Product Safety Assessment

*DOW™ 5-Chloro-2-Methyl-2H-Isothiazol-3-one/2-Methyl-2H-Isothiazol-3-one (CMIT/MIT)-Based Antimicrobial Products*


Select a Topic:

- Names
- Product Overview
- Manufacture of Product
- Product Description
- Product Uses
- Exposure Potential
- Health Information
- Environmental Information
- Physical Hazard Information
- Regulatory Information
- Additional Information
- References

**Names**

- CAS No. 55965-84-9 (CMIT/MIT mixture)
- CAS No. 26172-55-4 (CMIT)
- CAS No. 2682-20-4 (MIT)
- 5-Chloro-2-methyl-2H-isothiazol-3-one
- Chloromethylisothiazolone
- AQUCAR™ CM14 antimicrobial
- AQUCAR CM1P5 antimicrobial
- BIOBAN™ CM1P5 antimicrobial
- BIOBAN CM14 antimicrobial
- CANGUARD™ CM14 preservative
- CANGUARD CM1P5 preservative
- DUROTEX™ 6000 antimicrobial
- KATHON™ 886 MW biocide
- KATHON MWE microbicide
- KATHON 886F biocide
- KATHON CG preservative
- KATHON CG-ICPII preservative
- KATHON CF-400 microbicide
- KATHON LX 1.5% microbicide
- KATHON LX microbicide
- KATHON WT microbicide
- KATHON WTE microbicide
- KATHON LXE biocide
- KATHON WT1.5% microbicide
- KATHON 39FG biocide
- KATHON CF1400 microbicide
- KATHON CF150 microbicide
- KATHON FP biocide
- DOW™ CMIT/MIT-based antimicrobial products
- 5-Chloro-2-methyl-4-isothiazolin-3-one
- 2-Methyl-4-isothiazolin-3-one
- 2-Methyl-2H-isothiazol-3-one
- Methylisothiazolone
- KATHON LX1400 microbicide
- KATHON 886 CG select
- KATHON LX 150 microbicide
- KATHON CG II preservative
- KATHON 886 MW 1.5% preservative
- KATHON PSB preservative
- KATHON ICP III concentrate
- KATHON ICP III preservative
- KATHON CC preservative
- KATHON MVF microbicide
- KATHON SCP preservative
- KATHON SCP II preservative
- KATHON TCP microbicide
- KATHON TCP II microbicide
- KATHON PFM biocide
- KATHON CL microbicide
- KATHON WTE biocide
- KATHON ED biocide
- KATHON ED 1.5% biocide
- KATHON EDC 1.5% biocide
- KATHON MWC microbicide
- KATHON PS microbicide
- KATHON FP1.5 biocide
- LEGEND™ MK microbicide

*®™Trademark of The Dow Chemical Company (“Dow”) or an affiliated company of Dow

Back to top
Product Overview

- DOW™ CMIT/MIT-based antimicrobial products are a series of broad-spectrum, formaldehyde-free biocides based on a mixture of active ingredients: 5-chloro-2-methyl-2H-isothiazol-3-one and 2-methyl-2H-isothiazol-3-one (CMIT/MIT) in a 3 to 1 ratio. These products are marketed by The Dow Chemical Company and its wholly-owned subsidiary, the Rohm and Haas Company, under the trade names KATHONTM antimicrobials, biocides, microbicides, microbicides or preservatives; BIOBAN™ CM antimicrobials; CANGUARD™ CM preservatives; and AQUCAR™ CM antimicrobials.1,2 For further details, see Product Description.

- DOW CMIT/MIT-based antimicrobial products are used in water-based adhesives, paints, coatings and inks, household cleaning products, construction materials, polymer emulsions, personal-care products, paper-coating materials, industrial water-treatment, paper mill slimicides, metalworking fluids, and oil and gas fluids.3,4,5,6,7 For further details, see Product Uses.

- DOW™ CMIT/MIT-based antimicrobial products are produced, distributed, and stored, in closed systems. Personnel working with these products in manufacturing operations could be exposed during maintenance, sampling, testing, or other procedures. Consumers could be exposed to very low levels in household cleaners or personal-care products.8,9 For further details, see Exposure Potential.

- Eye contact with concentrated biocides may cause severe irritation or chemical burns with corneal injury, which may result in permanent impairment of vision, even blindness. Prolonged skin contact with concentrated biocides may cause chemical burns (skin corrosion). Prolonged or widespread skin contact may result in skin sensitization. These products have moderate toxicity if swallowed. Vapor or mist may cause irritation of the upper respiratory tract and lungs.10 For further details, see Health Information.

- The active ingredients in DOW CMIT/MIT-based antimicrobial products are unlikely to accumulate in the food chain (low bioconcentration potential). They are completely soluble in water and do not bind to soil. Therefore, in the environment, CMIT and MIT tend to partition to water. CMIT and MIT are quickly biodegraded in soil, water or in sediments. They are also removed by biological wastewater-treatment processes. The active ingredients are very toxic to aquatic organisms on an acute basis.11 For further details, see Environmental Information.

- DOW CMIT/MIT-based antimicrobial products are stable at recommended storage and use temperatures. At temperatures above 50°C (122°F), generation of gases can cause rapid pressure build-up in closed systems. Avoid temperatures above 40°C (104°F), and contact with amines, mercaptans, oxidizers, and reducing agents.12 For further details, see Physical Hazard Information.

Manufacture of Product13,14

- Capacity – Dow and its strategic partners produce DOW™ CMIT/MIT-based antimicrobial products at several global sites.

- Process – The active ingredients CMIT and MIT are produced via a series of proprietary reactions and purification steps. The structures of the two active ingredients of the mixture are shown below.

\[
\begin{align*}
\text{5-chloro-2-methyl-4- isothiazolin-3-one} & \\
\text{2-methyl-4-isothiazolin-3-one}
\end{align*}
\]
Product Safety Assessment: DOW™ CMIT/MIT-Based Antimicrobial Products

Product Description 15
The active ingredient in DOW™ CMIT/MIT-based antimicrobial products is a 3 to 1 mixture of 5-chloro-2-methyl-4-isothiazolin-3-one (CMIT) and 2-methyl-4-isothiazolin-3-one (MIT). These biocides inhibit the growth of bacteria, fungi, yeasts, molds, and algae in water-based products. These products are formulated as liquids and are active over a broad pH range.

CMIT/MIT-based antimicrobial products are marketed by The Dow Chemical Company and its wholly owned subsidiary, the Rohm and Haas Company, under the trade names KATHON™ antimicrobials, biocides, microbicides, or preservatives; BIOBAN™ CM antimicrobials; CANGUARD™ CM preservatives; and AQUCAR™ CM antimicrobials.16,17

Product Uses 18,19,20,21,22
DOW™ CMIT/MIT-based antimicrobial products are used as “in-can” or process preservatives in multiple water-based products including the following:

- Adhesives and sealants
- Paints and coatings
- Household products – detergents, fabric softeners, dishwashing liquids, cleaning solutions, polishes, and waxes
- Construction materials – tape-joint compounds and gypsum-based materials
- Polymer emulsions – latexes based on acrylates, butadiene rubber, polyvinyl alcohol (PVA), and styrene
- Personal-care products – cosmetics, shampoos, conditioners, body washes, and disposable wipes
- Paper-coating materials – starch- and casein-based coatings and rosin dispersions
- Mineral slurries
- Processing liquids
- Printing inks
- Industrial water treatment
- Air conditioning and air washer systems
- Metalworking fluids
- Oil and gas fluids

The active ingredient in DOW CMIT/MIT-based antimicrobial products can also be used effectively in combination with other antimicrobial agents to broaden protection. DOW CMIT/MIT-based antimicrobial products sold under the BIOBAN™ trade name are formulated specifically for this purpose.23

The use concentration range is usually 1 to 50 parts per million (ppm) of active ingredient CMIT/MIT. Personal care products have a maximum concentration of 15 ppm of active ingredient.

Exposure Potential 24,25,26
DOW™ CMIT/MIT-based antimicrobial products are used in the production of industrial and consumer products. Based on the uses for these products, the public could be exposed through:

- Workplace exposure – Exposure can occur in a DOW CMIT/MIT-based antimicrobial products manufacturing facility or in the various industrial or manufacturing facilities that use these products. These materials are produced in closed systems. Personnel working with these products in manufacturing operations could be exposed during maintenance, sampling, testing, or other procedures. Each manufacturing facility should have a thorough training

©™Trademark of The Dow Chemical Company (“Dow”) or an affiliated company of Dow

Created: December 17, 2010 The Dow Chemical Company Page 3 of 8
program for employees and appropriate work processes, ventilation, personal protective
equipment and safety equipment in place to limit exposure. See Health Information.

- **Consumer exposure to products containing DOW™ CMIT/MIT-based antimicrobial products** – Dow does not sell these products for direct consumer use, but they are used at very low levels in household cleaners, aqueous products like paints, adhesives, and personal-care products. At the dilute use concentrations, no adverse risk is expected. Always read the product information before use and follow the label/use instructions. See Health Information.

- **Environmental releases** – Very small quantities of these materials may be released to the environment if products that contain them are spilled or disposed of down drains. Because the active ingredients in these biocides are highly soluble, once introduced to water, these compounds tend to remain dissolved in water. These compounds are biodegradable and will be removed by wastewater treatment plants. In the event of an industrial spill, the focus is on containing the spill to prevent contamination of soil and surface or ground water. For small spills, DOW CMIT/MIT-based antimicrobial products should be absorbed with inert materials such as sand or clay. The active ingredients in these biocide products are very toxic to aquatic organisms on an acute basis (exposure to a large amount). 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. Keep unprotected personnel from entering the area. An approved respirator is recommended for emergency work. Keep upwind of the spill and ventilate the area. Rinse the spill area with a 5% bleach/5% sodium bicarbonate in water “deactivation solution.” Let stand for 30 minutes and then rinse with water. See Environmental, Health, and Physical Hazard Information.

- **In case of fire** – This material will not burn until the water has evaporated. The residue is combustible. Deny unnecessary entry into the area and consider the use of unmanned hose holders. Use water fog, carbon-dioxide or dry-chemical extinguishers, or foam to fight the fire. Firefighters should wear protective clothing, self-contained breathing apparatus (SCBA) and protective firefighting clothing. Immediately withdraw all personnel from the area in case of rising sounds from venting safety device or discolorations of the container. Contain fire-water run-off if possible to minimize the potential for environmental damage. Follow emergency procedures carefully. See Environmental, Health, and Physical Hazard Information.

For more information, see the relevant Safety Data Sheet.

---

**Health Information**

Health information for DOW™ CMIT/MIT-based antimicrobial products is summarized on the relevant Safety Data Sheets. Health risks associated with individual products may vary based on their formulation, concentration, or intended use. These materials may contain minor components or additives that have additional health risks. The Safety Data Sheet is the preferred source for specific health information.

The information that follows is based on data from concentrated biocide products. Harmful effects decrease as the concentration of active ingredients 5-chlor-2-methyl-4-isothiazolin-3-one (CMIT) and 2-methyl-4-isothiazolin-3-one (MIT) decreases. Therefore, the health risks associated with final product concentrations (less than 50 parts per million for consumer products) are very low compared to the concentrated active ingredient hazards listed below. Always read the product information before use and follow the label/use instructions.
Eye contact – Contact may cause severe eye irritation or chemical burns with corneal injury, which may result in permanent impairment of vision, even blindness.

Skin contact – Prolonged contact may cause skin burns with symptoms of pain severe local redness, swelling, and tissue damage. Prolonged or widespread contact may result in allergic skin reactions.

Ingestion – These products have moderate toxicity if swallowed. Small amounts swallowed incidental to normal handling operations are not likely to cause injury. However, large amount may cause serious injury, even death.

Inhalation – Vapor or mist may cause irritation of the upper respiratory tract (nose and throat) and lungs.

Repeated exposure – Repeated exposure is not expected to cause additional significant adverse effects.

Other – Similar materials have not caused cancer, birth defects, or fetal effects in animal testing.

For more information, see the relevant Safety Data Sheet.

Environmental Information

5-Chloro-2-methyl-4-isothiazolin-3-one and 2-methyl-4-isothiazolin-3-one, the active ingredients in DOW™ CMIT/MIT antimicrobial products, have a low bioconcentration potential (tendency to accumulate in the food chain) and a high potential for mobility in soil. They are completely soluble in water. In the environment these compounds would tend to partition into water where they would rapidly biodegrade to non-persistent substances which are several orders of magnitude less toxic than parent compound. They would also be removed by common biological wastewater treatment facilities. These compounds are very toxic to aquatic organisms on an acute basis.

For more information, see the relevant Safety Data Sheet.

Physical Hazard Information

DOW™ CMIT/MIT-based antimicrobial products are stable at recommended storage and use temperatures. The active ingredients can decompose violently at temperatures above 50°C (122°F). Generation of gases (hydrogen chloride, nitrogen oxides, sulfur oxides) can cause rapid pressure build-up in closed systems. Avoid temperatures above 40°C (104°F). Avoid contact with amines, mercaptans, oxidizers, and reducing agents.

For more information, see the relevant Safety Data Sheet.

Regulatory Information

Regulations may exist that govern the manufacture, sale, transportation, use, and/or disposal of DOW™ CMIT/MIT antimicrobial products. 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.

©™Trademark of The Dow Chemical Company ("Dow") or an affiliated company of Dow
Additional Information

- Safety Data Sheet (request from the Dow Customer Information Group www.dow.com/assistance/dowcig.htm)
- Contact Us (www.dow.com/microbial/contact/)
- Ask Us About Biocides for Oil & Gas Treatment, The Dow Chemical Company, Form No. 253-02573-09/22/09 TCG, September 2009 (www.dow.com/PublishedLiterature/dh_031f/0901b8038031fb57.pdf?filepath=biocides/pdfs/noreg/253-02573.pdf&fromPage=GetDoc)

For more business information about DOW™ CMIT/MIT biocides, visit the Dow Microbial Control web site at www.dow.com/microbial/.

References

5 KATHON™ CG: A Safe, Effective, Globally Approved Preservative for Rinse-Off Products, Rohm and Haas Personal Care, Form No. PC0202006B, June 2006, page 1.
6 Ask Us About Biocides for Oil & Gas Treatment, The Dow Chemical Company, Form No. 253-02573-09/22/09 TCG, September 2009, page 2.
21 Ask Us About Biocides for Oil & Gas Treatment, The Dow Chemical Company, Form No. 253-02573-09/22/09 TCG, September 2009, page 2.

Back to top
NOTICES:

As part of its 2015 Sustainability Goals, Dow has committed to make publicly available safety assessments for its products globally. This product safety assessment is intended to give general information about the chemical (or categories of chemicals) addressed. It is not intended to provide an in-depth discussion of health and safety information. Additional information is available through the relevant Safety Data Sheet, which should be consulted before use of the chemical. This product safety assessment does not replace required communication documents such as the Safety Data Sheet.

The information herein is supplied upon the condition that the persons receiving same will make their own determination as to its suitability for their purposes prior to use. In no event will Dow be responsible for damages of any nature whatsoever resulting from the use of or reliance upon the information herein or the product to which that information refers.

Nothing contained herein is to be construed as a recommendation to use any product, process, equipment or formulation in conflict with any patent, and Dow makes no representation or warranty, express or implied, that the use thereof will not infringe any patent.

NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR OF ANY OTHER NATURE ARE MADE HEREUNDER WITH RESPECT TO INFORMATION OR THE PRODUCT TO WHICH INFORMATION REFERS.

Dow makes no commitment to update or correct any information that appears on the Internet or on its World-Wide Web server. The information contained in this document is supplemental to the Internet Disclaimer, www.dow.com/homepage/term.asp.

Back to top