PHYSIC-CHEMICAL ANALYSIS OF BORE WELL WATER SAMPLE OF AKHADA BALAPUR CITY, M.S. INDIA.

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Abstract : For survival of every living animal water is most important compound without water life can not be existed. Due to human activity now a day water gets polluted. The present work is taken to understand the water quality of Akhada Balapur city at different places of borewell and analyzed for P^H, electrical conductivity, total hardness, total alkalinity, temperature, dissolved oxygen, total dissolved solid.

Key Words : pollution, quality, borewell, drinking water, physico-chemical analysis.

I. INTRODUCTION

Water is one of the most important natural resource available on the earth surface. There is no imagination of life without water. Water is fundamental need of all animals and plants. Water is significant since it has unique chemical and physical properties. Water consists of two hydrogen atom and one oxygen atom. In developing countries near about 70% of diseases are caused by water because of its poor quality. Now a day human uses groundwater for domestic, industrial, irrigation and water supply all over the world. Due to rapid growth of population, urbanization, industrialization and irrigation affects the availability and quality of groundwater because of its overexploitation and improper waste disposal. To give the information about the quality of groundwater, water quality index is one of the most effective tools for conserned citizens and policy makers. Unfortunately now a day water gets contaminated by pesticides and fertilizers. Borewell water is the enormous source of drinking water used in Akhada Balapur areas. The quality of borewell water changes from place to place depending on the nature of soils, rocks and surfaces through which it moves (Seth, 2014, okoro N 2017). Pesticides and fertilizers used to crops and lawns can accumulate and migrate to the water tables and affecting the physical, chemical and microbial quality of water.

II. METHODOLOGY

Analysis of water sample :-The water quality parameters were P^H, electrical conductivity, total hardness, total alkalinity, temperature, dissolved oxygen, total dissolved solid. These parameters analyzed by using standard methods recommended by APHA (2005) and Trivedi and Goel (1984) for the examination of water. The values of these parameters were campared with Indian Standards (IS) Bureau of Indian Standards (BIS) and World Health Organization (WHO)

Collection of water samples : The present work is under taken during the year 2018-19 innovations. The water samples from five borewell stations were collected randomly in a sterile 250 ml plastic bottle of Akhada Balapur city. The physic-chemical properties of these parameters were studied as shown in the following table :

Table 1 : Water standards for ISI, BIS and WHO

Sr.No.	Parameters	IS	BIS	WHO
1	P^H	6.5-7.5	6.5-7.5	7-8
2	Electrical conductivity (μmho/cm)	---	---	1400
3	Total Hardness (ppm)	200-600	600	100
4	Total Alkalinity (ppm)	200-600	600	-
5	Temperature (^{0}C)	---	---	---
6	Dissolved oxygen (mg/lit)	--	---	---
7	Total Dissolved solid (ppm)	500-2000	2000	1000

III. RESULT AND DISCUSSION

Table 2 : Physico-chemical Analysis of Borewell water sample of Akhada Balapur city .

Sr. No.	Parameters	S1	S2	S3	S4	S5
1	P^H	6.72	6.73	7.1	6.9	6.1

2	Electrical conductivity (μ mho/cm)	1800	1850	1500	1430	1200
3	Total Hardness (ppm)	272	278	352	348	237
4	Total Alkalinity (ppm)	782	652	342	350	360
5	Temperature (^{0}C)	25	27	29	28	23
6	Dissolved oxygen (mg/lit)	4.2	6.5	7.4	7.3	6.9
7	Total dissolved solids (ppm)	1340	1200	1270	1052	1100

Where,

S_1 = New bustand station ,

S_2 = Sai nagar station

S_3 = Market area station

S_4 = Balaji Mandir station

S_5 = Devi galli station.

1) P^H

It is defined as hydrogen ion concentration of a solution. It is very important for aquatic life because most of the organisms are adopted to an optimum P^H range and will not stand with small change in P^H value. The P^H value of stations in the study range from 6.1 to 7.1 with a mean value 6.71 indicating slightly acidic in nature. According to Shrivastava and Patil (2002), the value of P^H below 6.5 causes corrosion in pipe and their by presence of toxic metals such as copper, zinc and cadmium. According to Indian standards (2012) the value of P^H for drinking water ranges from 6.5 to 8.5. The P^H values of sample collected at S_1, S_2, S_3 and S_4 are within permissible limits where as at S_5 is below the permissible limits as shown in fig.1

Fig.1 PH v/s Sample Collected
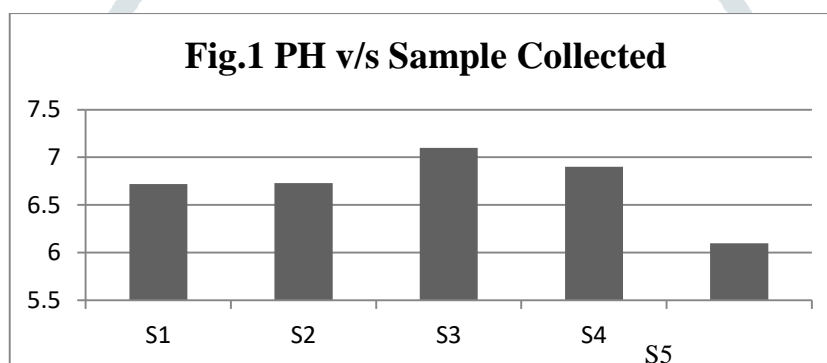
2)   Electrical Conductivity :

Electrical conductivity is defined as the ability of an aqueous solution to conduct to the electric current. According to Acharya (2008) electrical conductivity is a useful for detection of purity of water. The electric conductivity depends upon the presence of free ions, temperature, nutrient status, variations in dissolved solids and mobility of water. It is observed that borewell water generally possess high electrical conductivity due to the presence of high amount of dissolved salts. It is a measure of capacity of water to conduct electric current. The electrical conductivity of water samples collected from varions stations ranges from 120 μmho/cm to 1850 μmho/cm. the mean value of electric conductivity is 1556 μmho/cm. At station (S_2) has highest value where as at station (S_5) lowest value, shown in fig.2
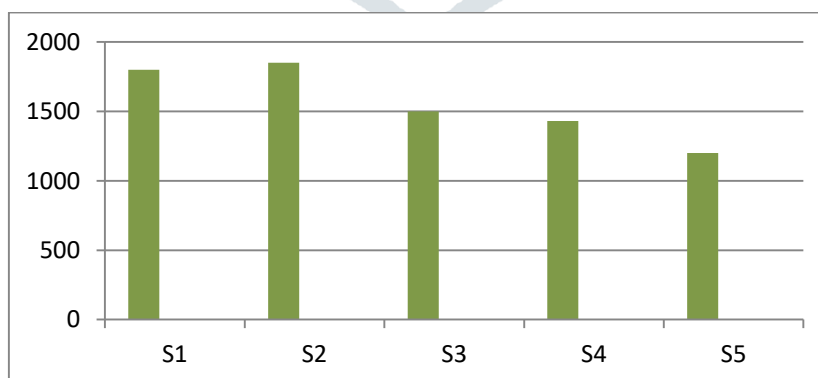

Fig. 2 Electrical Conductivity v/s Sample collected

3) Total hardness :

The presence of calcium and magnesium metals constitutes the total hardness of water. The most common salts are sulphates, carbonates and fluorides of calcium and magnesium. The hardness of water is very useful in order to prevent the corrosion in the pipes by forming a thin layer of scale thereby reducing the entry of heavy metals from the pipe to the water (shrivastava, 2002). The total hardness of sample collected at $S_1, S_2, S_3, S_4, \& S_5$ are within permissible limits as shown in fig. 3

Fig.3 Total Harness v/s sample collected.
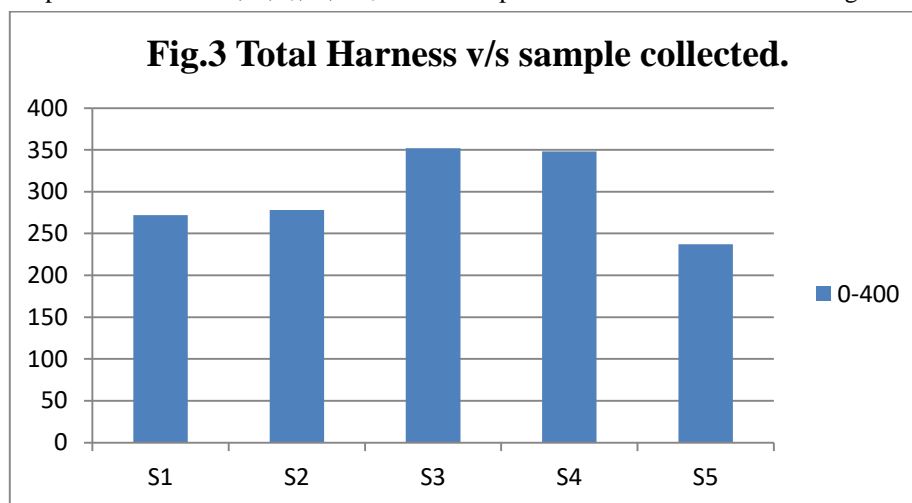
4) Total Alkalinity :-

The total alkalinity is due to the presence of minerals dissolved in water from soil. It gives information about natural salts present in water. The total alkalinity of water samples ranged between 342 ppm to 782 ppm at all the sampling stations as shown in fig. 4. The 497.2 ppm is the mean value of alkalinity. The alkalinity value of samples collected at S_1 and S_2 are above the Indian standard limits i.e. 200 ppm -600 ppm where as at S_3, S_4 and S_5 are within the permissible limits. The high value of alkalinity should be due to the dissolution of mineral in water from minerals rich soil. According to Sawyer et. al.(2000) the various ionic salts such as carbonates, bicarbonates, phosphates, hydroxides, organic acids, borates, silicates and in few cases ammonia or hydroxides are responsible for the alkalinity.


Fig.4 Total Alkalinity v/s sample collected
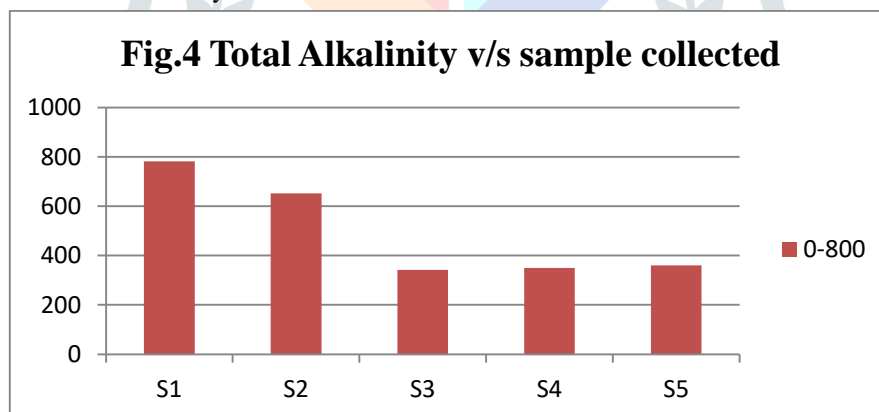
5) Temperature :-

Temperature is one of the most important physical parameter used for detection of quality of water. It affects on the aquatic organisms, vegetation and biological activity. The temperature value of samples collected ranges from 23^0C to $29\ ^0C$ at all the stations and which is shown in fig.5


Fig.5 Temperatuer v/s Sample collected
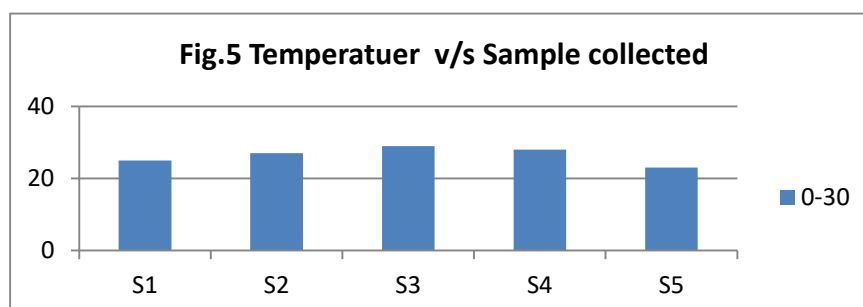
6) Dissolved oxygen :-

Dissolved oxygen is one of the most important parameter used in water quality assessment and biological processes preventing in the water. The degree of pollution in the water bodies can be determined with the help of dissolved oxygen. The presence of dissolved oxygen in water increases the quality of water and also acceptability. The dissolved oxygen values of water samples ranged from 4.2 mg/lit. to 7.4 mg/lit. The mean dissolved oxygen value was found to be 6.43 mg/lit. The dissolved oxygen values of samples collected at various stations are shown in fig. 6

Fig.6 Dissolved Oxygen v/s Sample collected
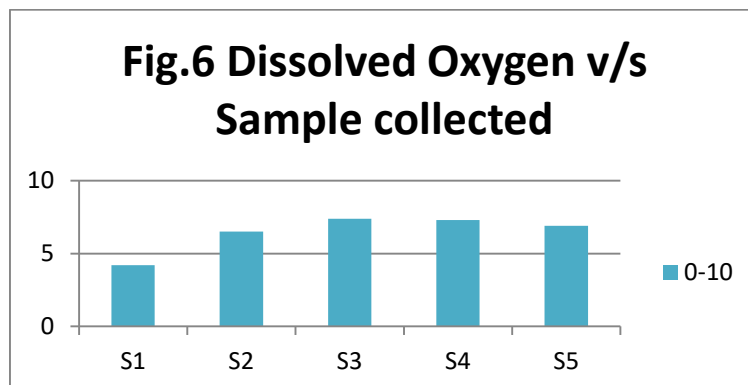
7) Total dissolved Solids :-

The total dissolved solids mainly consists of inorganic substances which are dissolved in water. The effects of total dissolved solids on drinking water quality depends on the levels of its individual components, mineral depositions, taste, excesses hardness and corrosion are common properties of highly mineralized water. The total dissolved solids of water samples collected ranges from 1052 ppm to 1340 ppm. The mean value of total dissolved solid was found to be 1192.4 ppm as shown in fig. 7 The total dissolved solid values of all the sampling stations are within the limits of Indian standards and safe for drinking.

Fig.7 Total dissolved Solids v/s sample collected
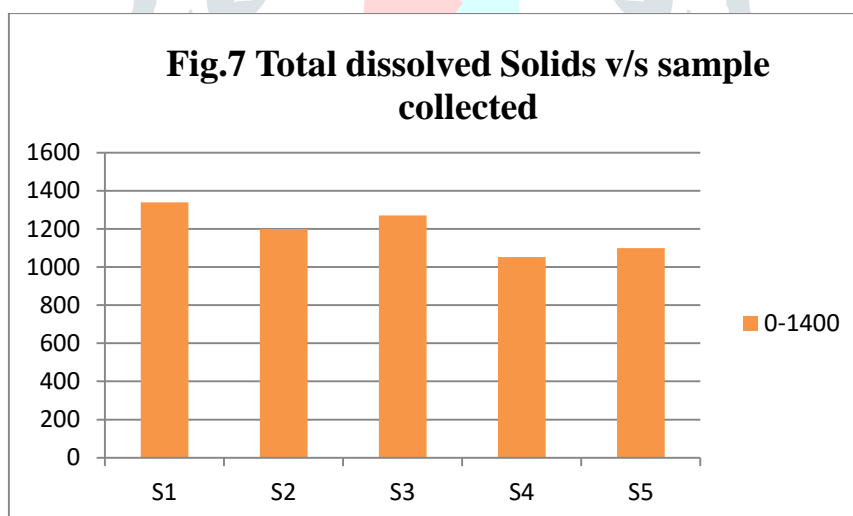
IV. CONCLUSION

The present study of physic-chemical parameters is carried out during 2018-2019 of borewell water sample collected from five stations in Akhada Balapur city. During the study it was observed that the P^H values of S_1, S_2, S_3 sand S_4 are normal as per IS and BIS where as at S_5 it is below the normal level. The value of P^H at all the stations were slightly acidic in nature. The electrical conductivity value is normal as per WHO standard only at S_5 stations. The total hardness value are normal in all sampling station as per IS and BIS where as it is above as per WHO to all the sampling stations.

It is observed that the total alkalinity at S_3, S_4 and S_5 are normal level as per IS and BIS but is above at S_1 and S_2 stations as per IS and BIS. The total dissolved solids value is within the permissible limits as per IS and BIS to all the sampling stations where as it is high at all the sampling stations as per WHO standards.

Overall observation clears that the borewell water quality of Akhada Balapur city is recently very good. It is necessary to construct gutters to avoid percolation of dirty polluted water.

There should be pre-treatment of sevage water before disposed into the environment to minimize the contamination of avoiding health hazards.

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