

L.No: 07

Topic: Internal Treatment

Treatment of Boiler Feed water (softening or Conditioning Methods)

The process of removing hardness producing salts from water is known as Softening (or) Conditioning of water.

Methods:

- * Internal Treatment
- * External Treatment

Internal Conditioning (or) Internal Treatment (or) Boiler Compounds.

It involves the removal of scale forming substance, which were not completely removed in the external treatment by adding chemicals directly into the boiler.

These chemicals are called boiler compounds.

- * phosphate Conditioning
- * Colloidal Conditioning
- * Sodium aluminat Conditioning
- * Calgon Conditioning

phosphate Conditioning

* Scale formation can be avoided by adding Sodium phosphate

* It is used in high pressure boilers.



a) Trisodium phosphate - Na_3PO_4 (Too alkaline) -

Used for too acidic water.

b) Disodium hydrogen phosphate - Na_2HPO_4 (weakly alkaline) -

Used for weakly acidic water.

c) Sodium dihydrogen phosphate - NaH_2PO_4 (acidic) -

Used for alkaline water.

Colloidal Conditioning

- Scale formation can be avoided by adding colloidal conditioning agents like kerosene, agar-agar, gelatin etc.
- It is used in low pressure boilers.
- These colloidal substances get coated over the scale forming particles and convert them into non-adherent, loose precipitate called sludge which can be removed by blowdown operation.

Sodium Aluminate Conditioning

* Sodium aluminate (NaAlO_2) undergoes hydrolysis in boiler water to give gelatinous white precipitate of aluminium hydroxide and sodium hydroxide.



* The sodium hydroxide, thus formed precipitates magnesium as magnesium hydroxide.

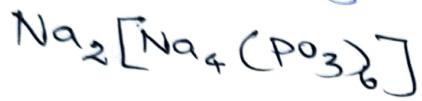
* The gelatinous precipitates of aluminium hydroxide and magnesium hydroxide entrap the

Colloidal silica and finely divided solids and settled easily.

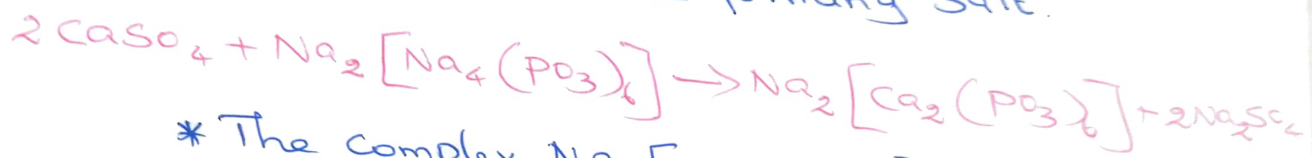
* This can be removed easily by blowdown operations.

Calgon Conditioning

* Calgon is Sodium hexametaphosphate



* This substance interacts with calcium ions forming a highly soluble complex and thus prevents the precipitation of scale forming salt.



* The complex $\text{Na}_2[\text{Ca}_2(\text{PO}_3)_6]$ is soluble in water and there is no problem of sludge disposal.

* So Calgon Conditioning is better than phosphate conditioning.