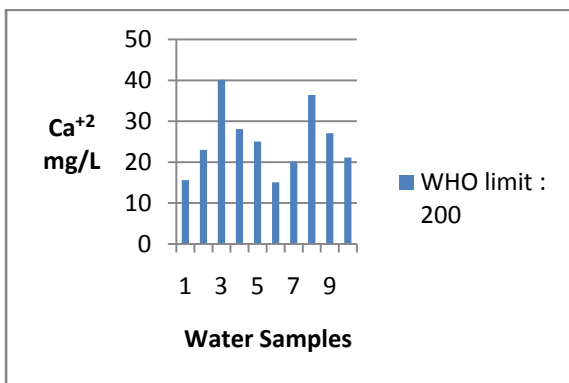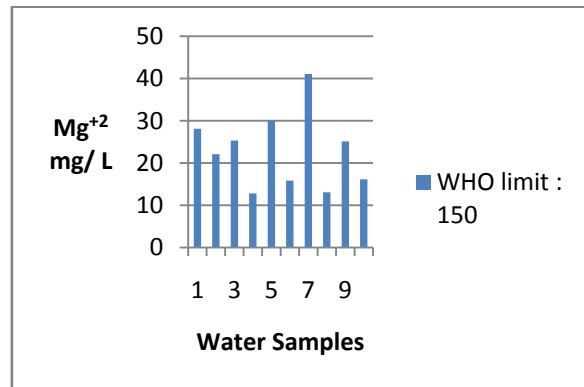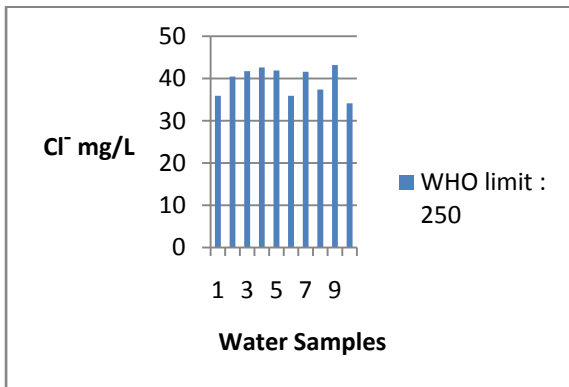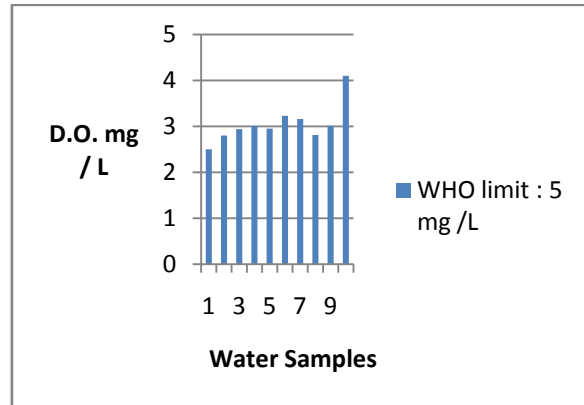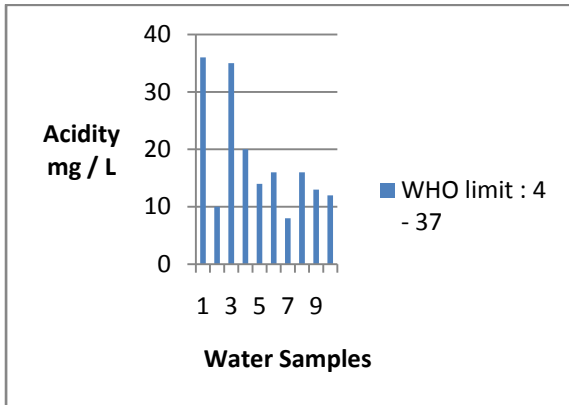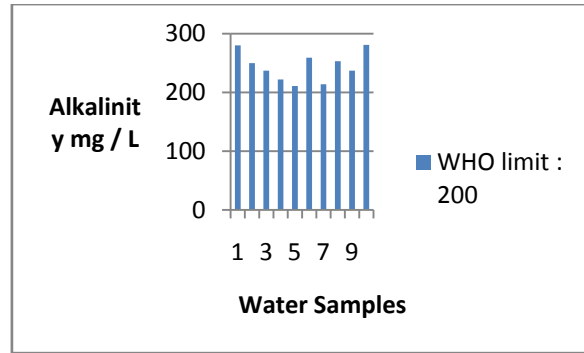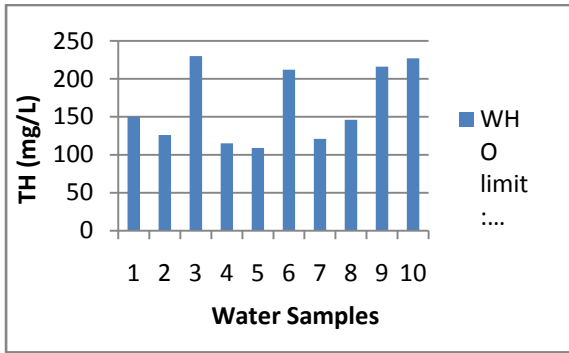
II. CONCLUSION

Physicochemical parameters of water which have deducted in the sampling location are within the WHO prescribed limits. We feel that this kind of study will bring awareness among the people about the importance of water analysis and will also help to know the different parameters present in the given water samples which affect the quality of water. All the other parameters which we have observed from this investigation are within the limits given by WHO and ISI -10500091. Apart from the water analysis we

feel that it is also necessary to decrease the pollution of water and also conservation of water by decreasing its wastage for sustainable life on earth. Every individual need attention in conservation, analysis and purity of water.

REFERENCES

[1] WHO "water health and human rights", world water day. http//www.worldwater day.org/thematic hmm rights. Html/#n4.
[2] WHO, (2003), guidelines for drinking water quality, Geneva, Report no: WHO/SDE/WSH 03.04.
[3] WHO, (2006), Guidelines for drinking water quality, Geneva, Report no: WHO/SDE/WSH 06.07.
[4] Analytical chemistry by Dr. Alka L Gupta – 2nd EDITION.
[5] Text book of quantitative analysis by Vogel-7th edition.