

Corrosion and Water Treatment:

Cooling tower water treatment regime mainly consists of :

1. Scale and Foul Prevention
2. Biological fouling prevention
3. Corrosion prevention

Apart from this filtration of water is done using side stream filtration system and maintenance of pH is done by dosing acid.

1. Scale and Fouling Prevention:

Cooling tower internals are more prone to scaling and fouling because:

- Cooling towers are generally having higher water temperatures, promoting scale deposition and corrosion.
- Recirculating water acts as scrubber for air and takes away all the dust, smoke etc present in the water.
- Makeup water used to keep the level of water in the basin carries with itself scale, foul forming and corrosion promoting constituents.

Generally deposition of solids take place by two mechanism:

- 1. Fouling** is due to deposition of suspended solids present in the recirculating water.
- 2. Scaling** is due to precipitation of dissolved salts when water becomes super saturated.

It is very much dependent on pH and temperature of the water. Deposits of both types form a layer of solid non conducting material. Thus the performance of heat exchangers is drastically reduced. Deposits choke pipes, fills and nozzles also.

Thus to reduce fouling filtration is done and to reduce scaling water treatment by acid and chemicals is done. To reduce calcium carbonate, calcium sulphate and calcium phosphate proper water treatment regime is followed taking into consideration bicarbonate, sulphate, phosphate level and pH in the water. Normally phosphate content of water is quite less but it may come from corrosion treatment chemicals. In that case pH must be highly regulated to prevent calcium phosphate deposition. Apart from this there is scaling due to magnesium, silica content etc.

For properly preventing scaling calcium needs to be removed from the water as sludge along with silica, magnesium etc by following proper water treatment regime.

2. Biological Fouling

Cooling tower is exposed to sunlight, has warm water and dissolved minerals. These are the ideal conditions for growth of microbes and larger living beings like algae, fungi, molluscs etc. These organisms present the problem of fouling. Bacteria and other microbes also have tendency to create corrosion inducing chemicals. Treatment of biological fouling is normally done by adding chlorine to water. Apart from chlorine there are other chemicals too which inhibit bio growth.

3. Corrosion Prevention

Corrosion is basically chemical reaction in which a metal reacts to form useless compounds. The result of corrosion is removal of metal from site which leads to pitting and peeling. In pitting localized attack takes place. Corrosion depends on many factors like amount of dissolved solid, pH, temperature, dissolved oxygen etc. Corrosion takes place as cathodic and anodic reaction. So to prevent corrosion water treatment is done for corrosion inducing chemicals taking the nature of chemical reaction by which the corrosion is taking place.

Successful treatment or prevention requires a detailed study of the problem at hand and understanding the water chemistry along with the nature of metal to be protected. For this chemicals characterized as cathodic and anodic inhibitors are used depending on the water chemistry.