

27/9/23

	Sludge	Scale
i)	Sludge is a loose, slimy and non adherent precipitate	Scale is a hard, adherent coating.
ii)	The main sludge forming substance are $MgCO_3$ , $MgCl_2$ , $MgSO_4$ and $CaCl_2$ .	The main scale forming substance are $Ca(HCO_3)_2$ , $CaSO_4$ , $Ca(OH)_2$ , $Mg(OH)_2$
iii)	Disadvantages: Sludges are poor conductors of heat. Excess of sludge formation decreases the efficiency of boiler.	Disadvantages: Scales acts as a thermal insulator. It decreases the efficiency of boiler. Any crack developed on the scale, leads to <del>explosion</del> explosion.

iv) \* Prevention (sludge):  
 \* Sludge formation can be prevented by using ~~soft and~~ softened water.

v) \* Prevention (scale):  
 \* It can be prevented by dissolving using acids like  $HCl$ ,  $H_2SO_4$ .

vi) \* Sludges can also be removed by blow down operation.

\* scale formation can be removed by



A : External treatment  
B : Internal treatment

vi) \* Blow down operation is a process of removing a portion of concentrated water by fresh water. frequently from the boiler. during steam production.

\* Scale - They can also be removed by applying thermal shock, scrubbers, wire brush.

### Treatment of boiler feed water

The process of removing hardness producing salt from water. is known as softening or conditioning of water.

Softening of water can be done in two method.

#### i) Internal treatment

It involves the removal of scale forming substance, which were not completely removed in the external treatment. by adding chemicals directly to the boiler. This chemicals are also called boiler compounds.