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WATER PROPARTIES AND ITS HARDNESS

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Abstract:

Water is unique substance with properties that are not predictable from those of other materials Different tyeps of samples collected to different areas and test with colour , turbidity , dissolved solids nature- order some other tests like pH , mineral test, bacteria test , salinity, temperature, BOD (biological oxygen demand), dissolved oxygen , nitrate & phosphate. Different Treatment methods

Key Words: pH , mineral test, bacteria test , salinity, temperature,etc.

INTRODUCTION:

The nature's most abundant supply i.e., water is essential for the survival of all the living beings on earth i.e., man, animals and plants. Water is not only essential for the survival of life, but it is also used for the operation in a large number of industries as coolant, solvent, for steam generation, for air conditioning, fire-fighting etc. Water is also used for all domestic purposes like bathing, drinking, washing, sanitary, irrigation etc.

HARDNESS OF WATER

"Hardness of water is the characteristic of preventing lather formation of water with soap". Generally salts like chlorides, bicarbonates and sulphates of Ca2+, Mg2+ and Fe2+ make water hard. This hard water on treatment with soap which is stearic or palmitic acid salts of sodium or potassium causes white precipitate formation of calcium or magnesium stearate or palmitate.

$$2C_{17}H_{35}COONa + CaCl_2 \rightarrow (C_{17}H_{35}Coo)_2 + 2NaCl$$

Thus the cause of hardness is the precipitation of the soap and hence prevents lathering at first. When the hardness causing ions are removed as insoluble soaps, water becomes soft and forms lather. 1

TYPES OF HARDNESS:

(i) **Temporary Hardness** is due to the bicarbonates of Ca2+ and Mg2+ and carbonate of Fe2+. Since bicarbonates readily get precipitated on boiling the water, the temporary hardness can be easily removed, viz.

$Ca(HCO_3)_2 \longrightarrow CaCO_3 \downarrow + H_2O + CO_2$

(ii) **Permanent Hardness** is due to the presence of chlorides and sulphates of Ca, Mg, Fe, etc. Permanent Hardness cannot be removed on boiling.

$CaCl_2 + Na_2Co_3 \longrightarrow CaCo_3 + 2NaCl$

EXPRESSION OF HARDNESS AND UNITS:

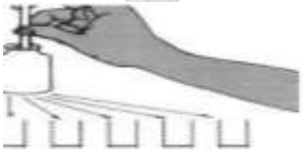
1. **Parts per million (ppm)**: It is the number of parts of calcium carbonate equivalent hardness present in one million parts of water. 1 ppm = 1 part of $CaCO_3$ equivalent hardness in 106 parts of water.

2. **Milligram per lite (mg/L)**: It is the number of milligrams of Calcium carbonate equivalent hardness present in one litre of water. 1 mg/lit. = 1 mg of $CaCO_3$ equivalent hardness in 1 litre of water.

3. **Degree Clarke (o Cl)**: It is the number of parts of $CaCO_3$ equivalent hardness present in 70,000 parts of water.

4. **Degree French (o Fr)**: It is the number of parts of $CaCO_3$ equivalent hardness present in 105 (1 Lakh) parts of water.

Colour , turbidity, total solids , dissolved solids , suspended solids , odour and taste are recorded. Colour in water may be caused by substances of vegetable origin such as algae and weeds. Colour tests indicate the efficacy of the water treatment system.



Temperature effects the solubility and reaction rates of chemicals. In general , the rate of chemical reactions increases with increasing water temperature . Biological processes temperature affects metabolism, growth , and reproduction.

S.N.	Parameters	Unit	Test methods
1	pH	-	pH meter
2	Dissolved oxygen	mg/L	Winkler method
3	Biochemical oxygen demand	mg/L	Incubation and titration
4	Conductivity	ms/cm	Conductivity meter
5	Alkalinity	mg/L	Titration
6	Total dissolved solids	mg/L	Digital conductivity meter
7	Chloride	mg/L	Argentometric titration
8	Total hardness as $CaCO_3$	mg/L	Complexometric titration
9	Ca	mg/L	Complexometric titration and calculation

Source	pH	Dry residue weight to volume ratio, mg/l	Conductivity, µmho
Ambazari	8.3	178	4 900
Telankhedi	8.1	275	5 400
Gandhisagar	8.4	554	9 900
Gorewada	7.6	221	–
Sonegaon Tank	7.8	386	2 900
Uni. Sewage pit.	8.0	386	7 400
Tap water	8.1	136	5 700
Well water	7.1	293	4 000
Bore well (DMN)	7.2	888	10 200
Bore well (NAG)	7.4	285	6 900
Dham River	10.6	433	20 700
Wardha River	7.4	169	6 300
Sea water	7.8	17 100	38 000
Rain water	6.5	4.98	102
Double distilled	6.1	11	9.5

Turbidity is measure of resistance offered by present in water in passge

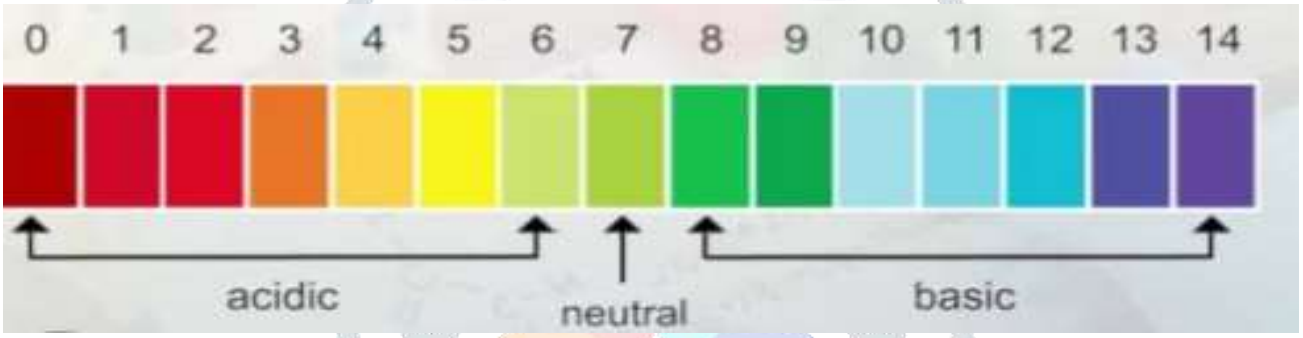
of light through water .Opaqueness in water is known as turbidity.

Turbidity in water is caused by

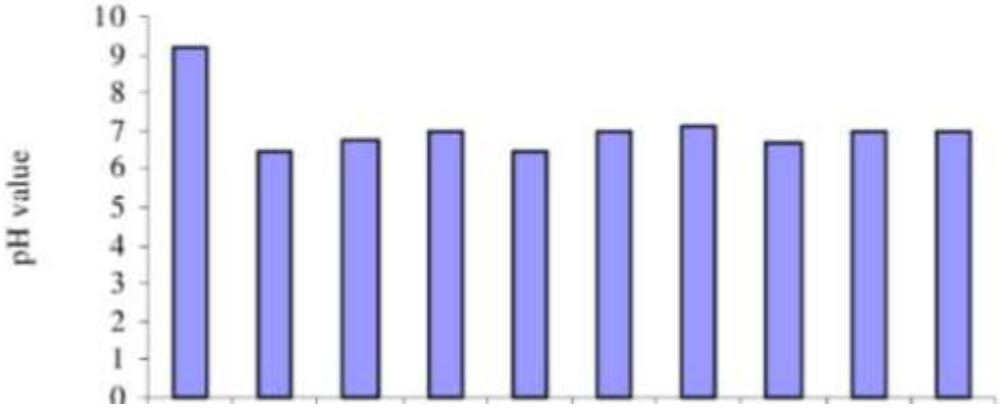
1. Suspended particles

2 .Colloidal Substanses

P^H is a measure of how acidic\basis watwe is. The reange goes from 0 to 14 with 7 being netural. P^Hless than 7 indicate acidity .where as a P^H of greater than than 7 indicates a base. P^H isrealy a measure of the relative amount of free hydrogen and hydroxyl ions in the water



pH values of water sources in study area



Location of different water

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