

STUDIES ON PHYSICO-CHEMICAL PARAMETERS TO ASSESS THE GROUND WATER QUALITY IN RAJA RAJESWARINAGAR OF BANGALORE

ALIMUDDIN

Asstt. Prof. of Chemistry, Deptt. of CS & IT, Maulana Azad National Urdu University, Gachibowli, Hyderabad-32

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Ground water samples were collected from six different sampling point in Raja Rajeswari nagar area of Bangalore and analysed for water quality parameters viz. pH , total alkalinity, chloride, total dissolved solids, electrical conductivity, sodium, potassium, calcium, magnesium, dissolved oxygen, BOD, COD and total hardness. The pH value of the study area ranges between 7.5 to 8.2 indicating that ground water is slightly alkaline. The total alkalinity are varied in the range from 132 to 156 mg/l which is well within the limit prescribed by BIS.

The TDS value found from 491 to 809 mg/l. The values of hardness of water ranges from 126 to 162 mg/l which is within the prescribed limit as per BIS.

KEYWORDS : Physico-chemical parameters, Ground water quality, Total alkalinity, Total hardness, TDS

INTRODUCTION

Availability of safe and good source of water is a mandatory prerequisite for sustainable development. Ground water quality is one of the most important characteristic in water resource studies. [1]. The increasing industrialization in India has modified the look of urban landscape and brought in its wake problems of ground water contamination endangering human beings.

Effluents from various industries are dumped into open pits or unlined channels without any treatment which pollute ground water sources [2]

Various anthropogenic and industrial activities causes increased contamination sites due to unawareness regarding production, use and disposal of hazardous substances [3]

Contaminated water having virus causes various diseases .It is estimated, that in India, about 21% of communicable diseases are water borne [4]

Understanding the potential impact of human activity on ground water quality is important for protection and sustainable use of ground water resources [5]

The problem of ground water quality is more serious in the areas which are identified by dense population, heavy industrialization and shallow ground water [6]

Hence, there is always a need for and concern over the protection and management of groundwater quality [7]

MATERIALS AND METHODS

The city of Bangalore lies towards the southeast in the South Indian state of Karnataka. On the northwest of the city is Tumkur District, On the northeast is Kolar District, on the southeast is the state of Tamil Nadu and on the southwest is Mandya District. The geographical location of Bangalore city of India is such that it lies at an altitude of approximately 920 m. Spread over an area of 2190 sq. km, the city stands positioned at 12.97° N 77.56° E.

Table 1. Method of determination of water quality parameters

S.No.	Parameters	Methods of determination
1	Electrical Conductivity	Conductivity meter
2	Total Alkalinity	Titration method
3	Chloride	(Argentometric method) Titrimetry
4	Sodium	Flame photometry
5	Potassium	Flame photometry
6	Calcium	EDTA titration
7	Magnesium	EDTA titration
8	Total dissolved solids	Gravimetric method
9	Dissolved oxygen	Winkler's method
10	Biological oxygen demand (BOD)	Winkler's method
11	Chemical oxygen demand (COD)	Open reflux method
12	pH	pH metry
13	Total hardness	EDTA titration

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)	978	1410	894	886	858	794
Total alkalinity (mg/l)	154	147	136	153	144	135
Chloride (mg/l)	38	46	46	114	42	45
Na (mg/l)	104.9	54.2	93.3	94.1	96.8	94.0
K (mg/l)	4.4	7.8	1.4	1.8	1.4	1.0
CaH (mg/l)	83	85	90	118	85	85
MgH (mg/l)	50	50	46	46	46	43
TDS	643	809	499	511	519	491
DO	7.0	7.7	6.4	7.1	6.7	7.2
BOD	1.1	2.8	1.5	2.6	1.5	5.4
COD	13.0	26.4	13.1	25	13.5	82
pH	7.8	7.8	7.7	7.6	7.5	8.2
TH	130	130	130	162	134	126

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 250 ml glass bottles. The samples for determining the BOD were collected in 250 ml dark bottles. pH and conductivity (μ mhos/cm) were determined at the site. The samples were analyzed using standard method, APHA 1995 [8].

RESULTS AND DISCUSSION

Electrical conductivity is a measure of the capacity of a solvent to conduct electricity. Most of the salts in the water are present in the ionic form which are responsible to conduct electric current. Ground water tends to have high electrical conductivity due to the presence of high amount of dissolved salts [9]. E C found to be in the range of 792 to 1410 μ mhos/cm.

The alkalinity values ranges between 132 to 156 mg/l. The alkalinity is mainly due to bicarbonates, carbonates, hydroxides, phosphates, borates, silicates and organic acids. In few cases, ammonia or hydroxides are also responsible for the alkalinity [10]

High chloride content in irrigation water gradually leads to accumulation of salt and adversely affected the soil property [11]. The chloride found in the range between 38 to 48 mg/l.

Calcium found in the range of 80 to 118 mg/l. Higher level of calcium is not desirable in washing, bathing and laundering while small concentration of calcium is beneficial in reducing the corrosion in pipes [9]. The magnesium ranges in between 40 to 50 mg/l.

The value of concentration of sodium and potassium varies in the study area between 54.2 to 15.2 mg/l and 1.0 to 7.8 mg/l respectively.

The TDS value has been found in between 491 to 809 mg/l. A high value of TDS reduces water utility for various purposes viz. agriculture, drinking and irrigation [12]. Increase in TDS is mainly due to seawater intrusion and increase in salts [13]. Dissolved oxygen (DO) is the amount of oxygen gas that is dissolved into water at any source. DO is a critical function and at time it may cause anoxia and death of aquatic organism. The value of DO fluctuates from 6.4 to 7.7 mg/l

BOD is the amount of oxygen needed by microorganism to decompose the organic and inorganic pollutant. Higher value of BOD indicates the more microorganism in water. The value of BOD ranges in between 1.1 to 5.4 mg/l.

Amount of oxygen consumed during the oxidation of organic matter by strong oxidizing agent. The COD of the study area ranges from 13.0 to 82 mg/l.

The pH value in the study area varied from 7.5 to 8.2 indicating slightly alkaline nature. High pH value causes the formation of trihalomethanes, which are toxic, while pH below 6.5 starts corrosion in pipe and releasing toxic metals such as lead, cadmium and copper [14]

Hardness is generally caused by the presence of calcium and magnesium and in the water. The hardness of water ranges in the study area from 126 to 162 mg/l.

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