

Polyphosphates and Scale Control

Scale is solid material that builds up on the surfaces of water-using kitchen equipment such as coffee makers, automatic ice makers, dishwashers and instant hot taps. This build-up causes serious problems, including diminished water quality and taste, clogged water lines and shorter life of appliances. Scale also can cause equipment to use up to 25 percent more energy to heat or cool water properly.

The most common scale material is lime scale. Originating as limestone in the ground, the material dissolves in water, and the calcium carbonate crystallizes again when conditions change in foodservice equipment and household appliances.

There are measures that can be taken to help prevent or reduce scale formation and extend appliance life. The most effective remedies are special filtration systems and stabilizing chemicals called polyphosphates, which inhibit the growth of scale crystals.

Causes of Scale Build-Up

Every water supply has some dissolved mineral content. Rainfall, for example, dissolves minerals when it falls to the ground. Limestone, the most common mineral, is dissolved by rain and produces "hard" water. The longer water is in contact with the ground, the more minerals are dissolved in it and the harder it gets. Even fresh lakes and streams that may be quite "soft" at their origin can become hard from evaporation.

Many water-using appliances, from coffee makers and ice makers to commercial vending machines and cheese dispensers, are susceptible to lime scale build-up that can result in repeated maintenance and high energy costs.

In the Home

In the home, scale build-up can affect the performance of coffee makers, ice makers and instant hot taps and produce film in shower stalls and clog shower heads.

Scale forms directly on heat-transfer surfaces, such as the bottom and sides of a coffee pot, and even on the heating elements themselves. On heating elements, scale acts both as an insulator and heat mirror, requiring more energy to heat the water and causing the heating elements to burn out more quickly. Scale also can clog the openings and pipes in instant hot taps.

In addition to surface growth, scale also forms around tiny particles floating in water. They act as "nuclei" to attract scale. Removal of these specks of dust can prevent or delay a lot of scale formation.

Refrigerators with automatic ice makers and water through the door also are affected. As water becomes ice, the minerals present in the water become concentrated, and scale begins to form on the cooling element. This results in ice maker breakdowns. What's more, scale can form on the water dispensing unit in the door.

In Restaurants and Foodservice Businesses

Many of the same scale problems that plague home kitchens are magnified in foodservice operations because of the volume of water used in these applications.

In addition to coffee makers and instant hot taps, steamers are among the most susceptible equipment for scale build-up. As water boils and evaporates, minerals remain and become concentrated. Because of these high concentrations, steamers require specialized maintenance and frequent cleaning.

Commercial cuber-type ice makers require more service to correct scale build-up than any other equipment commonly used in foodservice. Like steamers, commercial ice makers leave a high concentration of minerals as most of the water becomes ice. The resulting residue is a murky mixture full of sediment and growing crystals that restricts tubes, fouls pumps, clogs orifices, scores valves, and causes ice to hang in clumps. Scale can often leave foodservice managers with higher energy expenses to produce less ice, and frequent and costly machine breakdowns.

The Power of Polyphosphates

Fortunately, scale growth can be reduced by adding small amounts of polyphosphates to water. Polyphosphates are completely safe and nontoxic, and many occur naturally in foods or are added during processing. They are also used in the treatment of drinking water to combat corrosion and scaling.

At high concentrations, polyphosphates combine with minerals but stay dissolved to produce "soft" water. At moderate levels, polyphosphates cause all of the hardness to precipitate as sludge, also producing "soft" water. Only small amounts of polyphosphates are used in drinking water.

The addition of very small amounts of polyphosphates to water is referred to as "threshold treatment," and it works in two ways, simultaneously. First, the polyphosphates work on surfaces by clinging to growing scale, inhibiting further growth.

Second, polyphosphates prevent or inhibit the clumping of suspended particles, such as growing scale crystals. When combined with fine filtration to remove most of the smaller particles that serve as "nuclei" to initiate crystallization, the threshold method dramatically reduces scale build-up.

The threshold method, adopted by many water municipalities, must be carefully controlled to maintain effectiveness. Because of the high degree of control needed for maximum results, it is not consistently reliable when employed on a large scale.

Steps for Eliminating Scale

Most scale-producing situations can be resolved more effectively with a point-of-use water treatment system that couples fine filtration and a polyphosphate feed. Everpure, Inc. produces many systems meeting these specifications for home use, vending and office applications, and commercial foodservice.

Drinking water treatment units certified by NSF International under Standard No. 42: Aesthetic Effects and Standard No. 53: Health Effects, also guard against other water contaminants, such as lead and parasites. NSF International is an independent "third party" testing agency that sets standards for products that can affect sanitation and public health.

Units designed for residential use are typically the size of a household fire extinguisher. They are installed under the kitchen sink and dispense filtered water through a dedicated drinking water faucet. Water treatment units for commercial operation are larger to accommodate higher volume water usage.

For scale that has already formed, Everpure has available an alternative to the traditional solution of using strong acids to remove scale. ScaleKleen™ will delime most water-using equipment used in foodservice applications and at home. Since the product is more gentle than most acids, maintenance costs for foodservice equipment parts are less, no protective clothing is needed, and drain disposal is safe.

For more than 60 years, Everpure has been a leading manufacturer of water filtration systems for commercial and residential use and offers a full line of systems to meet all water quality needs.

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