Assessment of Water Quality in the vicinity of Anandapuram, Visakhapatnam Dt., A. P.

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ABSTRACT

Physico –Chemical analysis of surface & well water samples collected from eight sampling stations in the vicinity of Anandapuram, Visakhapatnam Dt. for three months during February to April 2017. The analysis consists of parameters such as pH, total dissolved solids, total hardness, nitrate, sulphate, biological oxygen demand, iron, manganese, nickel and lead and chromium content in those   selected areas .The values obtained for all the parameters are within the prescribed limits and hence the water in those stations are suitable for domestic as well as other purposes

KEYWORDS

water quality - parameters -Anandapuram-Visakhapatnam Dt.

1. INTRODUCTION

Water is essential for the survival of any form of life. In India the major source of water used to meet the domestic agriculture and industrial needs is the ground water .With exploding population resulting in urbanization, industrialization agriculture etc., and the demands of water supply have been increasing tremendously.. In a recent survey it is observed that only 12% of people get safe drinking water (Kudesia,1980). Industrial effluents discharged into the aquatic system change the physico-chemical properties of water such as hardness, conductivity, pH value, turbidity, total dissolved solids (TDS) and dissolved oxygen (DO) there by affecting the aquatic flora and fauna(Karnath,1989). Keeping in view of this, it is proposed to carry out a systematic study on the water samples collected from nine sampling stations in the surrounding areas of Anandapuram, Visakhapatnam Dt. AP

2. MATERIALS AND METHODS

Water samples were collected in clean polythene bottles (2 or 5 liters capacity). Bottles were cleaned with hydrochloric acid then washed with tap water and then rinsed with distilled water twice and again rinsed with the water sample to be collected and field up one-liter bottles with the water samples(APHA,1995) . All the reagents used were of analytical grade.DD water was used throughout the study. The procedures adopted for the estimation of various physical and chemical parameters as described in the standard methods (APHA ,1998). For the estimation of dissolved oxygen, BOD bottles have been used as recommended and the dissolved oxygen was fixed at the site of collection. All the chemicals, reagents used in this work were of analytical grade E. Merck, India.

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3.RESULTS

Physico – chemical parameters of water samples are presented in Tables – 1to 4.

Table – 1: Physico –Chemical Parameters of Water Samples Collected on 12-02-2017

Parameter	S_1	S_2	S_3	S_4	S_5	S_6	S_7	S_8	S9
Temperature ^{0}C	27.52	27.05	27.17	27.69	27.48	27.72	27.51	27.63	27.62
pH	7.39	7.85	7.64	7.38	7.49	7.51	7.45	7.70	7.48
EC	1.4	1.8	0.9	1.6	1.2	1.0	1.3	1.7	1.8
TDS	489.2	399.4	512.5	492.8	385.3	413.5	502.3	531.4	496.2
Hardness	247.4	192.8	234.6	178.5	203.5	198.6	201.3	208.9	188.9
Calcium	130.5	99.2	112.3	102.5	135.8	112.3	120.6	127.5	109.6
Magnesium	69.8	42.5	52.8	73.9	59.5	54.9	60.8	74.5	79.5
Chloride	42.9	80.6	79.8	99.5	97.2	105.8	92.3	92.9	107.2
DO	4.8	4.3	5.2	4.2	4.3	4.0	4.3	4.6	4.4
BOD	1.0	0.9	1.2	0.8	0.8	0.9	1.1	1.2	0.8
Sulphate	108.9	96.5	85.2	100.2	79.2	96.5	104.2	112.6	108.7
Alkalinity	102.8	124.3	93.8	108.7	89.0	103.2	96.3	88.8	98.4
Nitrate	0.97	1.03	1.08	1.10	0.91	0.86	1.35	1.01	1.09
Cr	0.025	0.012	0.032	0.004	0.0025	0.039	ND	0.028	0.014
Fe	0.022	ND	0.052	0.048	ND	0.18	ND	0.17	0.043
Mn	0.024	0.013	ND	0.016	ND	ND	0.023	0.038	0.012

All the parameters expressed in mg/lit. except pH and EC (mmhos)

* All the values are the average of 3 determinations. ;   ND- Not detectable

Table -2 . Concentration of metals in Water Samples collected on 13-02-2017

Stn.No.	Temp.(^{0}C)	pH	Cr	Cd	Fe	Mn	Pb	Zn
S1	26.54	7.60	0.022	0.060	0.14	0.052	ND	ND
S2	26.72	7.82	0.047	0.032	ND	0.022	ND	0.029
S3	27.22	7.80	ND	ND	ND	0.038	0.005	0.023
S4	27.65	7.83	ND	0.022	0.035	0.019	0.029	ND
S5	27.26	7.68	0.022	0.035	0.14	0.045	0.016	0.025
S6	27.28	7.75	0.044	0.039	0.019	0.026	0.011	0.018
S7	27.34	7.53	0.046	0.069	0.25	0.035	0.065	0.012
S8	27.25	7.70	0.034	ND	0.088	ND	0.059	0.054
S9	27.39	7.69	0.045	0.066	0.045	0.053	0.052	0.042

Table–3. Concentration of metals in Water Samples Collected on 12-03-2017

Stn No.	Temp.(^{0}C)	pH	Cr	Cd	Fe	Mn	Pb	Zn
S1	27.29	7.45	0.016	0.065	0.14	0.088	ND	0.019
S2	27.45	7.85	0.038	0.052	0.024	0.028	0.003	0.025
S3	27.52	7.90	0.045	0.068	0.045	0.048	0.050	0.035
S4	27.81	7.68	0.032	0.074	0.062	0.044	0.029	0.021
S5	27.64	7.82	0.030	0.062	0.17	0.038	0.016	0.009
S6	27.72	7.85	0.042	ND	0.062	0.032	0.040	0.029
S7	27.39	7.64	0.046	0.069	0.25	0.032	0.045	0.018
S8	27.55	7.35	0.038	0.071	0.069	0.048	0.037	0.079
S9	27.48	7.64	0.038	0.052	0.028	0.022	0.013	0.028

Table–4. Concentration of metals in Water Samples Collected on 14-04-2017

Station No.	Temp.(^{0}C)	pH	Cr	Cd	Fe	Mn	Pb	Zn
S1	27.39	7.65	0.033	0.065	0.16	ND	ND	0.016
S2	27.45	7.89	0.041	0.032	ND	0.018	0.034	0.024
S3	27.28	7.80	ND	ND	ND	0.068	0.042	0.022
S4	27.80	7.63	0.041	ND	0.032	ND	0.026	0.041
S5	27.62	7.85	0.036	ND	0.19	ND	0.036	0.019
S6	27.71	7.82	0.042	ND	0.089	0.036	0.022	0.026
S7	27.59	7.22	0.039	0.049	0.27	0.042	0.065	0.014
S8	27.72	7.56	ND	ND	0.062	0.055	0.029	0.065
S9	27.65	7.71	ND	0.06	ND	0.019	0.071	0.045

4. DISCUSSION

4.1 Temperature:

Temperature of water is basically important because it effects bio-chemical reactions in aquatic organisms. The average temperature of the present study ranged from 26.54to 27.81^0 c. The pH value of natural water changes due to the biological activity and industrial contamination. Higher pH includes the formation of trihalo methanes which are toxic(BIS,1991) . The pH values of the present investigation were within the WHO guide lines (7.0 – 8.5) (WHO.2005) .

4.2 Electrical conductivity

It is a measure of current carrying capacity. Thus, as concentration of dissolved salts increases conductivity also increases. Many dissolved substances may produce aesthetically displeasing colour, taste and odour. The values obtained are in the range 0.9 to 1.8 mmhos.

4.3 Total Dissolve Solids

TDS values ranged within 385.3 to 531.4mg/lt. Generally the TDS values for ground water range from 19 to 1280mg/lt as per standards. So in this respect the water under study is suitable for drinking purposes.

4.4 Dissolved Oxygen (DO)

Presence of DO in water may be due to direct diffusion from air and photosynthetic activity of autotrophs(WHO,2005) .Oxygen can be rapidly

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removed from the waters by discharge of oxygen demanding wastes. The DO values obtained in the present study are within the standards.

Bio-Chemical Oxygen Demand (BOD) is the parameter used to assess the pollution of surface water and ground waters. BOD values obtained in the present study are within permissible levels(WHO.2005).

4.5 Alkalinity

Alkalinity is a total measure of substance in water that has "acid-neutralizing" capacity. The main sources of natural alkalinity are rocks which contain carbonate, bicarbonate and hydroxide compounds; silicates and phosphates may also contribute to alkalinity. Alkalinity value with less than 100mg/lt is desirable for domestic use. However, in large quantities imparts bitter taste to water. In the present investigation the total alkalinity of the water samples is found in the Range 89.0 to 124.3 mg/lt.

4.6 Hardness:

Hardness in water is due to the natural accumulation of salts from contact with soil and geological formations or it may enter from direct pollution by industrial effluents. Hardness is a measure of the ability of water to cause precipitation of insoluble calcium and magnesium salts of higher fatty acids from soap solutions. The principal hardness causing *cations* are calcium, magnesium bicarbonate, carbonate, chloride and sulphates. Hardness in water is due to the natural accumulation of salts from contact with soil and geological formations or it may enter from direct pollution by industrial effluents. The

hardness values of the present study were found to range between178.5 and 247.4mg/lit.

The quantities of calcium in natural water depend up on the type of rocks. Small concentration of calcium is beneficial in reducing the corrosion in water pipes. Magnesium hardness particularly associated with sulphate ion has laxative effect an persons un accustomed to it (Kudesia,1980). In the present study calcium and magnesium contents are found in the range of 99.2 – 135.8 and 49.5- 79.5 mg/lt respectively.

4.7 Chloride

Chloride occurs in all types of natural waters. High concentration of chloride is considered to be an indication of pollution due to high organic waste of animal origin. Chloride values obtained in the study are found in the range between42.9-107.2 mg/ lt.

4.8 Sulphate

Sulphate ion does not affect the taste of water, if present in low concentrations. The sulphate ion concentration in the present investigation varied from 79.2-112.6 mg/lt.

4.9 Nitrate

Nitrate is the most important nutrients in an ecosystem. Generally water bodies polluted by organic matter exhibit higher values of nitrate (Sharma and Kaur 1999). In the present study water samples from the stations (S_1 to S_9) showed low concentrations of nitrate (0.91 to 1.35 mg/lt) well below permissible levels as per the standards.

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4.10 Heavy metals

The presence of heavy metals in organisms can cause many diseases even if present in very low concentration (Sagarand Pratap 2012) . Heavy metals not only cause phyto-toxicity but also enter into the food chain resulting in toxicity in animals and may be carcinogenic to human beings (Lokhande and Kelkar,1999). Metals in the present study such as Cr, Cd, Fe, Mn, Pb and Zn are detected [for the 3 months between February, March and April 2017] almost in very low concentration as per the standards prescribed by WHO limits. These heavy metals are within the permissible limits.

5. CONCLUSIONS

The values obtained for all the parameters in the stations selected for the study are within the prescribed limits. Hence, it can safely be considered that the water in those places is suitable for domestic as well as other purposes.

6. ACKNOWLEDGEMENTS

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