METAL CLEANING & FINISHING

Sodium Gluconate

Sodium gluconate is widely used in industrial cleaning formulations across several applications. Gluconate in an alkaline solution is used to clean and finish metal. Sodium gluconate is used because of its excellent chelating properties. This makes it desirable in areas where hard water is an issue.

Because gluconate can sequester divalent and trivalent metals it is a key ingredient in alkaline detergents for metal cleaning preventing these precipitates from forming. It has the ability to solubilize and strip metallic compounds from valued materials.

Gluconate is also used in steel processing, paint stripping, electroplating and aluminum processing.

Metal Cleaning

Gluconate is an essential ingredient in cleaning and/or degreasing ferrous and some non-ferrous metals, especially in alkaline solution.

The sequestering function of gluconate in most metal washing operations is to prevent hard water ions, such as calcium and magnesium from complexing with the alkali in the cleaner. If these hard water ions are allowed to react with alkali components, an insoluble complex will be precipitated. This undesirable precipitate can build up and deposit itself causing damage to the vessel and surface to be cleaned. The amount of gluconate normally depends on the cleaning purpose ranging from 1 to 20% in these formulations and can be fully compatible with other builders and surfactants.[1]

Steel Processing

Gluconate is a very important ingredient in alkaline formulations designed for the removal of corrosion. These hot caustic solutions (160° F to 180° F) require an effective chelating agent to aid in the removal of unwanted deposits (i.e. rust, scale, smut) from ferrous metals. Gluconate provides outstanding sequestration ability to inhibit the redeposition of the ions on the surface of the ferrous metal and the cleaned machinery (i.e. tanks, coils). Gluconate is effective and stable at relatively high temperatures in caustic solutions. It has become the preferred chelating/sequestering agent in derusting formulations, especially in heated soak operations with mechanical agitation and electrolytic treatments.

Formulations normally contain between 4 to 10% gluconate, based on the caustic content of the compound. A small amount of a wetting agent may be advantageous in enhancing the removal of oil and other soils.

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Paint Stripping

The addition of gluconate to highly alkaline paint strippers will increase their ability to remove enamels, lacquers, alkyds and modified epoxies. Gluconates improve the paint stripper's penetration and softening characteristics, thereby, decreasing stripping time. Gluconates have the ability to solubilize the surface pigment adhering to metal after stripping, thus reducing subsequent stripping steps.

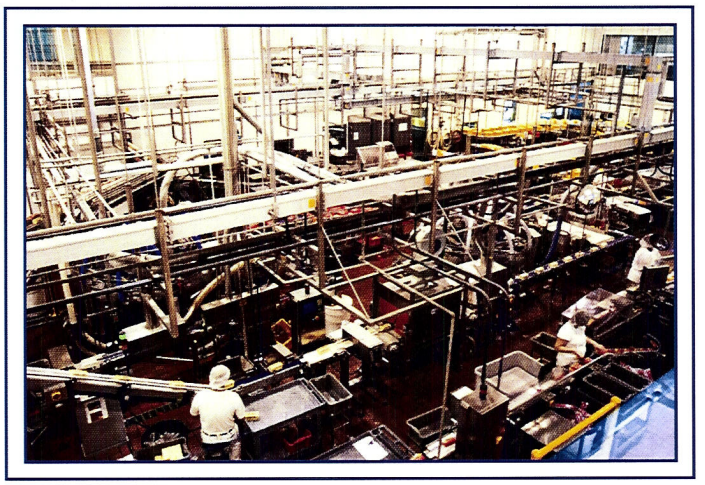
Electroplating

Gluconate, because of its strong affinity for metal ions, is useful in a number of electroplating processes. Gluconate can be used in copper, zinc and cadmium plating baths for brightening and increasing luster.

Aluminum Processing

Gluconate increases the efficiency and life of caustic aluminum etch bath by:

- Preventing the formation of hydrated aluminum oxide which can adhere to the sides and heating coils of etch tanks. By sequestering the aluminum, the dispersed aluminate sludge can be easily rinsed from the tank.
- Providing more uniform and controlled etching of aluminum.
- Enabling a mirror like finish to be obtained rather than a satin finish
- Providing excellent stability in caustic formulations and in normal operating temperatures (120°F to 180°F) when etching aluminum.



Caustic concentration of aluminum etch baths may vary from 3 to 10 oz/gallon. Gluconate is normally added at 2 to 5% based on caustic amount (100% caustic soda basis).

Because the degree of etching is controlled by the etch time, temperature, caustic concentration and gluconate, trial runs are recommended to arrive at optimum operating results.

Specifications

Sodium gluconate is available is solid or liquid form. Sodium Gluconate FCC comes in both granular and powder form. Liquid Gluconate 60 (LT) and Gluconic Acid 50% are available in drums, totes or bulk.

References

1 Oakite Products, Inc. Fundamentals of Metal Cleaning (1971) Am. Electroplaters' Soc.

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