

Investigation of Ground Water Quality Parameters in Jawaharnagar Area of Hyderabad

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Abstract

Drinking water needs to be protected from pollution and biological contamination. Suitability of water for drinking and irrigation purposes can be determined by various physico-chemical parameters. Ground water samples were collected from different area in Jawaharnagar of Hyderabad and analysed for 10 water quality parameters viz. pH, Electrical Conductivity, Total Alkalinity, Total dissolved solid, Total hardness, Calcium hardness, Magnesium hardness, nitrates, sulphates and Chlorides. On comparing results it was found that most of the parameters analyzed have shown that they are within the permissible limits for drinking water as prescribed by Bureau of Indian Standards (BIS). The pH values ranges from 6.56 to 7.62 which is within the limit prescribed by BIS. The low pH does not cause any harmful effect. EC values varied between 620 to 1820 μ mho/cm. The alkalinity values ranges from 240 to 620 mg/l. Calcium and magnesium content in the water present 185 to 420 mg/l and 65 to 280 mg/l respectively. The nitrate concentration in ground water ranged between 4.5 to 12.4 mg/l. The TDS values ranges from 215 to 1205 mg/ l which is within the permissible limit of BIS.

Keywords: Ground water quality, Chloride, Total alkalinity, Total hardness, Jawaharnagar, TDS, Electrical Conductivity

INTRODUCTION

Water is one of the precious natural resource of our planet. Groundwater is an important natural source of water supply all over the world. Its use in irrigation, industries and domestic usage continues to increase where perennial surface water source are absent. . All living organisms on the earth need water for their survival and growth [1]

The quality of groundwater may depend on geology of particular area and also vary with depth of water table and seasonal changes and is governed by the extent and composition of dissolved salts depending upon source of the salt and soil subsurface environment.

The quality of water usually described by its physical, chemical and biological characteristics [2-4]

Various physico-chemical parameters like pH, alkalinity, total hardness, total dissolved solid, calcium, magnesium, nitrate, sulphate have a important role in determining the potability of drinking water.

The main purpose of analyzing physical, chemical and microbiological characteristics of water is to determine its nutrient status. Since, the water contains dissolved and suspended materials in various proportions, its physical and chemical characteristics differ along with its biological characteristics. Any change in the natural water quality may disturb the equilibrium system and would become unfit for various uses [5]

The aim of the present study is an attempt to investigate the physico- chemical parameters of groundwater in Jawaharnagar area of Hyderabad.

MATERIALS AND METHODS

Hyderabad is located in central Telangana and is spread over an area of 260 km². The city lies in the Deccan Plateau and rises to an average height of 536 m above the sea level. The city lies at 17.366° N latitude and 78.476° E longitude. Hyderabad is blessed with a unique landscape – spectacular rock formations which are about 2,500 million years old; amongst the oldest and hardest rocks in the world

The original city of Hyderabad was founded on the banks of river Musi and has grown over centuries on the both banks of the river. Now known as the historic "Old City", home to the Charminar and Mecca Masjid, it lies on the southern bank of the river

Ground water samples were collected from 6 different sampling point. The samples for the analysis were collected in 500ml polyethylene bottles. pH were determined at the site. The samples were analyzed using standard method, APHA 1995 [6]

Table 1: Bureau of Indian standard (IS- 10500:1994)

S. NO	<u>PARAMETERS</u>	<u>Limits</u>
1.	pH	6.5 – 8.5
2.	Total Alkalinity (Mg/L)	200 - 600
3.	Electrical conductivity (μ mhos/cm)	700 - 3000
4.	Total dissolved solids (Mg/L)	500 - 2000
5.	Total hardness (Mg/L)	300 - 600
6.	Calcium hardness (Mg/L)	75 - 200
7.	Magnesium hardness (Mg/L)	30 - 100
8.	Nitrates (Mg/L)	45 - 100
9.	Sulphates (Mg/L)	200 - 400
10.	Chlorides (Mg/L)	250 - 1000

Table 2: - Water quality parameters of drinking water in jawahar nagar Hyderabad

Parameters	Station 1	Station 2	Station 3	Station 4	Station 5	Station 6
pH	6..60	6.56	7.42	6.67	6.85	7.62
Electrical Conductivity (μ mho/cm)	620	1700	850	1615	1950	1820
Total Alkalinity (Mg/L)	620	490	420	240	330	410
Total dissolved solids (Mg/L)	215	390	320	250	1150	1205
Total Hardness (mg/l)	702	650	451	349	291	284
Calcium hardness (Mg/L)	185	230	325	420	310	276
Magnesium hardness (Mg/L)	65	78	125	275	280	210
Nitrates (Mg/L)	10	5.2	4.5	6.5	11.5	12.4
Sulphates (Mg/L)	25	29	35	105	120	124
Chlorides (Mg/L)	42	68	85	120	225	321

RESULTS AND DISCUSSION

PH of solution is the negative logarithm of hydrogen ion concentration in moles per litre. The pH values ranges from 6.56 to 7.62 which is within the limit prescribed by BIS. The low pH does not cause any harmful effect [7].

The salt concentration is generally measured by determining the electrical conductivity of water. Most of the salts in water are present in their ionic form and capable of conducting current and conductivity is a good indicator to assess groundwater quality [8].

EC is an useful parameter of water quality for indicating salinity hazards. EC values varied between 620 to 1820 μ mho/cm which is within the prescribed limit of BIS.

Alkalinity is the measure of the capacity of the water to neutralize a strong acid. The alkalinity in the water is generally imported by the salts of carbonates, silicates together with the hydroxyl ions in Free State. [8]. The alkalinity values ranges from 240 to 620 mg/l.

A total dissolved solid (TDS) is the concentration of all the dissolved minerals in water. The higher total dissolved solids causes gastro-intestinal diseases to the human beings, but the using water containing higher dissolved solids for a long period of time can cause kidney stones and heart diseases [9]. The TDS values ranges from 215 to 1205 mg/ l which is within the permissible limit of BIS.

Total hardness is a measure of the capacity of water to the concentration of calcium and magnesium in water and is usually expressed as the equivalent of the CaCO_3 concentration. [10]. The total hardness values ranges from 291 to 702mg/l.

Calcium and magnesium content in the water present 185 to 420 mg/l and 65 to 280 mg/l respectively

The nitrate concentration in ground water ranged between 4.5 to 12.4 mg/l. Hence, all the ground water samples are well within the permissible limit.

The sulphate content in water is important in determining the suitability of water for public and industrial supplies. Higher concentration of sulphate in water can cause malfunctioning of alimentary canal and shows cathartic effect on human beings [8]. The sulphate value ranged from 25 to 124 mg/l. Hence all the values are well within the permissible limit.

Chlorides occur in all natural waters in widely varying concentrations. The chloride contents normally increases as the mineral contents increases [11]. Chloride values ranged in between 42 to 225 mg/l which is well within the BIS limit.

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