

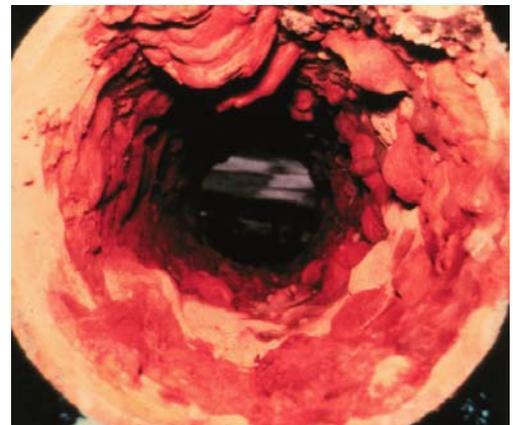


Improve Your Water Quality With Carus Phosphates

CARUS™ K-5 water treatment chemical, and CARUS™ 985 water treatment chemical are among the most effective products approved for drinking water corrosion control. Our products will help to maintain system infrastructure, mains, valves, and meters and ensure compliance with the Lead & Copper Rule by minimizing corrosion in your distribution system. As dictated by the Lead & Copper Rule, municipalities are required to implement a treatment program when lead and/or copper levels in drinking water exceed action levels (0.015 mg/L for lead and 1.3 mg/L for copper) to minimize the release of lead/copper by-products from plumbing, soldered joints, and brass fixtures.

BENEFITS

- Minimize release of iron, lead, copper, zinc, and calcium from pipe surfaces
- Prevent iron corrosion and color formation from pipe surface tuberculation
 - Effective at a wide range of pH (6-9)
 - Phosphate buffer alkalinity contributed to under-saturated water quality
- Minimize corrosion reactions and tuberculation at low dosage rates
 - 1 mg/L phosphate : 342 mg/L combined Ca/Mg bicarbonate
- Effectively lowers chlorine demand from iron by-products
- Inhibit general surface corrosion, microbial corrosion, and pitting
- Maintain system infrastructure, mains, valves, and meters



Highly Corroded Water Distribution Line

TREATMENT PROGRAM

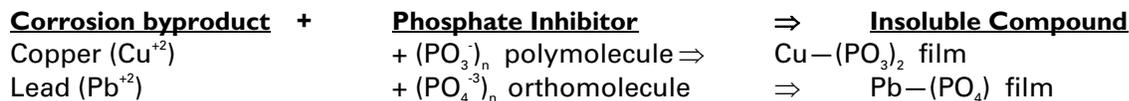


Like fingerprints, no two drinking water supplies are the same. Carus Chemical Company can help ensure compliance with the Lead & Copper Rule, eliminate red and black water, prevent scaling, and solve other drinking water headaches. By evaluating your key water quality parameters, such as pH, hardness, iron, and manganese and your treatment objectives such as Lead & Copper Rule compliance and corrosion control Carus can use computer modeling to select the most cost effective product, determine dosing requirements, and predict performance. Carus laboratory staff provides analytical services, feasibility studies, and dosage evaluations for the specific corrosion requirements of your water system.

DOSAGE & COSTS

Typical dosages of Carus phosphate inhibitors range from 1-5 mg/L in potable drinking water, and are allowed up to 10 mg/L as phosphate ion, by the ANSI/NSF Standard #60. The treatment cost can range from < 1 cent to 10 cents per 1,000 gallons of treated water.

CHEMISTRY



CARUS PHOSPHATE TECHNICAL DISCUSSION

Main breaks, water leakage, loss of hydraulic capacity from corrosion by-products, and water quality deterioration are the primary results of uncontrolled corrosion in a water system. The EPA Lead & Copper Rule (1991), 40 CFR Parts 9, 141, and 142 was enacted to minimize the release of lead/copper by-products from plumbing, soldered joints, and brass fixtures. Considered originally as the "best available technology", zinc orthophosphate (ZOP) had been used for many years to control rusty water and general forms of corrosion. Application of Carus phosphate-based corrosion inhibitors can easily be injected via a chemical metering pump into finished water separate from other chemical additives (chlorine, fluoride, caustic soda, etc.), or if permissible down the well casing to mix with groundwater at the pump intake.

CARUS™ K-5, and CARUS™ 985 water treatment chemical form microscopic coatings of insoluble orthophosphate or passivate the pre-corroded pipe surface with a metallic-phosphate complex. These chemicals adapt to the water quality and system conditions adhering to iron, steel, galvanized, lead, copper, asbestos/cement, and metallic alloys. Inhibitor

coatings tend to remain thin, since they are self limiting and yet very protective of the base metal or plumbing fixture, because some orthophosphate compounds are highly insoluble in water and polyphosphate chains carry an affinity for the metallic pipe surface. Carus orthophosphates provide barriers against anodic current flow and metal pipe release, while Carus polyphosphates react with metal ions (Metal^{+2}) released at the anode to minimize metal discoloration in the water and also react with corroded pipes minimizing oxygen transport to the surface, decreasing cathodic corrosion reactions. There are many variables to the corrosion mechanism and the inhibitory properties of Carus phosphates, but research reveals that Carus orthophosphate, polyphosphate, and blended phosphates are proven to minimize various corrosion reactions.

Phosphate ions are negatively charged particles (anions) with an electronic attraction for oppositely charged positive ions (cations) on a pipe or corroded pipe surface. When cations such as Fe, Cu, Pb, or Zn come in contact with the orthophosphate anions, they react to form a coordinated molecular structure that becomes insoluble in the water. Application of condensed polyphosphates into water supplies will delay the oxidation, color formation, and precipitation of metallic cations in a water system and also recapture iron that is being released from pipe tuberculation as rusty water.



Unsafe, Corroded Lead Pipe



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