

Chelates

Chelate is derived from the word "chela," which is the claw of a crab, lobster, scorpion, etc.

In our case the metallic ions such as calcium, magnesium, iron, etc. are bound by the "claw" and kept from reacting with other products that might form precipitates, etc.

Chelates are usually organic compounds which attract metal ions to itself.

You will also hear the word SEQUESTER which is used interchangeably with chelation. It's normal definition is to keep something apart from all other, to isolate.

Major Classes of Chelates

Aminopolycarboxylic Acids

- EDTA
- HEDTA
- NTA
- DEG
- EDG

Hydroxycarboxylic Acids

- Citric Acid
- Gluconic Acids
- Glucoheptonic Acid

Other chemical complexing agents act as chelating agents or have the ability to sequester metal ions.

- Oxalic Acid
- Lactic Acid
- Sorbitol
- Triethanolamine
- Thiourea
- Lignosulfonates

In our Focus Product Program we will concentrate on Polyaminocarboxylic acid chelating agents.

The removal of undesirable metal ions is often difficult and expensive and it is usually easier to inactivate them with a chelating agent.

Amino acid chelating agents securely bind these ions to form stable complexes, which remain very soluble. Thus, the metal ion can no longer exert an adverse effect on the system.

In the formulating and compounding industry the major problem is hard water, which can cause precipitation and/or separation. Even if the compounder has "soft" water, he may be making a concentrate and shipping it into an area with hard water.

It normally takes between .5 and 1% of a chelate to do the job.

Every compounder should be using EDTA, especially if they make disinfectants. The formulas will require EDTA as EDTA enhances the efficacy.

Active pH Range

Acid	Fe ⁺³	Mn ⁺²	Mg ⁺²	Cu ⁺²	Zn ⁺²	Ca ⁺²
NTA	0-5	3-11	5-11	0-12	3-11	7-14
HEDTA	0-10	3-13	5-12	0-13	3-11	4-14
EDTA	0-8	2-14	4-13	0-14	3-11	3-14
DTPA	0-10	2-14	4-13	0-14	3-11	4-14

EDTA Uses

- Agriculture
- Water Treating
- Detergents and Soaps
- Metal Plating/Electronics
- Food and Pharmaceuticals
- Mining
- Oil Industry
- Photography
- Polymer Processing
- Pulp and Paper
- Textiles
- Hydrogen Sulfide Removal

EDTA in Household Products

Bathtub and Shower Cleaning Products

- Rapid removal of hard water soap films and scums. EDTA removes calcium from soap film and converts it to the soluble sodium soap, which can be easily rinsed.

Disinfectants

- Increases the efficiency of the germicide.

Hard Surface Cleaners

- EDTA dissolves inorganic and fatty soil components while improving rinseability.
- Superior Builders when compared to TKPP in anionic systems.
- Greatly reduces streaking.
- Increases foam by softening the water.

Steam Extraction Carpet Cleaners

- Used as the primary builder as EDTA is stable to hydrolysis and eliminates scale and precipitation from occurring in the machine and carpet.

- EDTA minimizes the penetration and wetting of the carpet through to the backing. Thus faster drying time is obtained. This also aids in reducing mildew growth.

Household Ammonia

- Will form precipitates of magnesium hydroxide from traces of water hardness. Addition of a small amount of EDTA or HEEDTA will prevent this.

Bar Soaps

- Subject to discoloration and rancidity caused by traces of metal ions. 0.2-0.5% of EDTA or HEEDTA will increase the shelf life of these products.

Automatic Dishwash

- EDTA aid in the removal of proteinaceous soils.

EDTA in Institutional Products

Germicides

- EDTA acts to increase the permeability of the bacterial cell wall. The cell then becomes highly sensitized toward the germicide. It has been shown that without EDTA, certain pathogens develop a resistance to quats and phenolics.

Hand Cleaners

- Helps maintain clarity, prevent rancidity and eliminate clogging of dispenser orifices.

Wax Stripping

- Most floor polish products are made from a zinc-interlocked polymer. EDTA aids in the removal of the zinc, which aids in the removal of the polymer.

Vehicle Washing

- EDTA is effective in helping to remove road film and aids rinsing.