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Ground Water Quality Status in Vijaynagar Area of Bangalore

Alimuddin*

Department of CS & IT, Maulana Azad National Urdu University, Gachibowli, Hyderabad- 32

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Abstract: Quality of water is an important criterion for evaluating the suitability of water for drinking and irrigation purpose. Ground water sample were collected from different area in Vijaynagar of Bangalore and analysed for 13 water quality parameters viz. Electrical Conductivity, pH, Alkalinity, Total hardness, Total dissolved solids, dissolved oxygen, Biological oxygen demand, Chemical oxygen demand, Chloride, Sodium, Potassium, Magnesium and Calcium. On comparing results it was found that most of the physico- chemical parameters were within the permissible limits as laid by Bureau of Indian Standards (BIS).

Keywords*: Ground water quality, Total alkalinity, Chemical oxygen demand, Vijaynagar, Biological oxygen demand*

INTRODUCTION

Water is most essential commodity for human consumption and is one of the most important renewable resources, which must be prevented from deterioration in quality[1]. Due to increasing population, industrialization and human activities deterioration in water quality is observing now a days. The lakes, wells and bewares in city which were constructed for meeting the drinking water supply are being used as dumping places for waste and waste water. The old civic discipline to avoid the contamination has now disappeared[2]. In fact in a developing country like India around 80% of all diseases are direct consequence of poor drinking water quality and unhygienic conditions which is due to over exploitation and pollution of water [3, 4]. The healthy aquatic ecosystem is depended on the physico-chemical and biological characteristics [5]. The quality of water in any ecosystem provides significant information about the available resources for supporting life in that ecosystem. Good quality of water resources depends on a large number of physico-chemical parameters and biological characteristics[6] .Various physico-chemical parameters like pH, alkalinity, total hardness, total dissolved solid, calcium, magnesium, nitrate, sulphate have a significant role in determining the

potability of drinking water. The problem of ground water quality is acute. The resulting degradation of water quality in water body creates a condition so that water cannot be used for intended beneficial uses including bathing, recreation and as a source of raw water supply[7].

MATERIALS AND METHODS

Bangalore is located in the heart of south-Deccan plateau peninsular India to the south-East corner of Karnataka state between the latitudinal parallel of 12° 39' N and 13° 18-N longitudinal meridians of 77° 22-E and 77° 52-E at an altitude of 900m average mean sea level covering an area of about 2191 sq. km. For convenience it was divided into 5 phases as North, South, East, West and central phases. The Vijaynagar is located in the west phase of the city. Ground water samples were collected from 6 different sampling point. The samples for the routine analysis of parameters were collected in 500ml polyethylene bottles. The DO samples were collected in 250ml glass bottles. The samples for determining the BOD were collected in 250ml dark bottles. pH and conductivity (μ mhos/cm) were determined at the site. The samples were analyzed using standard method, APHA 1995[8].

Table 1:- BIS standard of desirable and permissible limits of various parameters.

S. NO	PARAMETERS	DL (mg/l)	PL (mg/l)
1.	Alkali airy	200	600
2.	Chloride	250	100
3.	Calcium	25	200
4.	Magnesium	30	100
5.	T D S	500	2000
6.	D O	4 .0	4 .0
7.	B. O.D	---	3 .0
8.	C. O.D	250	250
9.	pH	6 .5	8 .5
10.	T H	300	600

DL: Desirable limits, PL: Permissible limits, BIS: Bureau of Indian standard.

Table 2: - Common water quality parameters of drinking water.

Parameters	Station 1	Station 2	Station 3	Station 4	Station 5	Station 6
Electrical Conductivity (μ mhos/cm)	862	800	897	892	879	840
Total alkalinity (mg/l)	130	146	125	141	142	140
Chloride (mg/l)	44	42	53	48	49	51
Na (mg/l)	93.1	93 .0	113.6	113.3	112 .3	109.0
K (mg/l)	1 .1	1 .3	3.1	3.9	3.8	3.0
CaH (mg/l)	86	98	110	106	98	90
MgH (mg/l)	41	39	26	30	38	46

Table 3: - Important water quality parameters of drinking water.

Parameters	Station 1	Station 2	Station 3	Station 4	Station 5	Station 6
T D S (mg/l)	533	501	554	517	533	515
D O (mg/l)	6 .5	6 .7	7.1	7 .4	7 .3	7.2
B O D (mg/l)	1 .4	1 .2	13	1 .4	2.9	6.5
C O D (mg/l)	13 .1	13 .2	224	12 .9	41	77
pH	8 .12	8 .13	7.8	8 .04	8 .034	7.94
T H (mg/l)	125	139	142	144	133	130

RESULTS AND DISCUSSION

Table 2 represent the range of common parameters used for water quality assessment. Conductivity is the ability of water to carry an electric current. EC is found to be in the range of 800 to 892 µ mhos/cm. EC is very important parameter in determining the water quality because it is an indicator of salinity of ground water. The major chemical constituents which contribute to the EC are components of hardness (Ca^{2+} and Mg^{2+})[9].

Alkalinity of water is a measure of its capacity to neutralize strong acid and is due to the presence of bicarbonate, carbonate and hydroxide compound of calcium, sodium and potassium ions[3] .The observed values of alkalinity ranged between 125 to 146 mg/l in water. The chloride concentration of the area varies between 42 to 53 mg/l which indicates that all the samples are in desirable limit according to BIS.

The cations analysed in the present study includes calcium, magnesium, sodium and potassium. For the present study the concentration of calcium has varied from 86 to 110 mg/l whereas the concentration of magnesium varies from 26 to 46 mg/l in the study area. Water is in the range of soft and moderately soft category which is due to the low concentration of calcium and magnesium ions present in the water. Potassium content in the water samples varied from 1.1 to 3.9 mg/l whereas the concentration of sodium ranges from 93.0 to 113.6 mg/l in the study area.

Table 3 summarises the range of important parameters used for water quality assessment.

The pH value of the area ranges between7.8 to 8.13 indicating low alkalinity of water.

Dissolved oxygen (DO) is an important parameter of water quality which reflects physical and biological processes taking place in water. High level of DO speed up corrosion in water pipes. The values of DO fluctuates from 6.5 to 7.4 mg/l. The value of DO for the water samples may be due to wave action, pollution load, organic matter and photosynthetic activity.

Total dissolved solids indicate the nature of salinity in water. It also gives an idea about suitability of water for various purposes. Dissolved solids tend to increase with increasing pollution of water. TDS above 500 mg/l is not considered desirable for drinking purpose. In the present study, the total dissolved solids (TDS) is varied between 501 to 554 mg/l. The water samples have significantly higher amount of TDS. They suggest possibilities of ground water pollution. It might be due to sewage or industrial sources.

Biochemical oxygen demand (BOD) is a measure of organic material contamination in water. BOD is the amount of dissolved oxygen required for the biochemical decomposition of organic compounds and the oxidation of certain inorganic materials. It reduces oxygen content in water[10]. BOD depicts the oxygen uptake of organisms present in water. BOD of all the drinking water samples was in the range 1.2 to 6.5 mg/l. Almost all the samples had BOD within BIS permissible limit.

Chemical oxygen demand (COD) is a measure of organic material contamination in water. COD is the amount of dissolved oxygen required to cause chemical oxidation of the organic material in water. High COD may cause oxygen depletion on account of decomposition by microbes[11] to a level detrimental to aquatic life. In the present study COD values are found to be 13.1 to 224 mg/l (**Table 3)**

Hardness is caused by divalent metallic ions dissolved in water, principally calcium and magnesium. The most important anions with which they are associated are HCO_3^-, SO_4^{2-}, CL^-, NO_3^- etc. The value of hardness ranges between 125 to 144 mg/l (Table 3)

CONCLUSIONS

The present study was undertaken with an aim to analyze certain physico-chemical parameters in the ground water samples in Vijaynagar area. Most of the parameters analyzed have shown that they are within the permissible limits for drinking water. The pH value of the area ranges between7.8 to 8.13 indicating low alkalinity of water. The water samples have significantly higher amount of TDS, they suggest possibilities of ground water pollution. It might be due to sewage or industrial sources.

REFERENCES

1. D.G Zinjad; *J. of Applicable chemistry*, 2013, **2**(3), 545-548
2. Deepika Sharma; *J. of applicable chemistry*, 2014, **3**(2), 764-768
3. Daniel kibami et.al.; *J. of applicable chemistry*, 2013, **2**(6), 1634-1640
4. Olajire and Imeokparia 2001
5. Venkatesharaju et.al., *J. of sciences Engineering and technology*, 2010,**6**(1),50-59
6. Medudhula et.al.; *International J. of Environmental sciences*, 2012, **3**(1), 172-180
7. N. Khan et.al. *Indian J. Env. Prot*., 2004, **25**(3), 222
8. American public health association, American water works association, water environment federation **1995**
9. K**.** Niranjan Kumar et.al. Int. J.Chem Sci, 2009, **7**(1), 59-70
10. Mc Kenzle et.al; Integerated Resource Planning and Management: The Ecosystem Approach in the Great Lakes Basin, Washington, D.C.Island Press 1996.
11. Shiva Kumar et.al. ENV. Conserv and Manage. **1989**, 85-92

Corresponding Author: Alimuddin*

Department of CS & IT, Maulana Azad National Urdu University, Gachibowli, Hyderabad- 32