Product Safety Assessment

**DOWICIL™ 75 Preservative**

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Names

- CAS No. 4080-31-3
- Methenamine 3-chloroallylchloride
- Hexamethylenetetramine chloroallyl chloride
- 1-(3-chloroallyl)-3,5,7-triaza-1-azoniaadamantane chloride
- 3,5,7-Triaza-1-azoniatricyclo[3.3.1.13,7]decane,1-(3-chloro-2-propenyl)-chloride
- CTAC
- DOWICIL™ 75 Preservative
- AQUCAR™ TA 64 Water Treatment Microbiocide
- DOWICIL™ 75 Preservative Water Soluble Bags
- CANGUARD™ 64 Preservative

Product Overview

- DOWICIL™ 75 Preservative is an off-white powder. It is a biocidal product containing the active substance CTAC, which is a quaternary ammonium salt. DOWICIL 75 Preservative is stabilized with sodium bicarbonate. The product is water soluble, slightly basic, and has a low vapor pressure. See Product Description.
- DOWICIL 75 Preservative is used primarily for the preservation of detergents, construction materials, latexes, paints, inks, liquid floor polishes and waxes, adhesives, paper additives, mineral slurries, inks, textile production materials, oil and gas production fluids, and metal working fluids. See Product Uses.
- Occupational exposure to CTAC may occur by inhalation as well as skin contact. Consumer exposure to CTAC in dilute form is likely. However, this exposure potential is considered much lower compared to occupational exposure. See Exposure Potential.
- DOWICIL 75 preservative can cause skin irritation. It is harmful if swallowed. Skin contact with DOWICIL 75 preservative may cause an allergic reaction in a small proportion of individuals and respiratory sensitization may be experienced due to the presence of the hexamethylenetetramine component. See Health Information.
- DOWICIL 75 preservative is not flammable. CTAC decomposes when heated above 80°C (176°F). Hydrolysis of CTAC may result in the release of formaldehyde. See Physical Hazard Information.

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Manufacture of Product

- **Capacity** – Dow is the only global manufacturer of DOWICIL™ 75 preservative, with production capacity satisfying worldwide demand for this product.
- **Process** – The active substance in DOWICIL 75 Preservative, CTAC, is dried and formulated with sodium bicarbonate in an integrated process. The process for manufacturing DOWICIL 75 Preservative is proprietary. The chemical structure of CTAC is shown below:

![Chemical Structure of CTAC]

**Product Description**

DOWICIL™ 75 Preservative is an off-white, water-soluble powder with a low vapor pressure. The active ingredient in this product is 1-(3-chlorallyl)-3,5,7-triaza-1-azoniaadamantane chloride (CTAC). The composition of the product is shown below:

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS Number</th>
<th>Composition</th>
</tr>
</thead>
<tbody>
<tr>
<td>CTAC</td>
<td>4080-31-3</td>
<td>64.0 %</td>
</tr>
<tr>
<td>Methenamine (hexamethyleneetetramine)</td>
<td>100-97-0</td>
<td>≤5.0 %</td>
</tr>
<tr>
<td>1,3 Dichloropropene</td>
<td>542-75-6</td>
<td>≤0.25 %</td>
</tr>
<tr>
<td>Methylene chloride</td>
<td>75-09-2</td>
<td>&lt;0.1 %</td>
</tr>
<tr>
<td>Sodium bicarbonate</td>
<td>Not classified</td>
<td>≤39.0 %</td>
</tr>
</tbody>
</table>

DOWICIL 75 Preservative can be handled either as a free-flowing powder that dissolves readily in water or by preparing a liquid concentrate.

**Product Uses**

DOWICIL™ 75 Preservative is designed to provide highly effective broad-spectrum antimicrobial activity in water-based formulations. It is particularly effective against *Pseudomonas aeruginosa*, the most common spoilage organism. The product is also effective against other frequently encountered organisms, such as *Bacillus subtilis*, *Staphylococcus aureus*, and *Aspergillus niger*. Typical uses for DOWICIL 75 preservative include the following:

- **Oil and Gas Production** – Preservation of fluids used in a variety of oil and gas production applications.
- **Cleaners** – Preservation of dishwashing liquids, household cleaning products, and industrial cleaners.
- **Paint** – Preservation of water-based paints and coatings and latex formulations based on styrene-butadiene, polyvinyl acetate, acrylics, and vinyl chloride.
- **Building materials** – Preservation of materials such as caulking, grouting, spackling compounds, and joint cements.
- **Adhesives** – Preservation of adhesives based on starches, latexes, proteins, and natural or synthetic gums.
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- Paper – Preservation of coatings, finishes, and printing colors based on natural or synthetic starch and/or latex.
- Metal-working fluids (MWF) – Preservation of synthetic, semisynthetic, and soluble oil-based metal-working fluids.

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Exposure Potential

Based on the applications in which DOWICIL™ 75 Preservative is used, the potential for exposure to CTAC and/or its breakdown products, including formaldehyde, exists for two groups of individuals: 1) Occupational: workers in industrial settings (e.g., formulators who add biocides to products during manufacturing) and workers that use products containing dilute concentrations of DOWICIL 75 preservative; and 2) Residential: individuals in households where products that contain dilute concentrations of DOWICIL 75 Preservative may be used.2 Either group may be exposed via inhalation or skin absorption. Oral exposure is insignificant because CTAC is not used in materials in direct contact with food.

- Workplace exposure – Professionals working with DOWICIL 75 Preservative in manufacturing and/or formulating operations could be exposed during maintenance, sampling, testing, or other procedures. Use of recommended industrial controls and personal protective equipment will limit exposure under most conditions. For workers using products containing CTAC as a preservative, exposure is minimal since the amount of CTAC is low (maximum 0.66% by weight of formulation).5 See Health Information.
- Consumer exposure to products containing DOWICIL 75 preservative – DOWICIL™ 75 Preservative is not sold for direct consumer use, but it is formulated into products used by the general public, such as adhesives, paints and household detergents. The concentration of DOWICIL 75 preservative in these products is low, hence the potential for consumer exposure to this product is minimal.5 See Health Information.
- Environmental releases – DOWICIL 75 Preservative is very toxic to aquatic organisms, highly water soluble, and has a low vapor pressure.1 Therefore, it has a low potential for adsorption to soil or sediments and a low potential to volatilize from water or soil to the atmosphere. If released directly to soil or water, the substance will rapidly biodegrade and hydrolyze. In the event of a spill, the focus is on containing and recovering the spilled material quickly to prevent contamination of soil and surface or ground water. See Environmental Information, Health Information, and Physical Hazard Information.

Large release1 – Industrial spills or releases are infrequent and generally contained. If a large spill does occur, the material should be captured, collected, and reprocessed, or disposed of according to applicable governmental requirements. Positive pressure, self-contained breathing apparatus (SCBA) with a full-face mask approved by the National Institute of Occupational Safety and Health (NIOSH) is recommended for emergency work. All sources of ignition must be eliminated immediately and only explosion-proof equipment should be used. When relevant in scale or risk, the community should be notified of the hazards associated with the specific release event.

In the event of a fire1 – Deny any unnecessary entry into the area and consider the use of unmanned hose holders or monitor nozzles. Hand-held, dry-chemical or carbon-dioxide extinguishers may be used for small fires. A dust explosion hazard may result from too forceful application of fire-extinguishing agents. Move containers from the fire area if this is possible without hazard. Containers may rupture from gas generation in a fire situation. Do not permit dust to accumulate. When suspended in air, dust can pose an explosion hazard. If dust layers are exposed to elevated temperatures, spontaneous combustion may occur. Pneumatic conveying and other mechanical-handling operations can generate combustible dust. To reduce the potential for dust explosions, electrically bond and ground equipment and do not permit dust to accumulate. Dust can be ignited by static discharge. During a fire, smoke may contain the original material in addition to toxic and/or irritating combustion...
products that may include nitrogen oxides, hydrogen chloride, carbon monoxide, carbon dioxide, ammonia, and amines. See Environmental Information, Health Information, and Physical Hazard Information.

For more information, see the relevant Safety Data Sheet.

**Health Information**

DOWICIL™ 75 Preservative is not acutely toxic by the dermal and inhalation routes of exposure, but can be harmful by the oral route. The product may cause skin irritation through prolonged or repeated contact. Oral exposure is unlikely because CTAC is not used in materials in direct contact with food.

Products containing CTAC as an active substance tested negative for skin sensitization in both humans and animals. However, based on the presence of the impurity hexamethylenetetramine (CAS 100-97-0), DOWICIL 75 Preservative has been classified as both a respiratory and skin sensitizer as a precautionary measure.

CTAC-based products have been evaluated in subchronic laboratory animal studies by both oral (dietary) and dermal routes of exposure. The oral route was mainly associated with liver effects, so the liver can be considered a target organ. The dermal route of exposure was associated with irritation at the site of contact, but no systemic toxicity.

*In vitro* genetic toxicity tests with CTAC-based products were predominantly negative. The product also tested negative in *in vivo* mouse micronucleus assay and *in vivo* unscheduled DNA synthesis assay. Both tests are designed to evaluate genotoxic potential in the whole animal.

Although DOWICIL 75 Preservative contains traces of an impurity (methylene chloride) known to cause cancer in animal studies and also releases formaldehyde, a presumed carcinogen, in aqueous solutions, the product is not expected to cause cancer in humans. This conclusion is based on the largely negative *in vitro* genotoxicity studies, negative *in vivo* genotoxicity studies, and subchronic toxicity animal studies that have not demonstrated a concern for carcinogenic activity.

In several animal studies with CTAC-based products, it has been shown that relatively high oral doses were capable of causing birth defects, but when administered by skin contact (the most likely route of exposure); even relatively high doses had no effect.

**Formaldehyde Release**

The extent of hydrolysis and amount of formaldehyde released to solution from DOWICIL 75 preservative is dependent upon many factors, such as the physical/chemical characteristics of the solution (e.g., pH and temperature) and the formulation in which the product is used.

If you need assistance or for more information, see the relevant Safety Data Sheet, review the product information, or contact a Dow representative.

**Environmental Information**

DOWICIL™ 75 Preservative is very toxic to the green algae *Selenastrum capricornutum* and harmful to fish and aquatic invertebrates.


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The active substance, CTAC, breaks down rapidly in water, particularly at low concentrations. CTAC biodegrades readily and rapidly by a combination of processes in the environment. CTAC is poorly retained by animal tissues and that, combined with its rapid breakdown and biodegradability, suggests a low potential to bioconcentrate (accumulate in the food chain) in aquatic or terrestrial species.

Due to the low vapor pressure of CTAC and the short atmospheric half-life, the concentration of the compound in the air is predicted to be low.

Although CTAC rapidly degrades, care must be taken to prevent DOWICIL 75 Preservative from entering soil, ditches, sewers, waterways, and/or groundwater, since spills or discharges to natural waterways are likely to kill aquatic organisms.

For more information, see the relevant Safety Data Sheet.

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Physical Hazard Information

DOWICIL™ 75 Preservative is slightly basic with a pH of 8.1 measured in 1% weight-in-volume solution. The product is water-soluble, has a low vapour pressure, is not flammable, and has no characteristics of an oxidizing agent. Incompatible materials include oxidizing agents, strong acids, and metals such as aluminum. Since the active ingredient, CTAC, decomposes at temperatures above 80°C (176°F), the product must be stored in a cool and dry place and must be protected from atmospheric moisture. Under recommended storage conditions, the product is stable in its packaging for at least two years.

Do not permit dust to accumulate. When suspended in air, dust can pose an explosion hazard.

For more information, see the relevant Safety Data Sheet.

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Regulatory Information

Regulations may exist that govern the manufacture, sale, transportation, use, and/or disposal of DOWICIL™ 75 Preservative. These regulations may vary by city, state, country, or geographic region. Information may be found by consulting the relevant Safety Data Sheet, Technical Information or Contact Us.

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Additional Information

- Safety Data Sheet (http://www.dow.com/webapps/msds/msdssearch.aspx)
- Contact Us (http://www.dow.com/microbial/contact/index.htm)
- Dow biocides web site (http://www.dow.com/microbial/index.htm)
- DOWICIL 75 Preservative: Antimicrobial Protection for Water-Based Paints, The Dow Chemical Company, Form No. 253-01164-1098 SMG (http://www.dow.com/microbial/applications/ma_hii_products.htm#37)
“DOWICIL® CTAC,” Reregistration Eligibility Decision (RED), United States Environmental Protection Agency, Report EPA 738-R-95-017, April 1995

I-(3-chloroallyl)-3,5,7-triaza-1-azoniaadamantane (CTAC: Registration Review, US EPA March 2010

For more business information about DOWICIL 75 preservative, visit Dow’s Biocides web site. (http://www.dow.com/biocides/)

References

1. DOWICIL™ 75 Preservative Material Safety Data Sheet, The Dow Chemical Company, Number 50095/3005
3. “Methenamine IUCLID Chemical Data Sheet,” Search for “CAS# 100-97-0” on web site http://esis.jrc.ec.europa.eu/
4. National Toxicology program web site http://ntp.niehs.nih.gov/
5. DOWICIL 75 Preservative: Broad-Spectrum, Cost-Effective Antimicrobial Protection for Water-Based Formulations, The Dow Chemical Company, Form No. 253-00963-998GW
6. Estimate supplied by The Dow Chemical Company

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