AQUCAR™ 720 Water Treatment Microbiocide  
CAS Reg. No. 111-30-8

**General**
AQUCAR™ 720 Water Treatment Microbiocide combines the powerful antimicrobial action of glutaraldehyde enhanced by the addition of a biodispersant additive. Glutaraldehyde is especially effective in controlling slime-forming bacteria, sulfate-reducing bacteria and algae.

**Structure**

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**Physical Properties**
The following are typical properties of AQUCAR™ 720 Water Treatment Microbiocide; they are not to be considered product specifications.

- **Appearance:** Colorless to pale yellow
- **Active, % glutaraldehyde (w/w):** 20
- **pH @ 25°C:** 3.1 to 4.5
- **Solubility in water, 20°C:** Miscible
- **Boiling point:** 100.5°C/213°F
- **Freezing point:** -4°C/25°F
- **Specific gravity, @ 20/20°C:** 1.053
- **Vapor pressure @ 20°C:** 0.2 mm Hg based on glutaraldehyde (0.27 hPa)

**Key Benefits**
- Proven effective against aquatic microorganisms, including *Desulfovibrio sp.* and acid producing bacteria as well as common aerobic organisms
- Internal laboratory testing demonstrated low rates of corrosion of metals such as low carbon steel, galvanized steel and Galvaneel steel
- Meets requirements of Ready Biodegradability based on OECD 301 series testing
- No free formaldehyde or formaldehyde release from this formulation.
- Glutaraldehyde is not classified as a carcinogen
- Ability to remove established biofilm and to inhibit regrowth
- Broad spectrum of activity
- Chemically compatible with most common scale and corrosion inhibitors
- Reduces populations of sessile microorganisms known to cause corrosion
- Effective over a broad pH and temperature range
- Compatible with chlorine
- Non-corrosive at end use concentrations
- Non-halogenated material
- Does not contain heavy metals
NOTE: Not all AQUCAR™ products, applications and/or uses are registered and approved in all regions/countries/states. Please check with your local Dow Chemical Company Microbial Control representative for up-to-date information.

### Antimicrobial Activity

The graph below is from an internal study with six independent experiments testing shock-dosing AQUCAR™ 720 Water Treatment Microbicide efficacy against aquatic microorganisms in 200 ppm hardness synthetic cooling tower water. These experiments measured survival of *Pseudomonas aeruginosa*, *Flavobacterium odoratum*, and *Aeromonas hydrophila*.

![Graph showing efficacy against mixed bacterial population](image1)

*One of the six independent experiments at 375 ppm product had measurable bacterial counts at the indicated dosage, all others at this dosage were negative for bacterial growth.*

The graph below is from an internal study with two independent experiments testing shock-dosing AQUCAR 720 Water Treatment Microbicide efficacy against *Legionella pneumophila* in 200 ppm hardness synthetic cooling tower water.

![Graph showing efficacy against Legionella pneumophila](image2)

AQUCAR™ 720 Water Treatment Microbicide has been shown effective against a broad range of bacteria in both planktonic and sessile communities, including biofilm-associated SRB and APB in flowing systems. It has also been shown to remove biofilm from hard surfaces. The data below shows the efficacy of AQUCAR 720 against sessile bacteria in a standard laboratory biofilm test.

aqucar compatibility

AQUCAR™ 720 Water Treatment Microbicide is suitable for use with many piping materials. At the recommended use concentrations, it is compatible with all common materials of construction that can tolerate exposure to water. The following materials were subjected
to 25 spray/dry cycles at 25°C/76°F without rinsing. No detectable changes, relative to duplicate materials sprayed with water, occurred.

- Aluminum
- Brass
- Chrome-Plated Steel
- Copper
- Stainless Steel
- Glass
- Glazed Ceramic Tile
- Latex Rubber
- Polyethylene

While glutaraldehyde is compatible with most commonly used system additives (scale and corrosion inhibitors), there are some incompatibilities that should be noted. Glutaraldehyde can be incompatible with primary amines and ammonia as well as bisulfite-based oxygen scavengers. These interactions can usually be managed by dosing glutaraldehyde-containing products at different times or at different points in the system from incompatible actives. It is strongly recommended that dosing be optimized by testing in field water samples to understand the efficacy of AQUCAR™ 720 Water Treatment Microbiocide in a specific system. Please contact your Dow representative for further information.

### INDUSTRIAL RECIRCULATING WATER COOLING TOWERS

Add AQUCAR™ 720 Water Treatment Microbiocide to the basin (or any other point of uniform mixing). Additions should be made with a metering pump; it may be continuous or intermittent, depending on the severity of the contamination when treatment is begun, and the retention time of the system. Optimum performance with this product is attained by continuous or intermittent treatment. If “shock” treatment is used, the blowdown should be discontinued for 24-48 hours.

#### For Control of Bacteria

**BADLY FOULED SYSTEMS** must be cleaned before treatment is begun.

**INTERMITTENT OR SLUG METHOD:**

**INITIAL DOSE:** When the system is noticeably fouled, Add 34 to 84 fluid oz/1000 gallon or 263 mL to 658 mL/m³ (250-500 ppm as product dosage) of AQUCAR 720 to the water in the system. Repeat until control is achieved.

**SUBSEQUENT DOSE:**

Once the microbial control is evident add 24 to 34 fluid oz/1000 gallon or 184 mL to 263 mL/m³ (175-250 ppm as product dosage) of AQUCAR 720 in the system every 4 days, or as needed to maintain control.

**CONTINUOUS FEED METHOD:**

**INITIAL DOSE:** When the system is noticeably fouled, add 34 to 84 fluid oz/1000 gallon or 263 mL to 658 mL/m³ (250-500 ppm as product dosage) of AQUCAR 720 to the water in the system.

**SUBSEQUENT DOSE:** Maintain this level by pumping a continuous feed of 7 to 34 fluid oz/1000 gallon or 53 mL to 263 mL/m³ (50-250 ppm as product dosage) of AQUCAR 720 to the water in the system per day.
For Control of Fungi and Algae

BADLY FOULED SYSTEMS must be cleaned before treatment is begun.

INTERMITTENT OR SLUG METHOD

INITIAL DOSE: When the system is noticeably fouled, add 50 to 340 fluid oz/1000 gallon or 400 mL to 2.65 L/m³ (375-2500 ppm as product dosage) of AQUCAR™ 720 Water Treatment Microbiocide to the water in the system. Repeat until control is achieved.

SUBSEQUENT DOSE: When microbial control is evident, add 50 to 340 fluid oz/1000 gallon or 400 mL to 2.65 L/m³ (375-2500 ppm as product dosage) of AQUCAR 720 to the water in the system daily, or as needed to maintain control.

CONTINUOUS FEED METHOD

INITIAL DOSE: When the system is noticeably fouled, add 50 to 340 fluid oz/1000 gallon or 400 mL to 2.65 L/m³ (375-2500 ppm as product dosage) of AQUCAR 720 to the water in the system.

SUBSEQUENT DOSE: Maintain this treatment level by pumping a continuous feed of 50 to 340 fluid oz/1000 gallon or 400 mL to 2.65 L/m³ (375-2500 ppm as product dosage) of AQUCAR 720 to the water in the system per day.

Oil and Gas Production and Transmission Pipelines and Systems

Biofilms are a major problem in oil and gas production systems and pipelines are often afflicted with biofilm related problems. Microbiologically influenced corrosion (MIC) is often associated with the presence of a biofilm. The control of biofilms is therefore crucial to ensuring that corrosion events, due to microorganisms, are minimized. Glutaraldehyde has been shown to penetrate a biofilm and kill the microorganisms that are contained within it. The penetrating ability of glutaraldehyde, along with its long-term stability in oilfield waters, makes it an effective product to control established biofilms in pipelines and prevents the formation of new ones. AQUCAR™ 720 Water Treatment Microbiocide should be added to an oil/gas production or transmission pipeline via direct injection. To facilitate application, it may be desirable to dilute the product with an appropriate solvent immediately before use. Injections to the system should be weekly, or as needed to maintain control. Pipelines are typically dosed weekly at 1250-12,500 ppm product in the water phase of the system.

Water Flood Injection Water

Glutaraldehyde exhibits excellent stability in oilfield injection waters, which ensures that its antimicrobial activity will not be diminished in long pipelines. Hard waters or brines do not adversely affect its biocidal efficacy, and glutaraldehyde is non-ionic so it won’t interfere with the action of demulsifiers, corrosion inhibitors, or surfactants. AQUCAR™ 720 Water Treatment Microbiocide is typically slug dosed into the injection water on a daily or weekly basis at 50-12,500 ppm product for up to 4 hours, although the exact treatment regimen will depend on the condition of the system, the amount of water being treated, etc.

Fracturing Fluids

AQUCAR™ 720 Water Treatment Microbiocide reduces bacterial contamination and degradation of fracturing fluids and gels used in oil and gas well stimulations. Add AQUCAR 720 to the frac water storage tanks or directly into the well head injection pipeline as the water is being pumped down-hole at a rate of 250 to 12,500 ppm (2.3 – 119 gals per 10,000 gallons) depending on the degree of bacterial fouling in the source water.
Drilling, Completion, Workover, and Packer Fluids
Glutaraldehyde functions as a biocide over a broad pH range and its efficacy is much faster at neutral to alkaline pH's than at acidic pH's. Therefore, AUCAR™ 720 Water Treatment Microbiocide is an excellent choice for use in preserving drilling muds and other oilfield fluids that are typically alkaline in pH. The combination of rapid alkaline efficacy and proven stability and effectiveness in high salinity matrices ensures microbial protection of these important fluids. For drilling, completion, and workover fluids, 125-2500 ppm AUCAR 720 should be added at a point of uniform mixing such as the circulating mud tank. For packer fluids, add 125-1500 ppm product to a freshly prepared fluid before sealing the treated fluid between the casing and production tube.

Hydrotesting
Water used to hydrotest pipelines or vessels may be treated with 250 to 10,000 ppm AUCAR™ 720 Water Treatment Microbiocide, depending on water quality and length of time the equipment will remain idle.

Pipeline Pigging and Scraping Operations
Add AUCAR™ 720 Water Treatment Microbiocide to a slug of water immediately following the scraper (ideally this water volume can be kept to a minimum and contained between the scraper and a trailing pig). Sufficient UCAR® Sanitizer 420 should be added to produce a concentration of 0.25 to 2.5%, depending on the length of the pipeline and the severity of biofouling.

Glutaraldehyde and the Environment
Many studies have been performed on glutaraldehyde to determine its potential to biodegrade in the environment.

The OECD 301 series of biodegradation protocols are designed to determine the biodegradation potential of substances under stringent conditions. In one such biodegradation test, glutaraldehyde met and exceeded the OECD ready biodegradability classification criteria and was found to be readily biodegradable.

% Biodegradation of Glutaraldehyde in OECD 301A Test

Glutaraldehyde, the active ingredient in AUCAR™ 720 Water Treatment Microbiocide, is readily biodegradable according to the OECD 301A test.
**Aerobic Aquatic Metabolism**

T<sub>1/2</sub> in river water – 10.6 hr. Carbon dioxide was major metabolite, with glutaric acid as intermediate.

\[
\text{Glutaraldehyde} \rightarrow \text{Glutaric Acid} \rightarrow \text{Carbon Dioxide}
\]

**Anaerobic Aquatic Metabolism**

T<sub>1/2</sub> in river water – 7.7 hr. 1,5-Pentanediol was major metabolite.

\[
\text{Glutaraldehyde} \rightarrow 5\text{-Hydroxypentanal} \rightarrow 1,5\text{-Pentanediol}
\]

The compiled ecotoxicology data indicates that glutaraldehyde is a readily biodegradable compound that has little environmental impact when handled and used properly. Due to its rapid metabolism and biodegradation under both aerobic and anaerobic conditions, it has a favorable ecotoxicology profile. Complete details on the biodegradation tests mentioned above, as well as many other environmental fate and ecotoxicology tests that have been performed on glutaraldehyde, are summarized in a Dow publication entitled “Ecotoxicology of Glutaraldehyde” (Form No. 253-01418).

**Product Safety Information**

For product safety information, refer to the product Safety Data Sheet (SDS). For a complete discussion of the toxicology of glutaraldehyde, please ask your Dow representative for a copy of the booklet entitled “Toxicology of Glutaraldehyde” (Form No. 253-01419).

When applying AQUCAR™ products, it is important to wear the appropriate protective equipment. This equipment includes proper gloves, chemical goggles, coveralls, and when necessary, respiratory equipment. **Please refer to the product label for specific precautions and use directions.** Further information and precautions regarding the handling, storage, and disposal of AQUCAR products can be obtained by consulting the latest Dow Safety Data Sheet (SDS) and the Glutaraldehyde Safe Handling and Storage Guide, form number 253-01338, available from your Dow representative or the Dow Customer Information Group. See the back page of this piece of literature for addresses and phone numbers.

For spills, chemical deactivation of glutaraldehyde is recommended using the following guidelines:

**With Sodium Bisulfite:**

An effective chemical method that can be used to deactivate concentrations of glutaraldehyde (up to 5%) is by addition of sodium bisulfite (SBS). In order to assure rapid, complete deactivation, it is recommended that 2-3 parts (by weight) of SBS be added per part of active glutaraldehyde. Addition of 2-3 parts SBS will rapidly reduce the concentration of glutaraldehyde in solution to less than 2 ppm active within five minutes at room temperature. The remaining solution can then be disposed of by appropriate means. Concentrations higher than 5% should be absorbed on the appropriate absorbent material, collected, and disposed of according to regulations in your jurisdiction.
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.

Customer Notice

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. Dow personnel are available to answer your questions and to provide reasonable technical support. Dow product literature, including Safety Data Sheets (SDS), should be consulted prior to use of Dow products. Current Safety Data Sheets are available from Dow.

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