Appraisal for ground water quality analysis of Ahmedabad City of Gujarat, India.

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Abstract : Ground water sample collect from different area of Ahmedabad city in Gujarat. Six samples were collected and analysed for physic-chemical parameter such as pH, Total Alkalinity, Total Hardness (as caCo3), Chloride (as Cl^-), Nitrate (as $NO3^-$), Fluoride (as F^-), and Total Dissolved solids. In the paper will discuss on the analysis result of the sample. All the different location analysis result will compare and conclude that the area is most affected. The analytical result indicates that most of ground water sample are found to be near to permissible limit of water quality parameter.

I. INTRODUCTION

Water is very important for the life. Water is the precious gift by the GOD to the mankind and all other living species in the world. Water resources comprising of surface water like river and lakes, ground water, and marine and coastal waters support all living. Most of the water on this planet is stored in ice forms and in ocean which is difficult to be recovered for our diverse needs. Most of our demand is fulfilled by rain water which gets deposited in surface and ground water resources. The good quality water quantity utilizable is very much limited in the world. Though, water is continuously purified by evaporation and precipitation in the nature, pollution of water has emerged as one of the most precious environmental problems of present times, not only there is an increasing concern for rapidly deteriorating supply of water, but the quantity of utilizable water is also fast decreasing. The causes of such a situation are more, but gross pollution of water has in urbanization, industrialization and increase in human population were observed during the past ten decades. The volume of ground water is greater than that of all freshwater lakes and streams combined. Underground water is precious role in the overall water balance of the environment. As a reservoir, it has a huge capacity to store water obtained during rainy periods which can be used during dry periods. In most parts of Ahmedabad, major source of water for drinking and industrial purposes is groundwater.

II. STUDY AREA

Ahmedabad is the 7th largest metro city located in western India covering area of 505 km2. It at 23°03' N latitude and 72°58' E longitude on the bank of River Sabarmati. Ahmedabad has characteristics of a semi-arid region and so the climate is generally hot and humid with an annual rainfall of 751 mm occurs during, mid-July to September. Ahmedabad is known as an industrial hub and inhibits more than 73 lac populations. Now Ahmedabad also known as Heritage city of the world. In this study there were 6 different location sample were collected the site is shown in figure 1.

Ahmedabad is the largest Metro city of Gujarat and it has much industrial area available. So in the study area mainly selects the nearby industrial area and some residential area so the compression gets some good outcomes.

Figure 1. Location of the sample

III. COLLECTION OF SAMPLE

The ground water samples were collected in polythene can which were cleaned with distilled water. Also the sample bottles were partially filled and check the odour of the same.

IV. SAMPLE ANALYSIS

Once the sample collection was completed, various tests were performed on the samples in order to determine their characteristics. The tests for determining characteristics of ground water samples were carried out according to IS 3025. Concentration of pH, Total Alkalinity, Total Hardness (as CaCo3), Chloride (as Cl^-), Nitrate (as $NO3^-$), Fluoride (as F^-), and Total Dissolved solids in bore water samples were calculated as the method described in APHA 22nd ED.2012.

Table 1. RESULT OF SAMPLE

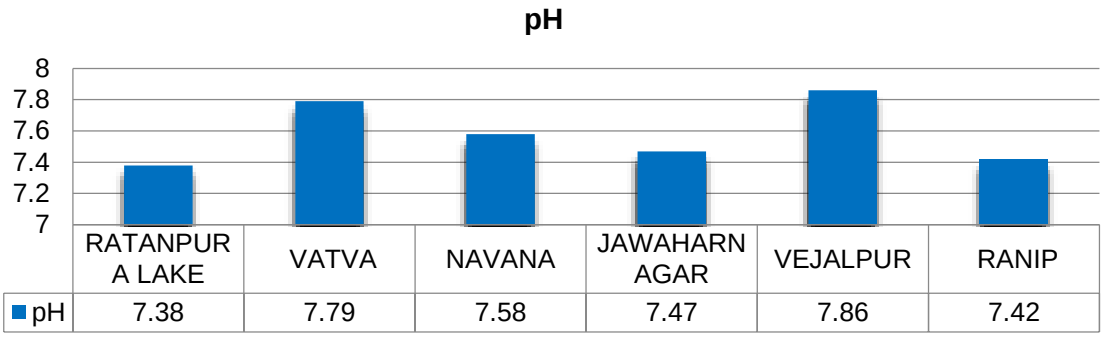
Sr. No.	Parameter Analyzed	Ratanpura Lake (Vastral)	Vatva	Navana	Jawaharnagar	Vejalpur	Ranip	Units
1	pH	7.38	7.79	7.58	7.47	7.86	7.42	-
2	Total Alkalinity	485	359	605	298	100	254	mg/l
3	Total Hardness (as caCo3)	328	256	244	298	120	269	mg/l
4	Chloride (as Cl^-)	568	270	341	361	57	322	mg/l
5	Nitrate (as $NO3^-$)	7.6	6.5	4.3	3.2	0.6	2.8	mg/l
6	Fluoride (as F^-)	1.4	1.1	1.1	1.2	0.4	1.1	mg/l
7	Total Dissolved Solids	1613	806	1129	935	237	860	mg/l

Table 2.DRINKING WATER QUALITY PARAMETER LIMIT (BIS 10500-2012)

Sr. No.	Parameter Analyzed	Units	Acceptable Limit	Permissible Limit
1	pH	-	6.5-8.5	No relaxation
2	Total Alkalinity	mg/l	500	2000
3	Total Hardness (as CaCo3)	mg/l	250	1000
4	Chloride (as Cl^-)	mg/l	45	No relaxation
5	Nitrate (as $NO3^-$)	mg/l	200	600
6	Fluoride (as F^-)	mg/l	200	600
7	Total Dissolved Solids (TDS)	mg/l	1	1.5

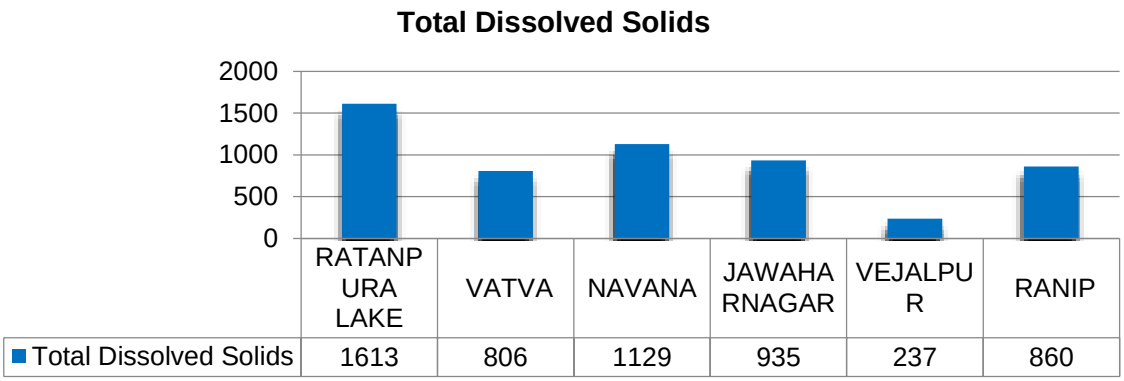
4.1 pH:

pH is a scale used to specify how acidic or basic a water-based solution is.



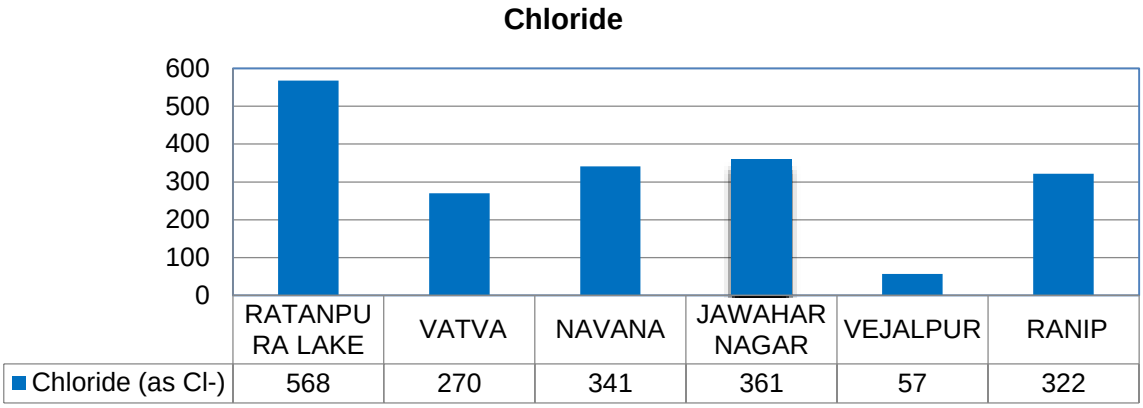
4.2 Total Dissolved Solid:

It is a measure of the dissolved combined content of all inorganic and organic substances present in a liquid in molecular, ionized or micro-granular suspended form.



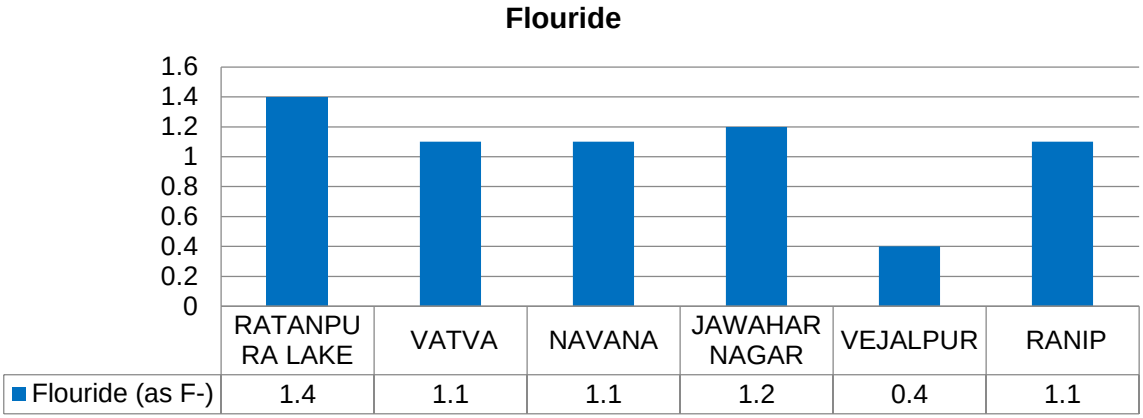
4.3 Chloride:

All type of natural and raw waters contains chlorides. Chloride is often associated with sodium since sodium chloride is a common constituent of some water sources especially ground water. Chloride values of water samples varied between 57 to 568 mg/l. Chloride values for all the ground water samples were found above the permissible limit of BIS 10500-2012 (1000 mg/l).



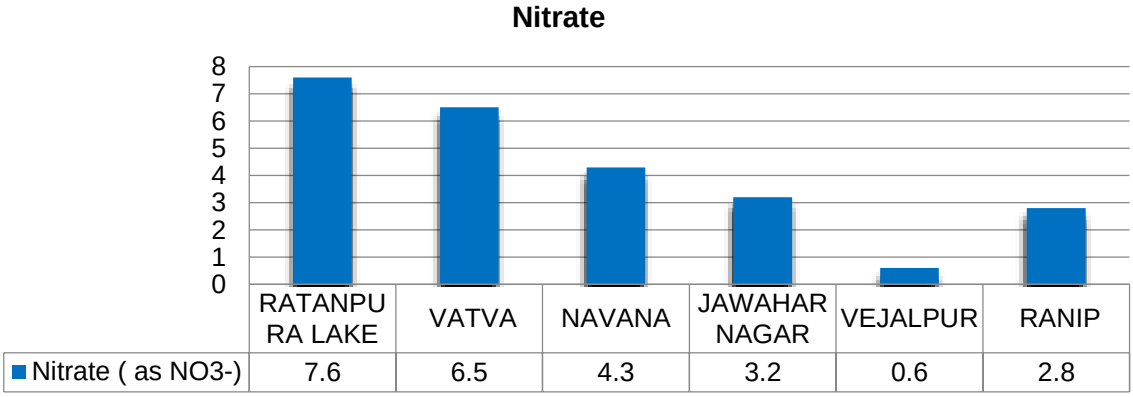
4.4 Fluoride:

Fluoride is the negative ion of the element fluorine. The symbol for the element fluorine is F. Fluoride often is written as F-, which stands for the anion of fluorine that has a -1 electrical charge. Any compound, whether it is organic or inorganic, that contains the fluoride ion is also known as a fluoride. Nitrate values of water samples were found below the permissible limit of BIS 10500-2012 (1.5 mg/l). The sample values varied between 0.4 to 1.4 mg/l.



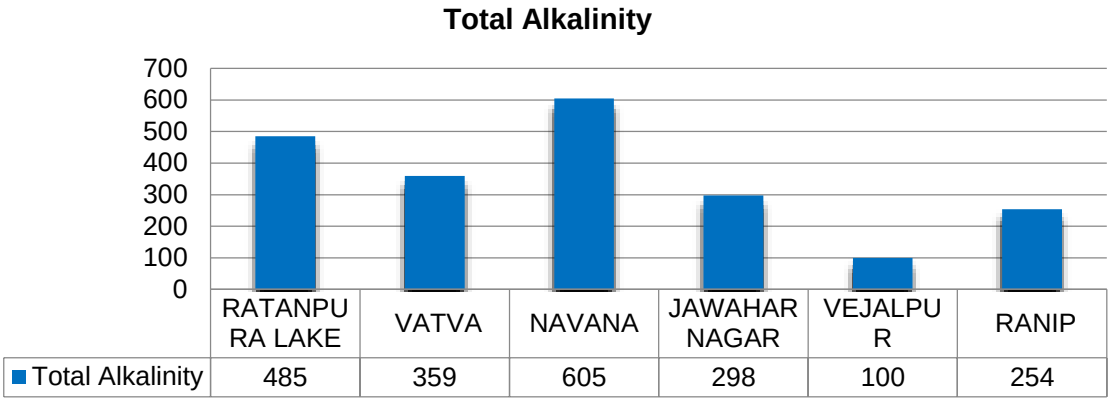
4.5 Nitrate:

Nitrate is very mobile in soil and ground water because unlike ammonium nitrate it does not absorb onto soil or aquifer geologic materials, and only precipitates as a mineral under dry condition. Health effects of nitrate in drinking water are most significantly linked to methemoglobinemia, also known as blue baby syndrome. Nitrate values of water samples were found below the permissible limit of BIS 10500-2012 (No relaxation). The sample values varied between 0.6 mg/l to 7.6 mg/l.



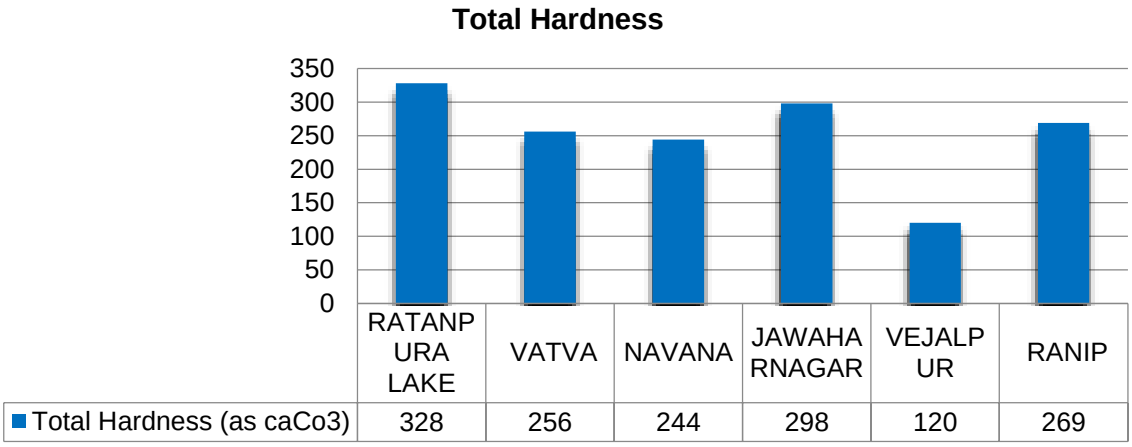
4.6 Total Alkalinity:

Total Alkalinity is the measurement of the concentration of all alkaline substance that dissolve in water. In swimming pool water, you should be concerned with bicarbonate alkalinity. This should be between 120 to 605 mg/l.. So, if the total alkalinity is within this range then it will prevent rapid pH changes and will stabiles the pH level in the water. Total Alkalinity values of water samples were found below the permissible limit of BIS 10500-2012 (600 mg/l).



4.7 Total Hardness:

Total hardness is an important index to evaluate drinking water quality. Hardness values shown range from 120 to 328 mg/l.. Hardness of water mainly depends on calcium or magnesium or both. Hard drinking water is generally not harmful to one's health but can pose serious problems in industrial setting. The values of all ground water samples were found below the permissible. Total Hardness values of water samples were found below the permissible limit of BIS 10500-2012 (600 mg/l).



V. CONCLUSION

Six ground water samples were collected in the Ahmedabad city most of the sample were near the industrial area and some near the residential area. The sample was subject to analyses and compare their result with each other and the result of the above work show that most of the parameter above the acceptable limit and near to the permissible limit. Most affected ground water sample were Ratanpura area and Navana area. In the Navana area Total Alkalinity result were above the permissible limit. So the direct use of the ground water is not advisable for the drinking or any use. For the use of the other than the Navana area used after the boiling or use reverse Osmosis for the treatment of the ground water.

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