



WATER TREATMENT NEWS

Exploding the Myth of "Safe" Scale Cleaners

Volume 29

Fall 2007

Caveat emptor! Great advice to follow if you're buying a used car or securing a mortgage. Buyer beware! Check under the hood, take a test drive; read the fine print. Know what you're getting before you spend your money, and avoid unpleasant surprises like a blown transmission or a mortgage payment that doubled because the interest rate reset.

Buyer beware is also excellent advice to heed when buying and using chemicals to remove scale from your chiller or boiler. When selecting a scale cleaning product, the buyer needs to consider not only the ability of the product to clean his equipment, but also the hazards associated with product use, as well as discharge of the spent cleaning solution. Failure to address all these issues could result in injury to personnel, damage to heat exchange and related equipment, and trouble with regulatory agencies, including fines for illegal discharge of hazardous material.

There are a number

of products on the market designed to clean scaled water-using equipment. Most products marketed for off-line removal of scale from steam boiler and cooling system heat exchange equipment share a common primary component: hydrochloric acid (HCl). Products that contain HCl as the major component are effective at removing "typical" scales consisting primarily of calcium carbonate and other calcium and magnesium salts, along with iron oxides and hydroxides. As effective as these products are, their use presents certain risks to the user.

HCl, in solutions at concentrations high enough to be effective at off-line scale removal, is corrosive to both skin and metal surfaces. Care should be used when handling HCl solutions to minimize contact with skin and eyes. Proper personal protective equipment (PPE), including impervious apron, rubber gloves and goggles and/or face shield, should be worn when handling *any* HCl solution. For handling more concentrated HCl solutions, a respirator with a cartridge rated for acid

gases is recommended.

The hazards inherent with the handling and use of scale cleaning products—possible damage to equipment being cleaned and the potential for injury to personnel handling the products—are obvious. The water treatment chemical industry is continually looking for ways to make these types of products safer to personnel, equipment and the environment.

Two companies that produce scale cleaning products seemingly made this breakthrough. Rydlyme, sold by Apex Engineering Products Corporation, and Safe-D-Scale, sold by Delta Products Group, are cleaners designed to remove scale from industrial water using equipment such as steam boilers and cooling system condensers and heat exchangers.

Claims made in marketing literature for both products are similar and include statements to the effect that human contact with the products presents *no* danger. A Rydlyme brochure claims that the product is "totally safe, non-toxic, non-injurious, non-flammable, non-hazardous, non-corrosive and biodegradable." The Safe-D-Scale Material Safety Data Sheet (MSDS) states, "This material is an aqueous organic solution and as such should **NOT** be considered hazardous under normal conditions." Both products are shipped as non-hazardous by DOT definition, and the literature for both products claims that when cleaning with the products is complete, no neutralization is required, and the spent solution may be safely flushed directly to sewer.

MSDS for both

Continued

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products lists the hazardous ingredient as “Hydrogen chloride, aqueous” at a concentration of “less than 10%.” This raises a red flag of suspicion, especially considering the companies’ claims that the products are totally safe, non-injurious, non-hazardous and non-corrosive. “Hydrogen chloride, aqueous” is hydrochloric acid!

International Chemtex Corporation (Chemtex), a producer of industrial water treatment chemical products including scale cleaners, makes a product it calls Desolve Safe, a material containing slightly less than 10% HCl, along with an organic corrosion inhibitor. Chemtex markets this product as a “safer” scale cleaner, meaning that Desolve Safe is less dangerous to personnel than concentrated HCl descalers, which typically have a hazard rating of 3 for health, meaning that serious injury would result from exposure to the product. Chemtex has submitted Desolve Safe to a dermal corrosivity test approved by US DOT and US EPA to determine its status as a corrosive hazardous material. Based on this testing, Desolve Safe has been determined to have a hazard rating for health of 1, which means that

irritation or minor injury would result from exposure to the product in “as received” form. This testing further indicates that Desolve Safe is a class 8 packing group 2 hazardous material by DOT definition. Thus, while Desolve Safe is much safer to use than more concentrated cleaners, it is still a hazardous material that requires care in handling.

Chemtex received repeated requests to produce a scale cleaner that was not just “safer,” but completely safe for handling and use as Rydlyme and Safe-D-Scale were represented to be. Chemtex technical staff were skeptical that an HCl solution of the concentration of Rydlyme and Safe-D-Scale could be made non-hazardous and totally safe to handle, so they submitted both products to the same DOT and EPA approved testing procedure used to test Desolve Safe. This testing determined that Rydlyme and Safe-D-Scale, in contradiction to their literature, were both class 8 packing group 2 corrosives, and needed to be labeled as hazardous by DOT definition. This would suggest that these products would have a health hazard rating of at least 1, also contrary to claims made on their literature.

Hofstad further states that Chemtex takes its customer’s safety and potential liability exposure seriously. Correctly describing and labeling its products, he asserts, is a big part of Chemtex’s commitment to assuring that its customers personnel and equipment are protected.

These contradictions cast suspicion on other claims made about these products, especially that, when cleaning is complete using either product, the spent solution can be safely sent to sewer with a water flush.

John Hofstad, Chemtex Operations Manager and head of laboratory services, directed Chemtex laboratory personnel to test the pH of Rydlyme and Safe-D-Scale. The pH of both products was found to be 0.1—the same as that of Desolve Safe. When HCl solutions of this pH are used to clean scale deposits, the pH of the spent solution will virtually always be in the range of 2.0—4.0. Sending this solution to drain with only a water flush would be in violation of most

municipality’s discharge regulations—almost everywhere in the country, the lower pH limit for discharge to the sanitary sewer is 6.0. Companies or individuals caught violating these regulations are subject to fines.

Hofstad says that Chemtex always recommends that its customers, when using Desolve Safe or any other acid-based scale cleaner, test the pH of the spent cleaning solution, and, if it is below 6.0, that they completely neutralize the solution up to a pH of 7.0—8.0 with a suitable alkaline material before discharging the solution to sewer. Hofstad further states that Chemtex takes its customer’s safety and potential liability exposure seriously. Correctly describing and labeling its products, he asserts, is a big part of Chemtex’s commitment to assuring that its customers personnel and equipment are protected.

Caveat emptor - - buyer beware! Know what you’re getting when you buy a scale cleaning product or any other chemical for use in your facility or home. Following this advice can prevent injury to personnel, damage to operating equipment and can save your company money!

In 40 CFR § 261.22, EPA defines a substance as being corrosive if “it is aqueous and has a pH less than or equal to 2 or greater than or equal to 12.5...” The US DOT also allows the use of this definition to determine whether a substance is to be considered hazardous for transport in commerce. However, this definition has two important limitations for liquid materials. First, scientific studies have shown that there are many substances whose pH falls within the presumably non-corrosive range of 2.0—12.5 that actually *are* corrosive. Second, it is impossible to use pH value by itself for accurate assignment of packing groups as required by DOT regulations for class 8 corrosive liquids. Also, there are a few rare instances in which substances with pH less than 2.0 or greater than 12.5 are not corrosive by DOT definition. The gold standard test to determine if a liquid is corrosive or not and, if it is corrosive, to assign its packing group, is the Corrositex® test produced by In Vitro International. Since questions persisted as to whether Safe-D-Scale, Rydlyme and Desolve Safe were actually corrosive, International Chemtex Corporation had all three products subjected to the Corrositex® test as the final determinant. The photographs below clearly show the results of that testing.

The Corrositex® procedure measures the dermal corrosivity of a substance by determining the length of time required for the substance to penetrate a test membrane. When penetration is made, the substance mixes with a reagent solution, producing a noticeable color change. The time required for penetration defines corrosivity and determines the packing group for DOT transport requirements. Penetration within three minutes indicates the substance is a class 8 corrosive material in packing group 1; 3-30 minutes indicates a packing group 2 corrosive and 30-60 minutes indicates a packing group 3 corrosive. If greater than 60 minutes is required for penetration, the substance is non-corrosive.

This shows the color change for Safe-D-Scale. Penetration occurred in 5½ minutes, indicating that the product is a class 8 packing group 2 corrosive material. Packing group 2 corrosive materials present “medium danger” of exposure



The Rydlyme sample showed a clear color change in 7 minutes, making this product a class 8 packing group 2 corrosive material.

Desolve Safe penetrated the test membrane in 8½ minutes, also making it a class 8 packing group 2 corrosive material.





**Do you need
to clean fouled
equipment?
Ask your
Chemtex representative
to recommend a product
that keeps your personnel
and
equipment safe!**

“Accurate information is good business”

-In Vitro International