



Product Safety Assessment

BIOBAN™ CS-1135 Antimicrobial

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Names

- CAS No. 51200-87-4
- 4,4-dimethyloxazolidine
- 4,4-dimethyl-1,3-oxazolidine
- BIOBAN™ CS-1135 Antimicrobial
- Oxazolidine-A
- DMO

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Product Overview

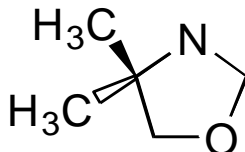
- BIOBAN™ CS-1135 Antimicrobial is a colorless liquid with a pungent odor. It is a biocidal product containing the active substance 4,4-dimethyloxazolidine (DMO), which is a cyclic amine compound. The product is water soluble, basic, and has a relatively high vapor pressure. For further details, see [Product Description](#).
- BIOBAN CS-1135 Antimicrobial is used primarily for the preservation of paints, inks, emulsions, slurries, non-food contact adhesives, surfactants, consumer, household and institutional products, oilfield water treatment, and metalworking fluids. For further details, see [Product Uses](#).
- Workers handling concentrated DMO may potentially be exposed by inhalation as well as skin contact. Consumer may be exposed to diluted DMO in formulated products; exposures to consumers are considered to be much lower than occupational exposures. For further details, see [Exposure Potential](#).
- BIOBAN CS-1135 Antimicrobial can cause severe eye irritation. It is acutely toxic by inhalation and is harmful by contact with skin. For further details, see [Health Information](#).
- BIOBAN CS-1135 Antimicrobial is readily biodegradable and susceptible to rapid hydrolysis, unlikely to accumulate in the food chain, and is toxic to aquatic organisms. For further details, see [Environmental Information](#).
- BIOBAN CS-1135 Antimicrobial is flammable and has no characteristics of being an explosive or an oxidizing agent. Decomposition of DMO may result in the release of formaldehyde. For further details, see [Physical Hazard Information](#).

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Manufacture of Product

- **Capacity** – Dow is a global manufacturer of BIOBAN™ CS-1135 Antimicrobial, with production capacity to meet worldwide demand for this product.
- **Process** – The process for manufacturing BIOBAN CS-1135 Antimicrobial is proprietary. The chemical structure of the active substance DMO is shown below:



4,4-dimethyloxazolidine (DMO)

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Product Description

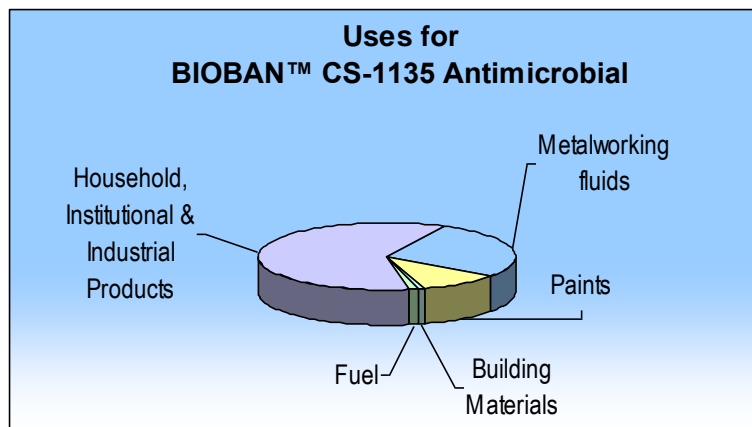
BIOBAN™ CS-1135 Antimicrobial is a colorless water-soluble liquid. The active ingredient in this product is 4,4-dimethyloxazolidine (DMO). DMO constitutes approximately 78% by weight of the composition of BIOBAN CS-1135 Antimicrobial. As a result of the manufacturing process, the product also contains approximately 22% by weight water.

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Product Uses

BIOBAN™ CS-1135 Antimicrobial provides broad-spectrum bactericidal activity in water-based formulations and is effective over a wide pH range (7-11). BIOBAN CS-1135 Antimicrobial is not currently approved for use in food contact applications. BIOBAN CS-1135 Antimicrobial is used as a preservative and bacterial growth inhibitor in the following applications:

- **Metal-working fluids (MWF)** – Synthetic, semi-synthetic, and soluble metal-working fluids
- **Paints, inks, and emulsions** – Water-containing systems such as latex paints and inks, wax and resin emulsions
- **Consumer, household, and institutional products** – Dishwashing and laundry liquids, surface cleaners, and polishes
- **Adhesives** – Non-food contact adhesives based on starches, latexes, proteins, and gums
- **Mineral slurries** – Calcium carbonate, titanium oxide and kaolin clays
- **Surfactants** – Anionic, nonionic, amphoteric and cationic surfactants used in the production of industrial and consumer products.
- **Oilfield water treatment** – Effective in controlling growth of bacteria in oilfield water systems such as subsurface injection water



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Exposure Potential

BIOBAN™ CS-1135 Antimicrobial is used in multiple applications leading to both occupational and consumer exposure to DMO and/or its breakdown products, including formaldehyde. In the occupational setting, workers may handle the concentrated product during manufacturing processes such as product formulation. Whereas consumers are exposed to DMO and/or its breakdown products and/or its degradates in final formulated products such as adhesives and paints. In either group, exposure to DMO and/or its degradates takes place via inhalation or dermal absorption. Oral exposure is insignificant because DMO is not used in materials in direct contact with food.

- **Workplace exposure** – Professionals working with BIOBAN™ CS-1135 Antimicrobial 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. See [Health Information](#).
- **Consumer exposure to products which contain BIOBAN CS-1135 Antimicrobial** – BIOBAN CS-1135 Antimicrobial 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 potential exposure to DMO and/or its degradates in consumer products is low with the final concentration of BIOBAN CS-1135 Antimicrobial in these products not exceeding 0.2% by weight. See [Health Information](#).
- **Environmental releases** – DMO may be released into the environment during use of products containing it. The compound is readily biodegradable and susceptible to rapid hydrolysis. If released to the environment, this material would biodegrade in water or soil and would not persist. 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](#), [Health](#) and [Physical Hazard Information](#).
- **Large release** – Industrial spills or releases are infrequent and generally contained. In the event of a large spill, the material, in accordance with Dow policy and procedure and applicable governmental regulations, is captured, collected, and reprocessed, or disposed of. When appropriate due to scale or risk, the community is notified of the hazards associated with the specific release event.
- **In case of fire** – Deny any unnecessary entry into the area. Isolate the fire. Containers may rupture from gas generation in a fire situation. Firefighters should wear positive-pressure, self-contained breathing apparatus (SCBA) and protective firefighting clothing and avoid contact with this material during firefighting operations. Use water fog or fine spray, dry-chemical or carbon-dioxide extinguishers, or foam. Foam is preferred. If possible, contain fire-water run-off 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](#).

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Health Information

BIOBAN™ CS-1135 Antimicrobial is harmful if ingested and acutely toxic if inhaled. Exposure to product mist may cause severe eye irritation and corneal injury. The product is not dermally toxic, however, prolonged contact with it may cause severe skin irritation.

BIOBAN CS-1135 Antimicrobial has been evaluated in subacute and subchronic laboratory animal studies by the oral and dermal routes of exposure. The oral route was mainly limited to portal of entry effects in the stomach, characterized by chronic active inflammation and ulceration, with additional effects reported in the liver. Repeated dermal exposure did not produce systemic toxicity in animals.

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In vitro genetic toxicity tests with BIOBAN CS-1135 Antimicrobial were negative in some cases and positive in others. However, the product tested negative in both the *in vivo* mouse micronucleus assay and the *in vivo* unscheduled DNA synthesis assay; both tests are designed to evaluate genotoxic potential in the whole animal.

In animal studies with BIOBAN™ CS-1135 Antimicrobial, it has been shown that relatively high oral doses do not cause birth defects even at maternally toxic dose levels. Effects on reproduction have been seen only at doses that produced significant toxicity to the parent animals.

Formaldehyde Release

The extent of hydrolysis and amount of formaldehyde released to solution from BIOBAN™ CS-1135 Antimicrobial 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 Sheet](#), or contact a [Dow representative](#).

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Environmental Information

DMO is very soluble in water, and when introduced, will have a tendency to remain in water. It has minimal tendency to bind to soil or sediment.

DMO is unlikely to persist in the environment. DMO is readily biodegradable and susceptible to rapid hydrolysis. The compound will biodegrade in water and soil and will not persist in the environment. Formaldehyde, a hydrolysis product of DMO, is also susceptible to rapid biodegradation.

DMO 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](#).

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Physical Hazard Information

BIOBAN™ CS-1135 Antimicrobial is water-soluble and has a pH of 10.9 measured in 1% weight-in-volume solution at ambient temperature. It is flammable but has no oxidizing or explosive characteristics. The product is a poor conductor of electricity and can become electrostatically charged, even in bonded or grounded equipment. For this reason, handling operations are designed to limit the accumulation of static charges.

Incompatible materials include oxidizing strong acids, and metals such as aluminum and copper. Acidic pH must be avoided since reaction with acid can generate flammable formaldehyde gas. The product must be stored in a cool and dry place. Under recommended storage conditions, the product is stable in its packaging for two years.

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 BIOBAN™ CS-1135 Antimicrobial. These regulations may vary by city, state, country or geographic region. Information may be found by consulting the relevant [Safety Data Sheet](#), [Product Information Sheet](#), or [Contact Us](#).

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Additional Information

- Safety Data Sheet (www.dow.com/webapps/msds/msdssearch.asp), or contact the [Dow Customer Information Group](#) at (www.dow.com/assistance/dowcig.htm)
- Contact Us (www.dow.com/microbial/contact/index.htm)
- BIOBAN™ CS-1135 Antimicrobial, Product label, EPA Registration NO. 464-660 (<http://oaspub.epa.gov/pestlabl/ppls.home>)
- *BIOBAN CS-1135: Product Information*, The Dow Chemical Company, Form No. Form No. 253-01207, October 2002 (www.dow.com/microbial/applications/ma_mf_products.htm#3)

For more business information about BIOBAN™ CS-1135 Antimicrobial, visit the [Dow Microbial Control](#) website at www.dow.com/microbial/.

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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.

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