Dow Microbial Control

Glutaraldehyde Materials of Compatibility & Bulk Handling Recommendations
Safe Use and Handling Guide

Materials of construction, temperature control and handling procedures are important considerations in maintaining high-quality glutaraldehyde products.

Materials of Construction

Solutions of glutaraldehyde are, in general, equal to or slightly less corrosive than water at an equivalent pH. Since the pH of these solutions is relatively low (3.1 to 4.5), materials such as carbon steel, aluminum, iron, copper and Monel* should not be used for bulk storage facilities. In addition to equipment damage from corrosion, these materials of construction will lead to product contamination. Suitable materials of construction for tanks, pumps and piping are listed below.

Materials NOT Acceptable for Packaging and Bulk Handling

- Carbon steel
- Aluminum
- Iron
- Copper
- Monel*

Lined carbon steel containers are not recommended for bulk storage, since pinhole leaks could cause product contamination. Rubber linings are also unsuitable because of the potential for swelling.

Recommended Materials of Construction

Tanks, pumps and piping
- Stainless steel types 304 and 316
- Nickel
- Fiberglass-reinforced plastics:
  - Polyester (e.g., "Atlac" 382)
  - Vinylester (e.g., "Derakane" 411 or 470)
  - High Density Polyethylene

Gaskets
Gasket materials should be chosen carefully since the use of incompatible materials may lead to product leakage or material failure. Recommended materials for gaskets include:
- Silicone
- Teflon®
- Kalrez®
- Grafoil’
Recommended Storage Conditions

**Nitrogen Blanketing/Venting**

Dow stores glutaraldehyde-based solutions in nitrogen-blanketed atmospheric tanks. Storage under nitrogen is preferred but not mandatory; comparison of glutaraldehyde-based solutions stored under air and nitrogen has not shown significant product quality differences. Dow recommends using a vapor-tight vent unit, instead of an open vent, to reduce odor and minimize emissions.

**Temperature**

Temperature control is the most important variable in maintaining high-quality solutions of glutaraldehyde. Bulk storage tanks should be insulated to prevent freezing or overheating. The recommended storage temperature range is between room temperature and the freezing point of the glutaraldehyde solution. Provisions should be made for heating bulk storage tanks in cold climates or for cooling in hot climates. Freezing glutaraldehyde-based solutions may lead to product stratification and should, therefore, be avoided.

Storage of glutaraldehyde-based solutions at elevated temperatures may cause formation of polymers and concomitant loss of monomeric material. Steam should not be used to heat glutaraldehyde solutions. While storage at temperatures as high as 37°C may have little or no effect on product activity, color formation may be appreciable. Therefore, storage for extended periods at elevated temperatures is not recommended.

**pH**

The recommended pH for storage of glutaraldehyde-based solutions is 3.1 to 4.5. Although the pH of the material may become more acidic over time, this normally will cause no decrease in storage stability. Solutions containing glutaraldehyde will polymerize under alkaline conditions and should not be stored in concentrated form above pH 4.5.

**Typical Bulk Storage System**

Dow recommends storage of these solutions in insulated, stainless steel vessels that are tall in relation to their diameter. Figure 1 illustrates Dow’s typical storage tank for glutaraldehyde-based solutions. Round-bottomed tanks on legs with bottom drawdown are generally used. Stainless steel centrifugal pumps are used for transfer service.

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**Figure 1 – Bulk Storage Tank for Receiving Glutaraldehyde-Based Solutions**

**Notes:**
1. Insulate tank and lines if storage is outdoors. Provide electric or warm water 60°C (140°F) maximum heating if extended ambient temperatures below solution freezing point are expected.
2. Nitrogen blanket is preferred but not essential.
Polymerization Prevention

Additional design practices are available to minimize or prevent polymer buildup or plugging. A recirculation system will keep the contents of the tank well mixed during drawdown and prevent pump dead-heading. The piping system should be designed with the shortest possible storage line between the pump suction and the tank. Check valves should be avoided. Bulk storage tanks should be constructed so that the entire volume of the tank is consumed in normal operation every six to twelve months (depending on storage conditions). This will minimize storage time and will thus ensure that fresh material is available on a continual basis. Note that it is therefore undesirable to continually top off a single bulk storage tank. If this is done on a routine basis, it is likely that polymer buildup will occur (as aged glutaraldehyde collects at the bottom of the tank) and will worsen as the period between complete emptying of the tank lengthens. Ideally, dual bulk storage tanks would be employed so that one can be completely emptied before it is refilled and still maintain an adequate inventory of glutaraldehyde-based solutions.

Genuine Glutaraldehyde

The recommendations in this Safe Use and Handling Guide apply to glutaraldehyde sourced from Dow, a supplier of GENUINE GLUTARALDEHYDE.

In the more than six decades since glutaraldehyde was introduced to the marketplace, it has become known as a versatile molecule. Today, non-genuine products, mixed with less-effective “aldehydes” such as formaldehyde or glyoxal, but labeled deceptively as glutaraldehyde, are available in the marketplace all over the world.

Risks are potentially high for workers and the environment when mislabeled chemicals, especially ones containing carcinogens, are unknowingly handled. GENUINE GLUTARALDEHYDE is not a carcinogen, mutagen, nor a reproductive toxicant. It does not bio accumulate and is readily biodegradable. It’s critical for companies to ensure they are using GENUINE GLUTARALDEHYDE to comply with approved safe handling guidelines. Non-genuine products may have significantly different toxicological properties that can harm workers and the environment and have been proven to fall short in efficacy and sustainability.

The Dow Chemical Company has developed and validated new analytical methods to help customers distinguish GENUINE GLUTARALDEHYDE from non-genuine products that are labeled incorrectly as “glutaraldehyde”. These methods include an innovative, field-deployable, and easy to use test-kit that provides a rapid detection method.

For more information, visit www.glutaraldehyde.com.

Product Stewardship

Dow has a fundamental concern for all who make, distribute, and use its products, and for the environment in which we live. This concern is the basis for our product stewardship philosophy by which we assess the safety, health, and environmental information on our products and then take appropriate steps to protect employee and public health and our environment. The success of our product stewardship program rests with each and every individual involved with Dow products - from the initial concept and research, to manufacture, use, sale, disposal, and recycle of each product.

Dow strongly encourages its customers to review both their manufacturing processes and their applications of Dow products from the standpoint of human health and environmental quality to ensure that Dow products are not used in ways for which they are not intended or tested. When considering the use of any Dow product in a particular application, review the latest Safety Data Sheet (SDS) and country-specific product label to ensure the intended use is within the scope of approved uses and can be accomplished safely. Dow personnel are available to answer your questions and to provide reasonable technical support. Dow product literature, including SDS’s, should be consulted prior to use of Dow products. Current SDS’s are available from Dow.