Product Safety Assessment

**DOWICIL™ 200 Preservative**

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**Names**

- CAS No. 51229-78-8
- Methenamine 3-chloroallylochloride
- Hexamethylenetetramine chloroallyl chloride
- *cis*-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

**Product Overview**

- DOWICIL™ 200 preservative is an off-white powder with an amine odor. The product typically contains 96% of the active ingredient *cis*-1-(3-chloroallyl)-3,5,7-triaza-1-azoniaadamantane chloride (*cis*-CTAC) with small amounts of the impurities 1,3-dichloropropane and dichloromethane.\(^1,2\) See Product Description.
- DOWICIL 200 preservative is used primarily as a broad-spectrum preservative in a wide variety of personal-care and cosmetic products, typically at levels of 0.2% or less.\(^3,4\) See Product Uses.
- Occupational exposure to *cis*-CTAC may occur by inhalation or skin contact. Consumer exposure to *cis*-CTAC in dilute form is possible when using products formulated with the material. However, the potential for consumer exposure is considered much lower than occupational exposure and is not expected to cause an adverse response.\(^5,6\) See Exposure Potential.
- Eye contact may result in moderate irritation. Prolonged skin contact can cause slight irritation or an allergic reaction in a small proportion of individuals.\(^7,8\) See Health Information.
- DOWICIL 200 preservative is susceptible to both biodegradation and hydrolysis, unlikely to bioaccumulate in the food chain, and is toxic to aquatic organisms on an acute basis.\(^9\) For further details, see Environmental Information.
- DOWICIL 200 preservative is a flammable solid. Under certain use conditions, *cis*-CTAC may result in the release of formaldehyde.\(^10,11\) See Physical Hazard Information.
Manufacture of Product

- **Process** – The manufacturing process for DOWICIL™ 200 preservative is proprietary. The active ingredient, *cis*-CTAC, is dried and formulated in an integrated process. The chemical structure of *cis*-CTAC is shown below:

![Chemical Structure of cis-CTAC]

Product Description

DOWICIL™ 200 preservative is an off-white powder with an amine-like odor. The product typically contains 96% of the active ingredient *cis*-1-(3-chloroallyl)-3,5,7-triaza-1-azoniaadamantane chloride (*cis*-CTAC), a quaternary ammonium salt, with small amounts of impurities, which may include 1,3-dichloropropene and dichloromethane.

Product Uses

DOWICIL™ 200 preservative is used primarily as a preservative in a wide variety of personal-care and cosmetic products. It is designed to provide highly effective broad-spectrum antimicrobial activity, especially in water-based formulations. It is used in both leave-on and rinse-off application such as baby-care products, hair-care products, lotions, powders, and creams.

Exposure Potential

A potential for exposure to DOWICIL™ 200 preservative exists for workers in industrial settings and consumers in households where products that contain this material may be used.

- **Workplace exposure** – Those working with DOWICIL 200 preservative in manufacturing and/or formulating operations could be exposed during maintenance, sampling, testing, or other procedures. The highest potential for exposure is through inhalation or skin contact. Use of recommended engineering controls and personal protective equipment will limit the potential for exposure. See Health Information.

- **Consumer exposure to products containing DOWICIL 200 preservative** – DOWICIL 200 preservative is not sold for direct consumer use, but can be formulated into products used by the general public, such as lotions, powders, hair-care products, and baby-care products. Because the concentration of DOWICIL 200 preservative in these products is low (0.2% or less by weight), the potential for an adverse response in consumers is low. See Health Information.

- **Environmental releases** – Small amounts of DOWICIL 200 preservative may be released into the environment during use of products containing it. Because of its high water solubility, once introduced the compound will remain in water. Since the compound is susceptible to both biodegradation and hydrolysis, it will degrade in the environment, including removal by sewage treatment plants. In the event of a spill, the focus is on containing and recovering the spilled material quickly to minimize contamination of soil and surface or ground water. See Environmental, Health, and Physical Hazard Information.

- **Large release** – 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 an approved full-face mask is recommended for emergency
work. Eliminate all sources of ignition immediately and use only explosion-proof equipment. When relevant in scale or risk, the community should be notified of the hazards associated with the specific release event. See Environmental, Health, and Physical Hazard Information.

- **In the event of a fire** – Deny any unnecessary entry into the area and consider the use of unmanned hose holders or monitor nozzles. Hand-held water, 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 to DOWICIL™ 200. Move containers from the fire area if possible. Containers may rupture from gas generation in a fire situation. During a fire, smoke may contain the original material in addition to toxic and/or irritating combustion products that may include chlorinated hydrocarbons, trimethylamine, nitrogen oxides, hydrogen chloride, carbon monoxide, carbon dioxide, ammonia, and amines. See Environmental, Health, and Physical Hazard Information.

- **Potential Hazards of DOWICIL™ 200 dust** – Pneumatic conveying and other mechanical-handling operations can generate combustible DOWICIL™ 200 dust. When suspended in air, DOWICIL™ 200 dust can pose an explosion hazard. If DOWICIL™ 200 dust layers are exposed to elevated temperatures, spontaneous combustion may occur. DOWICIL™ 200 dust can be ignited by static discharge. To reduce the potential for DOWICIL™ 200 dust explosions, electrically bond and ground equipment and do not permit DOWICIL™ 200 dust to accumulate. See Physical Hazard Information.

For more information, see the relevant Safety Data Sheet.

**Health Information**

**Eye contact** – Contact may cause moderate irritation. Corneal injury is unlikely.

**Skin contact** – Prolonged contact may cause irritation. In a small proportion of individuals contact may cause an allergic reaction. The response may be more severe if the skin is damp.

**Inhalation** – A single exposure to DOWICIL™ 200 dust is unlikely to be hazardous.

**Ingestion** – Low toxicity if ingested in small amounts. Small amounts swallowed incidental to normal handling operations are unlikely to cause injury.

**Repeated exposure** – Ingestion of high doses in animal studies has been reported to affect the liver and to cause birth defects.

**Other** – 1,3-Dichloropropene, a contaminant, has been shown to cause cancer in laboratory animals by oral route. This product also contains traces of methylene chloride, which is known to cause cancer in animal studies. This product can release formaldehyde, a suspected carcinogen, in aqueous solutions. However, based on the largely negative *in vitro* genotoxicity studies, *in vivo* genotoxicity studies, and subchronic toxicity animal studies, the product is not expected to cause cancer in humans.

**Formaldehyde release** – The extent of hydrolysis and amount of formaldehyde released to solution from DOWICIL 200 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. Under typical use conditions, formaldehyde in aqueous solutions is present in the form of methylene glycol and in equilibrium with gaseous formaldehyde.

For more information, see the relevant Safety Data Sheet.
Environmental Information²²,²³
DOWICIL™ 200 preservative has low volatility, so evaporation from products containing it will be minimal. The substance is very soluble in water, and when introduced, will have a tendency to remain in water with minimal tendency to bind to soil or sediment.

DOWICIL 200 preservative is unlikely to persist in the environment. The substance is susceptible to both biodegradation and hydrolysis which suggests the chemical will be removed from water and soil environments, including biological wastewater treatment plants. Any formaldehyde released by hydrolysis will also biodegrade in the environment.

DOWICIL 200 preservative is not likely to accumulate in the food chain (bioconcentration potential is low) and is toxic to aquatic organisms, particularly algae, on an acute basis.

For more information, see the relevant Safety Data Sheet.

Physical Hazard Information²⁴
DOWICIL™ 200 preservative is slightly basic with a pH of 8.2 measured in 1% weight-in-volume solution. Do not store this product in aluminum containers. Incompatible materials include oxidizing agents and strong acids. DOWICIL 200 preservative must be stored in a cool and dry place and protected from atmospheric moisture.

This product is a powder. Do not permit DOWICIL™ 200 dust to accumulate. When suspended in air, DOWICIL 200 dust can pose an explosion hazard.

For more information, see the relevant Safety Data Sheet.

Regulatory Information
Cosmetic and personal-care regulations exist that govern the manufacture, sale, transportation, use, and/or disposal of DOWICIL™ 200 preservative. These regulations may vary by city, state, country, or geographic region. Information may be found by consulting the relevant Safety Data Sheet or Contact Us.

Additional Information
- Safety Data Sheet (www.dow.com/webapps/msds/msdssearch.asp)
- Contact Us (www.dow.com/microbial/contact/index.htm)
- The Dow Answer Center (www.dow.com/microbial/about/ab_dow_answer_center.htm)
- Summary of Toxicology Data for 1-(2-Chloroallyl)-3,5,7-Triaza-1-Azoniaadamantane Chloride, Chemical Code #000250, California Environmental Protection Agency Department of Pesticide Regulation Medical Toxicology Branch, March 26, 2003 (http://www.cdpr.ca.gov/docs/risk/toxsums/pdfs/250.pdf)
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For more business information about DOWICIL™ 200 preservative, visit the Dow Microbial Control web site at www.dow.com/microbial/ or the Dow Answer Center at www.dow.com/microbial/about/ab_dow_answer_center.htm.

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References

8. DOWICIL 200 Preservative Shows Excellent Results in Skin Irritancy and Contact Dermatitis Testing, The Dow Chemical Company, Form No. 253-01663-12/12/03, December 2003, pages 1–3.

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Form No. 233-00847-MM-1111