

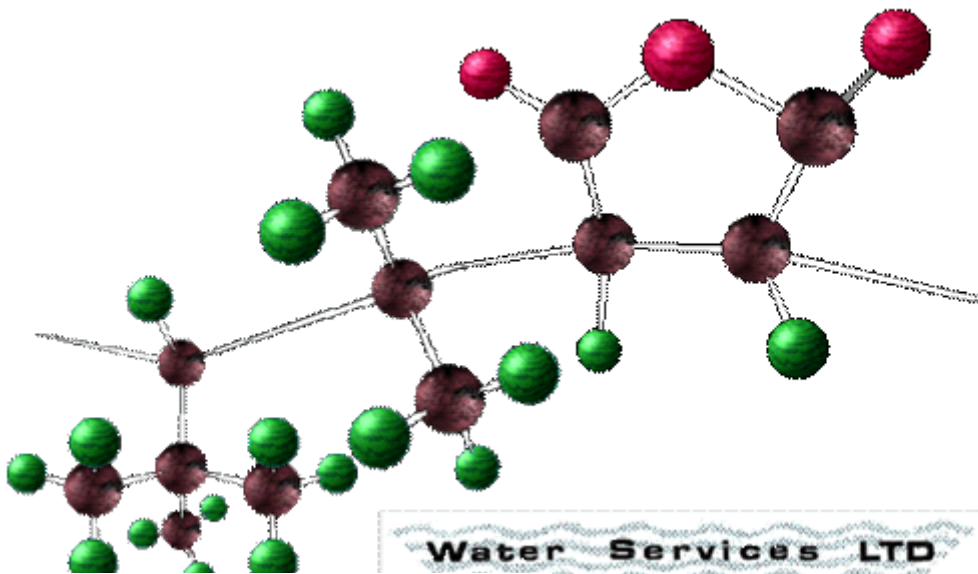
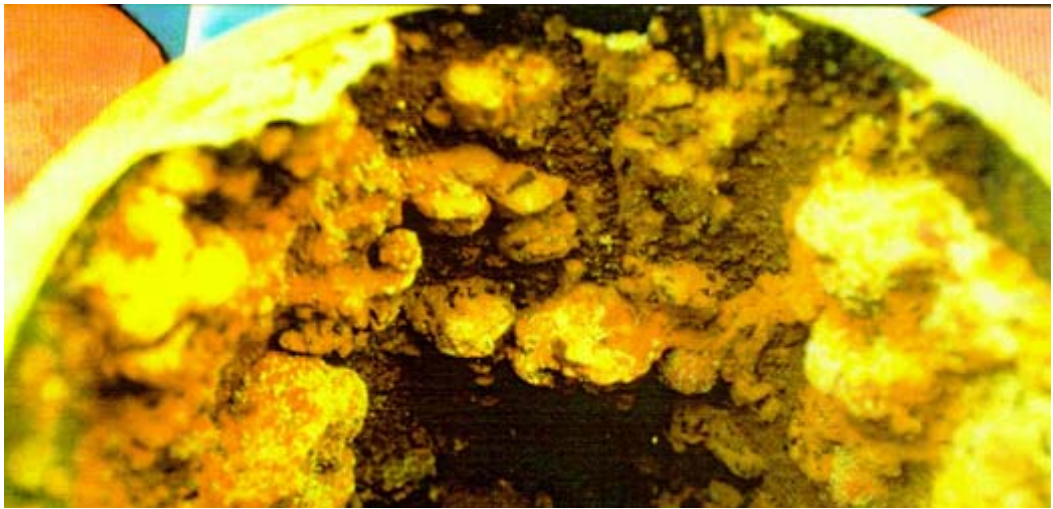
deposit control agents

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■ deposit control agents

Over the last 20 years, the technology of cooling water deposit control has advanced significantly. There are presently numerous different deposit control agents available that are used to prevent the formation of the various scales and foulants discussed in the previous section. Prior to discussing the actual composition of these materials, it is necessary to understand the different mechanisms by which these materials function.

In general, cooling water deposit control agents function via one or more of the following mechanisms:

- flocculation,
- scale crystal distortion,
- dispersion,
- sequestration, and
- surfactancy.

Since many of the materials that function via these mechanisms are polymers, we will first develop differences between the various types that exist.

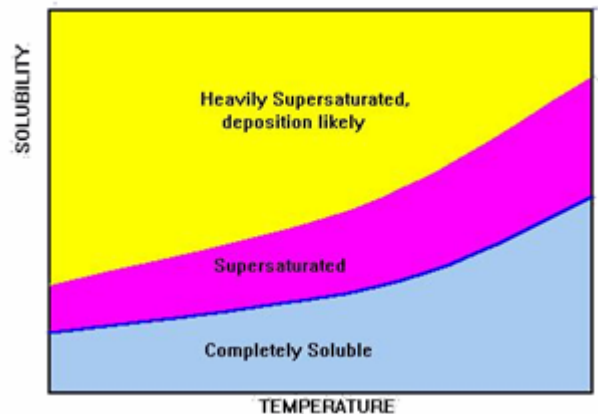


THRESHOLD INHIBITION

Low molecular weight substances or polymers (those whose chains are not long enough to link particles together via the bridging mechanism), tend to be absorbed on individual particles and on growing crystals of scale.

The action of these substances in preventing scale can be classified as threshold inhibition, whereby sub-stoichiometric quantities of inhibitor agents, inhibit scale formation.

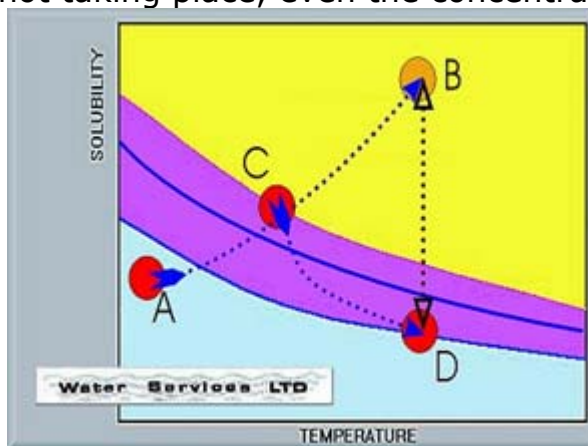
Threshold inhibition can act through dispersion, sequestration, or scale crystal distortion, but the most common in water treatment are the substances that act through supersaturation.



If we observe the solubility diagrams, we distinguish three zones. The zone of the solubility, the zone of supersaturated and the heavily supersaturated area.

As the concentration increases starting from point A, deposition is not taking place, even the concentration overpasses the solubility, and the solution becomes supersaturated.

Deposition starts at the point C at the boundary of



supersaturated and heavily supersaturated, and will be deposited a sufficient quantity of substance as to drop the concentration at the point D, at the solubility limits.

A threshold inhibitor enlarges the area of the supersaturated liquid, till a new point B, allowing the water to keep in solution higher amounts of substance.



But if the capability of the threshold inhibitor will be over passed, massive deposition will occur, and the concentration will drop at the same point D, like in the untreated liquid.

DISPERSION

A polymer can be adsorbed on foulant surfaces - imparting a like charge to them and thereby causing the particles to remain in suspension because of charge repulsion.

The molecular weight of the polymer must be kept low to prevent particle bridging and a resultant increase in particle size.

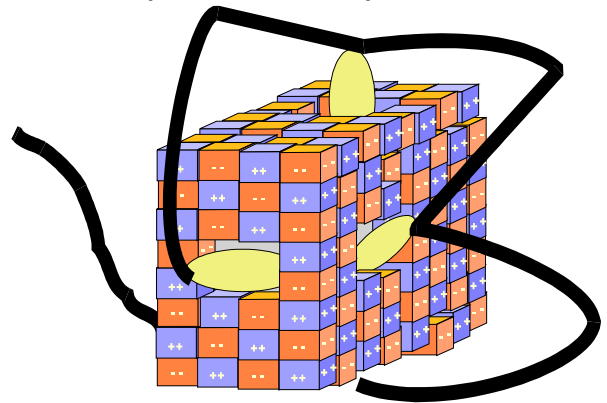
Because most of the fouling material in cooling waters already has a slightly negative surface charge, it is economically sound to add anionic polymers to water.

These increase the negative surface charge and keep particles separate. Addition of a cationic polymer is feasible but might involve considerably greater expense. The charge on the suspended particles would neutralize before sufficient positive charge was built up to keep them separated.

SCALE CRYSTAL DISTORTION

Scale crystal distortion is a mechanism whereby the solubility of the growing crystal is increased by altering its growth structure.

The inclusion of a relatively large irregularly-shaped polymer in the scale lattice tends to prevent the deposition of a dense uniformly-structured crystalline mass on the metal surface.

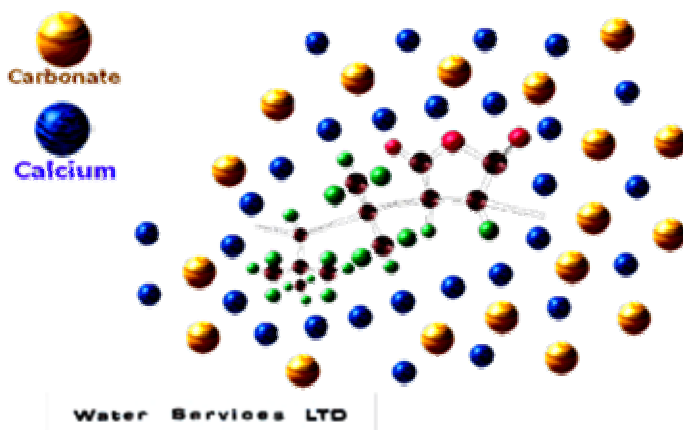


In theory, these crystals can develop internal stresses which increase as the crystal grows, with the result that the deposit breaks away from the metal surface.

SEQUESTRATION

A sequesterant is an agent which prevents an ion from exhibiting its normal properties by complexing with it. Some sequesterants are threshold inhibitors because they function below stoichiometric levels.

Other sequesterants which depend on stoichiometric reactions between themselves and deposit components are called chelants.

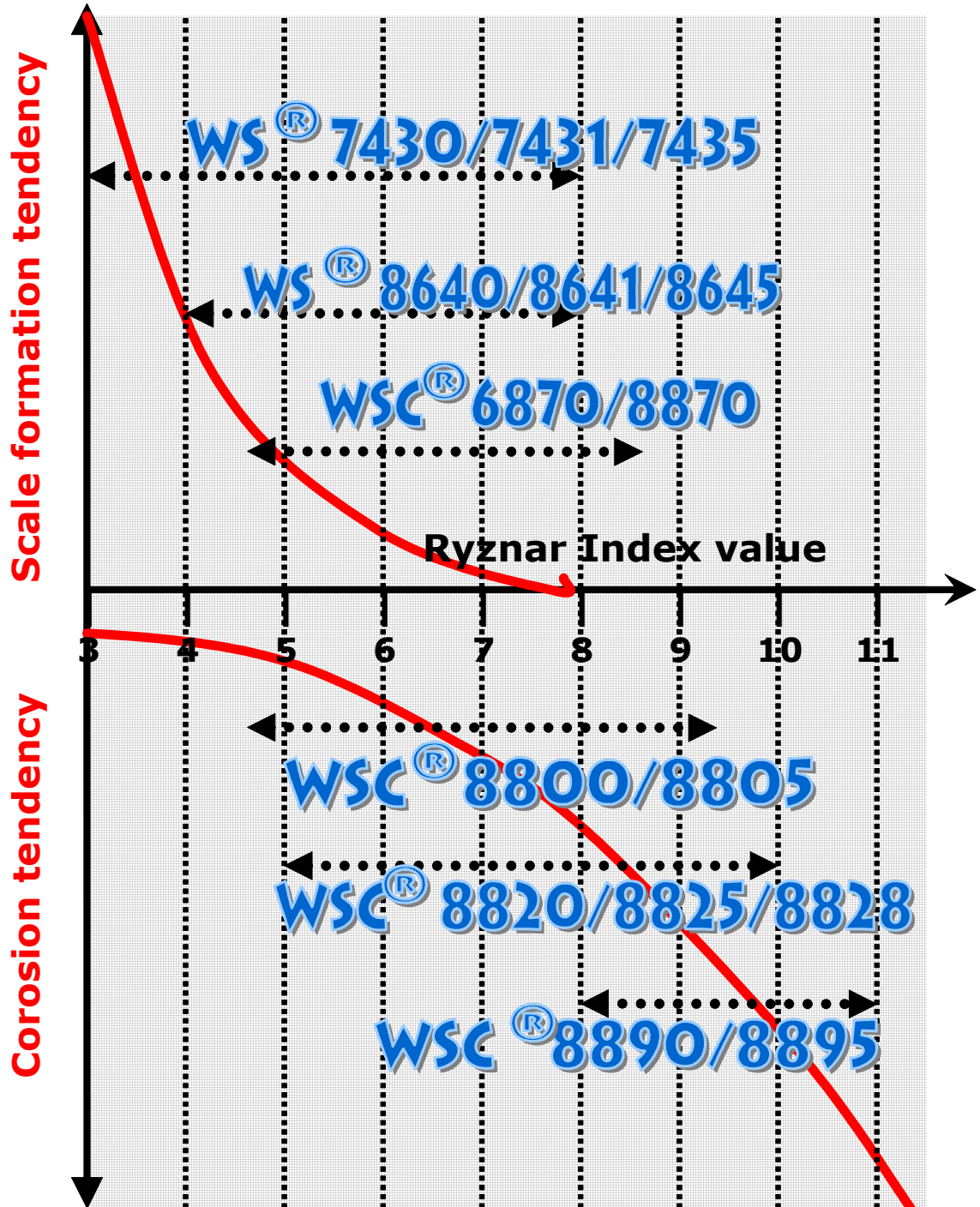


In polymers technology a sequesterant it is creating around it a "cloud" of ions, through electrochemical attraction.

Those ions, being in the water (and analyzed by chemical analysis) are actually not available to react between them and to create chemical deposits.

Cooling water

selection of scale/ corrosion inhibitor



Our representatives:

Country	Company
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