



SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)



HARDNESS OF WATER

Hardness is the property or characteristics of water, which does not produce lather with soap solution

Hardness of water can be detected in two ways

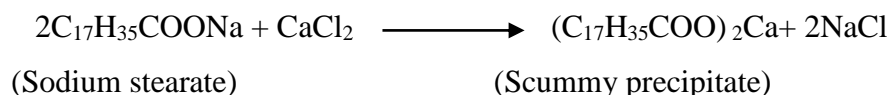
- When the water is treated with soap solution, it does not produce lather
- Hard water gives wine red colour with Eriochrome black T indicator

Hardness of water

If the water produces lather with soap, it is soft water. If the water does not produce lather with soap, it is called as hard water. The property is known as hardness. But it will produce a scummy white precipitate. The hardness is due to Ca^{2+} , Mg^{2+} and SO_4^{2-} , Cl^- , CO_3^{2-} , HCO_3^- ions and their salts.

Test for hardness:

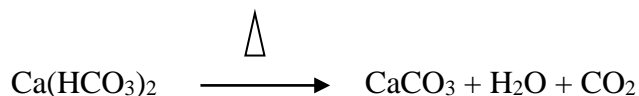
- a) Eriochrome Black – T indicator gives red colour in hard water.
- b) With soap, hard water gives a scummy precipitate.



Types of Hardness:

Temporary hardness (Carbonate hardness):

The hardness due to carbonates and bicarbonates of calcium and Magnesium salts which can be removed by simple physical methods such as boiling and filtering.. So, they are known as temporary or carbonate or alkaline hardness.



1.9.3.2. Permanent hardness (Non-carbonate):

The hardness due to chlorides and sulphates of calcium and Magnesium cannot be removed by simple boiling. They need special methods like lime soda process and zeolite

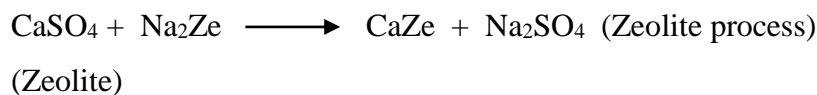


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process. This hardness is called as “Permanent hardness or Non-carbonate or non alkaline hardness.



Units of hardness:

i) ppm ii) mg/L iii) degree Clarkes iv) Degree French

1 ppm – 1 part by weight of CaCO_3 equivalent hardness / 10^6 parts of water

1 mg/L – 1mg of CaCO_3 / 1 Lr of water

CaCO_3 equivalence

Hardness is expressed in CaCO_3 equivalence. Because,

- i) It is the most insoluble and easily precipitable salt.
- ii) Its molecular weight is 100 and equivalent weight is 50. As these are whole numbers, it is very easy to use them in calculations

Detection of hardness

It can be detected in two ways.

When the water is treated with soap solution, If it prevents lathering and forms white scum, the contains hardness.



Water containing hardness, gives wine redcolour with EBT indicator at pH 9-10.