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CHEMICAL PROCESSES FOR INDUSTRY
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T.C. 223
Liquid Aluminum Cleaner and Etchant

PRIMARY APPLICATIONS

T.C. 223 is a liquid consisting of a blend of alkalis, chelating agents and low-foaming surface active agents. This balanced blend of ingredients functions as:

- An efficient etchant for aluminum, combining cleaning action with uniform etching. T.C. 223 also suppresses scale build-up on tank surfaces and heating coils.
- An economical rapid action paint stripper that features pigment residue removal and good rinseability.
- A convenient, clean and fast method of neutralizing acid wastes on a continuous down-the-drain basis.
- A heavy duty cleaner of railroad trucks, underframes and running gear.
- A low-concentration, highly efficient cleaner in paper mill stock systems and suction rolls.

PRODUCT FEATURES

1. Provides a uniform etch on aluminum and its alloys.
2. Depth of etch is easy to control.
3. By-products of etching reaction do not form as a scale on tank surfaces and heating coils. Sludge remains soft and is easily flushed away. Costly, time-consuming and often damaging mechanical means of scale removal are eliminated.
4. A combination of bleed-off of used solution and fresh material input can be established to maintain a uniform etching rate and a uniform etched aluminum finish.
5. Can be automatically metered into the tank with a continuous bleed-off, feed-in operation.
6. Controlled foaming produces a foam blanket that reduces obnoxious fumes without foaming out of the tank.
7. Good rinseability leaves metal in prime condition for subsequent operations.
8. It is a liquid material that is immediately soluble in water. There is no pre-mixing required and no dead and wasted, undissolved material on the bottom of the tank.
9. Meets FDA requirements for use on food contact surfaces.

APPLICATION PROCEDURE

Aluminum Etching

Precleaning

If soil is light, precleaning will often not be needed. T.C. 223 will remove light oil. Where the aluminum is covered with considerable soil and stencil ink, a separate cleaning operation before etching may be desirable. T.C. 206 or T.C. Brightener can be used. These products have the advantage of being single step processes. If standard alkaline cleaners such as T.C. 208 or T.C. 206 Aluminum Cleaner are used to preclean, deoxidizing after cleaning and before etching is generally necessary.

Etching

1. Add T.C. 223 directly to cold water in tank at the following concentrations:
   a. For a light etch, 2% to 4% by volume
   b. For a medium etch, 4% to 6% by volume
   c. For a heavy etch, 6% to 8% by volume

   A 1% by volume addition of T.C. 223 is approximately equal in alkalinity strength to 1 oz./gal. of T.C. 218 or equivalent dry etchant.
2. Mix and heat solution to a temperature of 140° to 160°F.
3. Immerse aluminum into the solution. The immersion time will depend on the degree of etching required. The following conditions along with solution concentration affect the etching rate:
   a. Temperature - A 6% by volume concentration of T.C. 223 solution at 80°F will etch an 1100-H-14 alloy at the rate of approximately 0.03 mils per minute. Increasing the temperature to 180°F, all other conditions being the same, the etch rate becomes approximately 0.66 mils per minute, an approximate 2100% increase in etching rate for a 125% increase in temperature.
   b. Aluminum Pick-up - As the dissolved aluminum builds up in the solution, the etching rate decreases. For example, a solution with 10 oz./gal. aluminum salts in solution will etch at a rate equal to approximately one-third that of a fresh solution. A uniform etch rate can be established by bleeding off some of the used solution and replacing with fresh T.C. 223. This technique is similar to that used to control chromic acid anodizing baths. Maintaining the aluminum concentration at 4 to 6 oz./gal. is the indicated level for optimum results.

   The control of these conditions is necessary to maintain uniform results.
4. Cold running water rinse.
5. Aluminum ready for other operations in the conditioning and finishing process.

Etching Solution Control

If T.C. 223 is made up on a weight basis, the conversion factor is 1.1. The concentration of the solution will be in oz./gal. of active etchant.

Etching Solution Upkeep
The period for replacing the etching solution may be extended almost indefinitely by a constant bleed-off and a continuous input of fresh T.C. 223. Using this procedure, a uniform etching rate can be maintained by holding the aluminum salt concentration constant, generally 4 to 6 oz./gal., and keeping the proper T.C. 223 concentration.

Paint Stripping

T.C. 223, as a paint stripper, offers the convenience of a liquid, the ability to remove pigment residues and the property of good rinseability. T.C. 223 can be used full strength or reduced with water. The work can be carried out by tank immersion or hot flow-on.

Application
Full strength - Used full strength at room temperature or up to 160°F, T.C. 223 is an economical paint stripper for use on such paint films as may be readily removable by alkaline strippers.

Solution
Use T.C. 223 at 5% to 25% by volume with water. The temperature is maintained as close to the boiling point as possible. Adjustments in concentrations and temperature can be made to meet individual conditions.
The many classes of paints and variations within each class of paint necessitate testing before firm recommendations are made. Often paint types that are considered highly resistant, such as epoxies, are at times modified to such an extent with other resins that although they retain their classification, they lose much of their resistant properties. The stripping of such paint films may not require costly solvent type strippers.

Neutralizing Acid Wastes

Disposal of acid waste is controlled by local regulatory authorities. Before acid waste is allowed to enter the sewage lines, often it must be neutralized with an alkaline material to bring the pH up to a specified range, usually pH 6.0 - 8.0.
A common practice is to shovel a dry alkali material into a settling tank containing the acid waste. Comparing cost of materials, this method seems, on paper, the least expensive. However, in practice, the cost picture changes. Often a substantial portion of the dry material settles out in the bottom of the tank and is wasted. Additional material is required to obtain the proper pH.

T.C. 223 is 100% efficient. Every ounce of T.C. 223 added to acid waste is active. The operation, as outlined below, is quick and simple.

1. Determine amount of T.C. 223 required to neutralize the acid waste by taking a measured sample of the acid waste. Add T.C. 223 slowly under good agitation while checking the pH with pH paper. Note the amount of T.C. 223 added to bring the solution to the desired pH level.

2. Add T.C. 223 to the bulk waste in the proportion determined above. The instantaneous neutralizing action of T.C. 223 lends itself to semi-automatic treatment of acid wastes of uniform concentration. A suggested method is to by-pass the settling tanks and discharge the acid waste directly down the drain at the same time T.C. 223 is injected. The correct rate of T.C. 223 injection is obtained by adjusting the metering screw on the unit while checking the pH at the discharge end with pH paper.

Cleaning Railroad Trucks, Underframes and Running Gear

The versatility and heavy duty cleaning ability of T.C. 223 lends itself well for removing dense accumulation of road grime, oil, caked grease, carbonaceous, and other difficult-to-remove soils found on railroad trucks, underframes and running gear. Using a 5% to 8% by volume concentration, spray onto the surface by using high pressure spray equipment. Let soak for short time then follow with hot or cold water pressure rinse. For faster cleaning action, heat solution to between 140° to 160°F. With heat, the solution can be further diluted. With a steam gun, effective action is maintained with concentrations of 1% to 2% by volume. On painted surfaces, low concentrations in the order of 2% by volume are used as the starting test point to check the effect of the solution on the paint.

Cleaning in Paper Mills

The rapid action of T.C. 223 on resinous materials and its ability to convert these polymers into a form that is easily flushed away, is of prime value in cleaning paper mill systems. The accumulation in the system of resinous matter such as pitch, size and resin must be removed periodically. This is accomplished as follows:

Stock Systems

Use T.C. 223 at 1% to 6% by volume with water at room temperature. Heat if necessary to remove chill from water. Re-circulate through stock system. Finish with a fresh water, re-circulated flush. T.C. 223 may be used with or without the addition of T.C. Additive, depending on the extent of cleaning required. In most instances, T.C. 223 alone is satisfactory.

Suction Rolls

T.C. 223 at 3% to 5% by volume heated to 140°F to 160°F is circulated on rolls in place. The cleaning operation is followed by thorough rinsing.

SOLUTION CONTROL

Will be supplied by Tru-Chem Company Inc.

DISPOSAL

T.C. 223 generally does not present a disposal problem. Some localities may require neutralization and dilution. T.C. 223 is biodegradable.

HANDLING

T.C. 223 is a heavy duty alkaline material. The same normal handling care should be exercised with T.C. 223 as with all highly alkaline products.

CHARACTERISTICS

T.C. 223 is a blend of alkalis, low foaming wetting agents and chelating agents.

Physical form	Liquid
Bulk density	12.8 lbs./gal.
Specific gravity	1.53
Color, as received	Slightly amber
Color, as used	Clear
Foaming	Moderate foam initially, then quickly subsides; 15 ml., initially; 0 ml., 15 seconds
pH	13
Flash point	None
Solubility	Infinite
Rinseability	Complete in hot and cold water
Toxicity	Non-toxic; heavy duty alkali, avoid contact

STORAGE

Indoor storage during cold weather is desirable. At a temperature below 45°F, the product crystallizes but returns to normal condition on thawing and mixing without any effect on the product's performance. The thawing can be quickened by applying heat or simply moving the drum to a warmer area in the plant.

ACTION ON METALS

Steel	None
Stainless steel	None
Aluminum	Etches
Zinc	Etches
Copper	Etches
Brass	Etches
Magnesium	None

PACKAGING

Large drum	380 pounds net weight