

# ESTIMATION OF CARBONATES, BICARBONATES, CHLORIDES AND PH OF GROUNDWATER IN DIFFERENT AREAS IN AND AROUND HYDERABAD.

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## ABSTRACT

*Borewater is ground water that has been accessed by drilling a bore into underground water storages and pumping to the surface. Since ground water passes through various layers of underground rocks, it has some large amount of minerals and chemicals dissolved in it. While accepted levels of minerals can benefit us, excess levels of these minerals can have harmful effects on our health. The quality of ground water in some parts, particularly in shallow waters, is changing as a result of human activities. The most common dissolved mineral substances are sodium, calcium, magnesium, potassium, chloride, bicarbonate, and sulfate. The Present study is aimed at estimating the amount of carbonates, bicarbonates and chlorides in different industrial areas and comparing them with the residential area in and around Hyderabad. This study also deals with the pH of groundwater in these areas.*

**Keywords :** Groundwater, Industrial areas, minerals, health,

**Introduction:** The chemical and biological character of ground water is acceptable for most uses. The quality of ground water in some parts of the country, particularly shallow ground water, is changing as a result of human activities. Ground water is less susceptible to bacterial pollution than surface water because the soil and rocks through which ground water flows screen out most of the bacteria. Bacteria, however, occasionally find their way into ground water, sometimes in dangerously high concentrations. But freedom from bacterial pollution alone does not mean that the water is fit to drink. Many unseen dissolved mineral and organic constituents are present in ground water in various concentrations. Most are harmless or even beneficial; though occurring infrequently, others are harmful, and a few may be highly toxic. Dissolved mineral constituents can be hazardous to animals or plants in large concentrations.

In recent years, the growth of industry, technology, population, and water use has increased the stress upon both our land and water resources. Locally, the quality of ground water has been degraded. Municipal and industrial wastes and chemical fertilizers, herbicides, and pesticides not properly contained have entered the soil, infiltrated some aquifers, and degraded the ground-water quality. Other pollution problems include sewer leakage, faulty septic-tank operation, and landfill leachates. In some coastal areas, intensive pumping of fresh ground water has caused salt water to intrude into fresh-water aquifers.

Carbonates and bicarbonates are generated by the action of carbon dioxide in water on carbonate rocks such as limestone and dolomite. Bicarbonates of calcium and magnesium decompose in steam boilers and hot-water facilities to form scale and release corrosive carbonic acid gas. In combination with calcium and magnesium, they cause carbonate hardness. Chlorides are dissolved from rocks and soils. Present in sewage and found in large

amounts in ancient brines, sea water, and industrial brines, large quantities increase the corrosiveness of water and, in combination with sodium, give a "salty" taste. The chlorides of calcium, magnesium, sodium, and potassium are readily soluble. Drainage from salt springs and sewage, oil fields, and other industrial wastes may add large amounts of chloride to streams and groundwater reservoirs. Small quantities of chloride have little effect on the use of water. Chlorides in high concentrations present a health hazard to children and other young mammals.

Any Increase or decrease in pH level water can cause adverse effects.

## MATERIALS AND METHODS

Groundwater from four different areas was collected for the experiment. Out of them, 3 areas were Industrial areas and one was residential area. The three Industrial areas include-BHEL, Chintal and Gaganpahad, which are situated in and around Hyderabad. The residential area included the Mehdiapatnam area. Borewater from these areas was collected and the amounts of carbonates, bicarbonates and chlorides were determined by quantitative analysis in the laboratory. The pH of water was analysed using a pH paper. The levels of the above minerals in industrial areas was compared with that of the residential area.

### Estimation of Carbonates

Reagents used: 1% phenolphthalein indicator and  $n/20$   $H_2SO_4$

50 ml of water sample is taken and phenolphthalein indicator is added and titrated against  $H_2SO_4$ . Three readings were taken and the calculation was done.

Formula: Amount of Carbonates in water sample = Burette reading  $\times 1000/50$

### Estimation of Bicarbonates

Reagents used: 1% methyl orange indicator and  $n/20$   $H_2SO_4$

50 ml of water sample is taken and methyl orange indicator is added and titrated against  $H_2SO_4$ . Three readings were taken and the calculation was done.

Amount of Bicarbonates in water sample = Burette reading  $\times 1000/50$

### Estimation of Chlorides:

Reagents used:  $AgNO_3$  and Potassium dichromate

10 ml of water sample is taken and potassium dichromate is added, yellow colour is obtained and titrated against  $AgNO_3$ . Three readings were taken and the calculation was done.

Amount of chlorides present in water sample =  $N_1 \times \text{mol. wt} \times 1000$

Where  $N_1 = N_2 V_2 / V_1$

$N_1$  = Normality of water sample

$N_2$  = Normality of  $AgNO_3$

$V_1$  = Volume of water sample

$V_2$  = Volume of  $AgNO_3$

## Estimation of pH

Water from the four areas was taken and tested with a pH paper.

## RESULT

The amounts of carbonates is as follows

Mehdipatnam: 4mg/lit

Chintal: 6mg/lit

BHEL: 8mg/lit

Gaganpahad: 12mg/lit

The amounts of Bicarbonates is as follows

Mehdipatnam: 12mg/lit

Chintal: 22mg/lit

BHEL: 20mg/lit

Gaganpahad: 28mg/lit

The amounts of chlorides is as follows

Mehdipatnam: 88.75mg/lit

Chintal: 145.55mg/lit

BHEL: 71 mg/lit

Gaganpahad: 337.7mg/lit

The pH is as follows

Mehdipatnam area: Neutral pH



Chintal area:pH 7.5



BHEL area:pH 8



Gaganpahad area:pH8.5

**CONCLUSION:**

The amounts of carbonates, bicarbonates and chlorides were found to be the highest in the Gaganpahad region. The Chintal and BHEL areas showed intermediate levels. When compared to the residential area i.e. Mehdipatnam, all the industrial areas were found to have more mineral content in their borewaters.

Increase in carbonate and bicarbonate levels may cause more hardness of water. Chlorides in high concentrations present a health hazard to children and other

young mammals. The study suggests that the effluents released by the Industries are causing drastic changes in the groundwater quality and making it unfit for consumption.

The pH levels of the three Industrial areas was found to be more i.e., the water is found to be more basic than the residential area.

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