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Physicochemical Analysis of Ground Water from Few Selected Areas of Hyderabad, Telangana.

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Abstract:: *physicochemical analysis of ground water was carried out by collecting samples of water from Bore wells, Hand pumps from few selected areas of Hyderabad Telangana, in the month of August 2016, various parameters such as Acidity, Alkalinity, Hardness of water, Total dissolved solids, Dissolved oxygen, Turbidity, Conductivity, P^H, Chloride, Nitrates, Calcium and Magnesium have been investigated and compared with WHO standards of water quality.*

Key words*: Water samples, Physicochemical Analysis, Acidity, Alkalinity, Total Hardness of Water, Total Dissolved Solids, Dissolved Oxygen, Turbidity, Conductivity, P^H, Chloride, Nitrates, Calcium and Magnesium.*

I.   INTRODUCTION:

Water is one of the most wonderful, abundant, precious and useful natural resource which covers about 70% of the Earth's surface. It is essential to all forms of life. Water is not only for animals and plants but also occupies a unique position in the industries, in food production, in the disposal of water material and also for cultural requirements. The statistics given by WHO says that an approximately 36% of urban and 65% of rural Indians were without access to safe drinking water [1, 2, 3]. The main sources of water are rain, river and lakes (surface water), wells and springs (underground water) and also the sea water. Among the all sources of water, rain water is the purest form of water but it is very difficult to collect whereas sea water is the most impure form, so surface and underground water are normally used for domestic and industrial purpose, such water must be free from undesirable impurities .The process of removing all the undesirable impurities from water for domestic or industrial purpose we should do the water treatment before using the water, Before treating the water we should know the nature as well as the amount of total impurities. For this purpose we have collected different water samples from various selected areas of Hyderabad for the analysis of underground water.

II.   EXPERIMENT:

Mostly in Hyderabad which is the capital city of the newly formed Telangana state, the people commonly use open well water, tube well water, pump water as well as municipal water for their daily use. The present physicochemical analysis reveals the water quality in few selected regions of Hyderabad city like Imiliban, Mullah ka Chilla, Shoukat jang ki Dawadi, Zafar Road, Bada Bazar, Sabor Colony, Murtuza Nagar, kotla Alijah, Pathar ka Makaan , Malakpet, Narsingi, Gandipet, Shaheen Nagar , Madannapet , Santosnagar which are highly populated areas of old city, keeping the importance of water quality and to bring awareness the attempt has been made to investigate the physicochemical parameters of water. For this we have collected different samples from the Hand pumps and Bore wells. The various parameters like Acidity, Alkalinity, Hardness of water, Total dissolved solids, Dissolved Oxygen, Conductivity, p^H, Turbidity, Chloride, Nitrates, Calcium and Magnesium are observed.

Preparation of water samples:

For physicochemical analysis the various water samples were collected from 15 different selected research areas in the plastic bottle of 1 liter capacity without air bubbles at room temperature as per the standard procedures. The selected water samples from different sources are given in Table (1).

Table 1:

Samples number	Sampling location	sources
S_1	Imiliban	Hand pump
S_2	Mullah ka chilla	Hand pump
S_3	Shoukat jang ki dawadi	Hand pump
S_4	Zafar road	Hand pump
S_5	Bada bazar	Bore well
S_6	Saboor colony	Bore well
S_7	Murtuza nagar	Bore well
S_8	Kotla ali jaha	Bore well
S_9	Pathar ka makaan	Hand pump
S_{10}	Malakpet	Bore well
S_{11}	Narsingi	Bore well
S_{12}	Gandipet	Bore well
S_{13}	Shaheen Nagar	Bore well
S_{14}	Madanna Pet	Bore well
S_{15}	Santosh Nagar	Bore well

Physicochemical Analysis:

The study was carried out for different parameters like Acidity, Alkalinity, Hardness of water, Total dissolved solids, Dissolved oxygen, Conductivity, P^H, Turbidity, Chloride, Calcium and Magnesium. AR grade chemical of high purity were used for this analysis and double distilled water is used for the preparation of standard reagents or solutions.

III. RESULT AND DISCUSSION:

The various physicochemical parameters which were observed for the present work are reported in Table 2 and the following observations are being made and explained below.

Analysis of P^H:

The term P^H is used to express the concentration of hydrogen ion. Most of the water samples have shown slightly alkaline P^H. The P^H value of the water samples were found to be in between 6.8 to 8.2, which are very much within the prescribed limits given by WHO.

Electrical Conductivity:

Elico based digital conductivity meter is used for the study of conductance i. e the amount of an electric charge an aqueous solution can carry .The conductivity of water signifies the amount of total dissolved solids. The conductivity of our selected water samples range between 1060 micro mhos/cm to 2970 micro mhos/cm. the conductivity of few water samples i. e S_{11}, S_{12}, S_{13} and S_{15} are found to be high which shows an indication of the presence of high amount of dissolved inorganic substance in ionic forms.

Alkalinity:

Alkalinity of the water is a measure of its capacity to neutralize acid and major contributor for alkalinity of water are dissolved bicarbonates, Carbonates and hydroxide of calcium, sodium and potassium. The total alkalinity values of various water samples were found to be within the exceeding limits prescribed by the WHO.

Acidity:

The acidity of water due to the presence of CO_2, salts of strong acids, weak base and mineral acids. The acidity is found in between 125 to 275 mg/l.

Turbidity:

Turbidity is an expression of optical property that causes light to be scattered and observed by the water. In most of the samples which we have collected from different areas show the turbidity values in between 0.01 to 0.09 NTU which again exceeding the limits of WHO.

Total dissolved solids:

Total dissolved solids indicates the salinity of ground water containing more than 500 mg/l total dissolved solids is not considerable for drinking water but in some cases the water containing more than 1500 mg/l of total solids is also considerable .The range of total hardness in our study lies in between 500 to 1940 mg/l. the samples S_{11}, S_{12}, S_{13}, S_{15} showed higher total dissolved solids value than the prescribed limits given by ISI-10500-91.

Total hardness:

Hardness of water is one of the important parameter of water which does not produce lather readily with soap and increases the boiling point of water (4). Hardness of water is due to presence of bicarbonates, carbonates, chloride of calcium and magnesium. The hardness values shown ranges from 210 to 820 mg/L .The samples S_{11}, S_{15} shown higher total hardness than prescribed limits.

Dissolved oxygen:

Dissolved oxygen is one of the most important parameter to find the quality of water. Dissolved oxygen is needed for aquatic life to maintain their biological processes .The dissolved oxygen values indicates the degree of pollution in the water .The dissolved oxygen content in our selected areas are between 4.3 to 5.2 i. e under sustainable limits.

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 [4] for the public health the chloride up to 250 gm are not harm full, our studies reveals that the chloride concentration is 112.4 to 324.8 mg/L which are above the WHO limits.

Nitrates:

Nitrogen occurs naturally in ground water usually the concentration of nitrates is below a concern for drinking water safety our studies shows that the nitrates concentration are lies between 0.01 to 0.06 mg/l.

Calcium:

Calcium hardness determination was done by titrating with EDTA using EBT as indicator. The values of different water samples are reported in Table [2], which are within the limits of WHO.

Magnesium

Magnesium hardness is calculated by using standard procedure. The values of different water samples are reported in Table [2].

Table 2:

S.NO	parameters	Sampling location									
		S_1	S_2	S_3	S_4	S_5	S_6	S_7	S_8	S_9	S_{10}
1	P^H	6.8	7.2	7.1	7.4	7.2	8.3	8.1	7.9	7.7	7.8
2	Conductivity	1400	1310	1330	1260	1310	1450	1640	1240	1060	1540
3	Total Dissolved Solids	500	700	840	450	420	820	500	840	920	1020
4	Turbidity	0.04	0.09	0.01	0.02	0.08	0.03	0.02	0.06	0.09	0.07
5	Dissolved Oxygen	4.5	4.6	4.3	4.8	4.9	4.6	4.6	4.7	4.6	4.8
6	Total Acidity	200	200	250	125	225	200	295	250	250	250
7	Total Alkalinity	250	300	300	325	300	325	300	220	300	250
8	Total Hardness	215	250	205	225	260	200	260	200	210	200
9	Chloride	240.9	124.9	132.4	112.4	137.4	149.9	119.9	200.1	149.9	137.4
10	Calcium	86	100	82	40	90	80	40	92	80	80
11	Magnesium	52.24	60.75	49.81	24.3	54.67	48.6	24.3	55.89	48.6	48.9
12	Nitrates	0.10	0.01	0.03	0.02	0.05	0.01	0.02	0.04	0.02	0.05

S.NO	parameters	Sampling location					WHO	ISI-10500-91
		S_{11}	S_{12}	S_{13}	S_{14}	S_{15}		
1	P^H	7.5	6.7	7.5	8.0	7.9	7-8.5	6.5-8.5
2	Conductivity	2200	2015	2000	1120	2970	1400	-
3	Total Dissolved Solids	1920	1640	1420	1020	1940	1000	500
4	Turbidity	0.09	0.07	0.09	0.04	0.09	5.0	10
5	Dissolved Oxygen	2.1	2.6	2.9	3.0	2.6		5.0
6	Total Acidity	125	250	200	200	280	-	-
7	Total Alkalinity	250	125	250	200	125	120	200
8	Total Hardness	720	515	406	540	620	500	300
9	Chloride	155.2	124.9	274.8	299.8	162.4		250
10	Calcium	102	84	104	100	96	100	75
11	Magnesium	68.0	51.0	63.1	60.7	58.3	150	30
12	Nitrates	0.04	0.06	0.04	0.06	0.06		45

IV. CONCLUSION:

Physicochemical parameters of water which have been deducted in the sampling location are within the WHO prescribed limits. It was found that some of the samples which were collected from Narsingi , Shaheen Nagar, Santosh Nagar, Gandipet are exceeding the WHO limits for few parameters like Conductivity, Total dissolved solids, Chloride ,which makes the water not potable . We feel that this kind of analysis will bring awareness among the people about the importance of water analysis and will also help to know the different parameters present in the selected water samples which affect the quality of water. All the other parameter which we have observed for this investigation are within the limits given by WHO and ISI-10500-91.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 the sustainable life on earth. Every individual needs attention in conservation, analysis and purity of water.

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