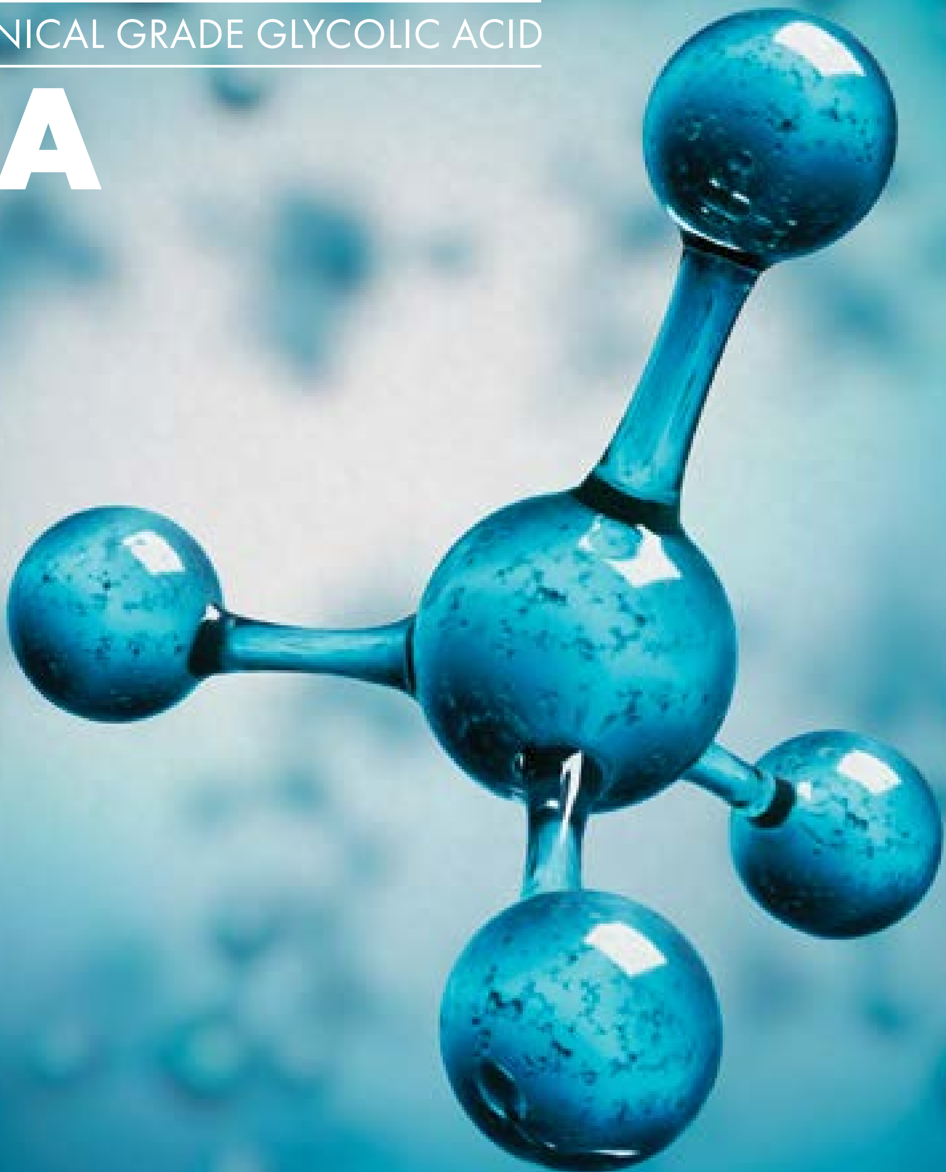
TEKGrade®

TECHNICAL GRADE GLYCOLIC ACID

GA



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Introduction

CrossChem's TEKGrade® GA is a technical grade glycolic acid designed specifically for today's industrial applications. Our proprietary acid saponification and purification process delivers a next generation acid with low ppm chloride and color meeting the technical requirements for a variety of industries and applications.

TEKGRADE® GA SPECIFICATIONS

SPECIFICATIONS	LIMITS
Total Acid %	70-72
Color (Gardner)	3 Max
Chloride (ppm)	10 Max
Formaldehyde	Report

TEKGRADE® GA PHYSICAL PROPERTIES

PROPERTY	VALUE
Formula	$HOCH_2COOH$
Precipitation Point, C (F)	14 (57)
Molecular Weight g/mol	76.05
pH, 25C (77F)	0.4
Density @ 15.6C (60F) lbs/gal	10.5
g/mL (Mg/m3)	1.27

TEKGrade® GA

HI&I

Glycolic acid is a highly effective cleaner in both household and institutional settings. The small size of the glycolic acid molecule provides a higher rate of penetration into hard deposits. The molecular size enables glycolic acid molecules to enter spaces that are too tight for other larger cleaning molecules, giving enhanced cleaning performance once it has penetrated within tough-to-remove substances.

Glycolic acid's alpha hydroxy structure allows for easy and effective deprotonation, where the glycolic acid molecule can more easily form the reactions needed to effectively dissolve and remove tough compounds or deposits. While many other acid candidates may not as easily form the hydrogen bonds crucial to the cleaning process, the "alpha" position of the hydroxyl group in glycolic acid gives the glycolic acid molecule the means to effectively bond in a wide range of circumstances.

With the ideal balance of bonding ability and removal potential, glycolic acid is an outstanding molecular candidate to kickstart the cleaning process of many household or institutional surfaces.

Finally, the natural biodegradability of glycolic acid and its non-toxic structure offers an earth friendly and household-safe substance. In a world of increasing environmental awareness, glycolic acid stands out as a prime example of a product distinctly suited for use in household and institutional settings. Glycolic acid can even be used to clean the insides of coffee makers, where its bonding abilities can be used to complex with the calcium and magnesium that can build up within. With glycolic acid safe and straightforward to use in the kitchen, treating coffee makers with it prevents the buildup of limescale and bacteria in everyday settings. Glycolic acid can be readily diluted with water to reduce potential irritation, and naturally degrades over time to prevent any potential environmental contamination. These characteristics make glycolic acid the perfect candidate for cleaning in household and/or institutional settings.

Concrete Cleaning/Removal

The very same chemical characteristics that make glycolic acid an attractive option in other applications make it well-suited to use in concrete cleaning and removal as well. The small size and superior penetrating characteristics of the glycolic acid molecule allow it to penetrate deeper into concrete deposits than some other molecules. The high solubility of glycolic acid in water also means it can be safely handled and can be easily diluted to a desired concentration. Concrete removers formulated with glycolic acid can penetrate small gaps and use its bonding ability to dissolve hardened concrete, without needing to scrub.

The low corrosivity of glycolic acid when exposed to metal is also an ideal characteristic for use in concrete cleaning and/or removal. As an acid that is more readily able to deprotonate, glycolic acid can be more active in reactions with concrete compounds and metal oxides to remove or clean them. At the same time, it can be safely used on a variety of industrial metals like stainless steel, aluminum, copper, or bronze.

The non-volatility and low corrosivity of glycolic acid mean that over-removal of metal oxides is unlikely with glycolic acid. Thus, the risk of volume loss that can occur with more corrosive acidic cleaning agents is avoided through the use of glycolic acid in concrete removal.

Laundry Sour

The chemical structure of glycolic acid also means it can serve as a dependable liquid sour for use in modern laundry systems. When added to clothing during the final rinse cycle of a washing machine, glycolic acid lowers the pH of the water and assists with the removal of any remaining detergents or rust. Glycolic acid's acidic structure likewise facilitates neutralization and reversal of the detergent cycle in laundry loads, by counter-balancing alkaline residues that detergents leave on clothing following washes. The balancing effects of glycolic acid restore pH to the correct level, leaving washed articles properly conditioned for finishing processes like drying and ironing.

Glycolic acid also provides far greater solubility when compared to other common laundry sours like silicafluorides or hydrofluosilicic acid. This enhanced solubility permits higher concentrations for greater neutralizing efficiency and avoids salting or rust discoloration problems. Especially at low wash temperatures, glycolic acid reaches a neutralized pH level of 5-6 much more quickly than silicafluorides. Lower toxicity and biodegradability also mean no damage to fabric, even when treated articles are ironed while wet. Glycolic acid's water-soluble structure and molecular stability also means that it will not cake in storage and can be easily and safely dispensed in desired quantities.

Metal Cleaning/Finishing

Glycolic acid is also highly effective in metal cleaning and finishing applications. With dual functionality as an acid and an alcohol, glycolic acid can safely and efficiently remove rust, scale, and oxidation deposits off metal surfaces.

The molecule's acid group removes rust and scale buildup, and the alcohol group forms complexes (chelates) to keep impurities dissolved and prevent the formation of solid deposits. Glycolic acid readily dissolves carbonate, oxide, and most casein deposits, giving effectiveness in a wide range of applications. Glycolic acid is well-suited to use in copper and aluminum finishing and metal cleaning applications. And as previously discussed, exceptionally low chloride levels also make it a prime candidate for stainless steel cleaning without any associated stress-cracking. Glycolic acid emits little corrosive fuming when heated, and 70% concentrate can be easily diluted to any desired strength with water with excellent solubility.

The flexible cleaning applications of glycolic acid in metal finishing and the electronics manufacturing industry also set it as the most versatile option for process efficiency. Glycolic acid is compatible with additives, such as surfactants, biocidal agents, and corrosion inhibitors, meaning it can be conveniently combined with other compounds to achieve desired results depending on the user's needs.

Glycolic acid is also readily biodegradable, so waste disposal is not a concern, and the growth of bacteria is inhibited. Natural biodegradability and a small molecular size enable glycolic acid to enter spaces too tight for larger cleaning molecules, giving enhanced cleaning performance within tough-to-remove substances characteristic and may preclude the need to add a special chelating or complexing agent. The addition of glycolic acid can also enhance the rinsability of the cleaner, with an easy-to-handle liquid form and no "incomplete dissolving" problems in industrial contexts.

Salts & Complexes

Glycolic acid uses both the alcohol and carboxylic ends of its molecular structure to form five-member ring complexes (chelates) with metals in a wide range of situations. The ability to form such complexes is useful in the dissolution of hard-water scale, prevention of deposition, and minimization of rust formation. The multifunctional bonding ability of glycolic acid is especially useful in cleaning applications where rinsibility is a factor. Glycolic acid is highly soluble in water, and after forming its own complexes to prevent the formation of problematic deposits, it is easily rinsed out of the system for disposal. Glycolic acid readily forms typical salts with active metals, metal oxides and bases, while dissolving and complexing hard water scale more effectively than other solutions such as phosphoric acid. In industrial applications, the characteristic complexing behavior of glycolic acid may eliminate the need to add an additional chelating or complexing agent specific to the process, while still enhancing the rinsability of the cleaner.

Organic Synthesis

Due to its stable structure and multiple bonding ends, glycolic acid is a useful intermediate for organic synthesis in a range of reactions. Glycolic acid undergoes typical oxidation reactions to give glyoxylic acid and oxalic acid, and reduction reactions with active metals to form acetic acid. It also reacts as a typical organic acid with organic amines to form amides and amine salts, useful as intermediates for synthesis of complex organic compounds, including in esterification and long chain polymerization contexts. Glycolic acid is used as a monomer in the preparation of polyglycolic acid and other biocompatible copolymers.

Commercially, important derivatives include methyl and ethyl esters which are readily distillable. The butyl ester is also a useful organic intermediate, with desirable qualities of non-volatility and good dissolvability. Overall, the stability, flexible reactivity and characteristic carboxylic and alcohol ends position glycolic acid as a crucial tool in the development of organic synthesis processes.

Oil Field Chemical & Petroleum Refining

Glycolic acid can enhance the effects of cleaning and descaling in the refining process of oil fields and petroleum. Use of glycolic acid allows economical cleaning by providing low-cost metal complexing in a biodegradable form, it will not accumulate in the environment. Use of glycolic acid in oil field and petroleum refining also avoids contributing undesirable Biological Oxygen Demand (BOD) or Chemical Oxygen Demand (COD) while facilitating the formation of metal complexes and the degradation of unwanted deposits.

Glycolic acid can also be paired with hydrochloric or sulfamic acids to prevent iron precipitation in cleaning operations or water flooding. Its strong acidity means it can dissolve the same amount of calcium carbonate as other active acids, remove carbonate scales formed within wells, while preventing corrosion from disrupting extraction. The minimal odor, low vapor pressure and non-flammability qualities of glycolic acid position it to effectively eliminate harmful deposits while minimizing corrosion damage to steel or copper piping systems.

Compared to other mineral acids, the relatively-slow reaction of glycolic acid is helpful for acid treatment during the well completion. With its slower reaction time, glycolic acid has more time to penetrate into the stratum around the oil wells before the reaction is completed. The desalination of crude oil, acidification of oil wells and synthesis of well-drilling mud are also dependent on glycolic acid. The glycolic acid has low toxicity and low steam pressure and can remove rust, dirt, and particles in oil-gas wells and production equipment. Glycolic acid and metal ions also can complex to form soluble salts which are then easily extracted from oil wells as needed. Glycolic acid is unlikely to corrode the metal components found in oil wells, reducing the possibility of equipment damage.

Leather Dyeing & Tanning

Glycolic acid is utilized as a dyeing and tanning agent in the leather industry to improve the quality of finished products. It is well-suited for use in the leather industry, especially where grain is important and high quality desired. In tanning, glycolic acid is extremely efficient in bath pH adjustment in the production of sole leather and other vegetable and plant tanning production. Its sodium salt is effective as a masking agent. In the deliming step of leather processing, glycolic acid penetrates hides rapidly, frequently reducing operations time. Deliming is traditionally carried out using ammonium salt which generates a huge amount of hazardous ammonia in tannery wastewater. This results in toxic effects on aquatic organisms and the environment. Application improves grain and texture quality by eliminating excessive pelt swelling that can cause wrinkles and reduce tear resistance. The biodegradability and non-toxicity of glycolic acid offer an environmentally friendly option in the deliming process that optimizes worker safety and comfort. Able to be diluted to reduce potential irritation, and naturally degrading over time, glycolic acid is an effective deliming agent while also preventing environmental contamination.

In the pickling reaction, another step in the overall tanning process, glycolic acid's bonding ends and alpha-hydroxy acid structure can form metal complexes with chrome and alum mordants, beneficial in both fur and leather finishing. This procedure involves lowering the pH and increasing the acidity of the hide, to make the fibers more receptive to the addition of tanning chemicals. As an alpha hydroxy acid, glycolic acid can fulfill this role in the pickling process. The glycolic acid molecule avoids unwanted side effects that might arise from the use of less stable acids, and its low corrosivity prevents the degradation of the fibers throughout the process. Finally, in the dyeing process, glycolic acid also requires lower usage than more volatile agents like acetic acid. With minimal corrosive fumes when heating, maintenance of pH levels is made easier overall during the tanning and dyeing processes.

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