

Alden Leeds, Inc.

Manufacturer of chemicals that care for your pool

Technical Document #4

CHELATORS & SEQUESTRANTS

The word CHELATE is derived from the Greek word for "claw". In pool and spa chemistry chelate means a chemical treatment to control or "coat" soluble metal ions and prevent their oxidation into unwanted colored precipitates. A chelator attaches to a metal ion like copper or iron and wraps around it like a claw.

There are many types of chelators available in the market. Among the most widely used is a group of organic acids called "amino polycarboxylic acids". These chemicals are usually formulated into liquids that quickly attach to copper or iron ions and deactivate them. Please note that chelators will not react with metals such as finely divided iron shavings and they react very slowly with metals that are already oxidized or precipitated.

Sequestrants differ from chelators in the way they "coat" or react with mineral ions. Sequestrants generally have a few active sites on each molecule allowing it to control two or more metal ions at a time. Because of this, sequestrants are often more powerful as stain removers and are often sold with specific stain removal directions.

FACTS ABOUT CHELATORS & SEQUESTRANTS

Many chelators and sequestrants have metal ION PREFERENCES called "displacements". This means that certain metal ions will be coated before others. The usual preference is iron, then copper, then manganese, then calcium, then magnesium. There are chelators that favor calcium first.

The EFFECTIVENESS of chelators and sequestrants to coat undesired metal ions depends on the concentration of the ions to be chelated. For example, it is easier to control 1 ppm of copper and 1 ppm of iron in soft water (50 ppm of calcium) than in hard water (350 ppm of calcium). The presence of 350 ppm of calcium in water, for example, will occupy a large portion of the chelator intended to control the copper and iron. With this in mind it is advisable to chelate or sequester undesired metal ions before adding calcium to the water.

The AMOUNT of chelator or sequestrant needed depends on the type of metal ions present. For example, copper, iron, and manganese all require about the same amount of chelator whereas calcium requires 50% more chelator. Reactions to control metal ions occur within seconds in most cases.

Chelators and sequestrants are PH AND OXIDIZER sensitive. Very low pH, occurring in a "pocket" of water where acid has been added, can cause loss of chelation. Very high pH, again a "pocket" effect, can also cause chelation failure and precipitation of copper or iron. Because most chelators and sequestrants are organic molecules, they are subject to attack by high levels of oxidizers and "wear off" over time. This is the reason that most product labels state that continued additions may be necessary to control metals. With this in mind, it is obvious that shock treatments should not be performed directly after chelators or sequestrants have been added.

TEMPERATURE and TDS (Total Dissolved Solids) have slight effects on chelation. According to manufacturer studies, high temperature and high TDS increase the amount of chelator or sequestrant needed.