Types of Hardness

- Temporary Hardness or Carbonate Hardness (CH) or Alkaline Hardness (AH)

This is due to the presence of bicarbonates of calcium and magnesium. It can be removed by mere boiling. The bicarbonates are converted into insoluble carbonates and hydroxides, which can be removed by filtering.

$$Ca(HCO_3)_2 \longrightarrow CaCO_3\downarrow + H_2O + CO2$$

$$Mg(HCO_3)_2 \longrightarrow Mg(OH)_2\downarrow + 2CO_2$$

- Permanent Hardness or Non-carbonate Hardness (NCH) or Non- alkaline Hardness (NAH)

This is caused by the presence of chlorides and sulphates of calcium and magnesium. It cannot be removed by boiling. It can be removed only by Chemical or special treatment.

Units of Hardness

The concentration of hardness is expressed in terms of equivalent amount of $CaCO_3$ because it is the most insoluble salt obtained in water treatment and its molecular weight is 100(Eq.Wt .50). The different units are

- ppm : 1 part of $CaCO_3$ equivalent hardness in 10^6 parts of water
- mg/ L :1 mg of $CaCO_3$ equivalent hardness in 1 L of water

Weight of 1 L of water = 1 Kg. = 1000 g = 1000000 mg = 10^6 mg

Hence 1ppm = 1mg / L