Product Safety Assessment

*BIOBAN™ P-1487 Antimicrobial Agent*

*FUELSAVER™ Antimicrobial Agent*

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Names

- BIOBAN™ P-1487 Antimicrobial Agent
- FUELSAVER™ Antimicrobial Agent

**Product Overview**

- BIOBAN™ P-1487 Antimicrobial Agent and FUELSAVER™ Antimicrobial Agent are yellow to brown liquids. They are biocidal products containing 81% 4-(2-nitrobutyl) morpholine and 5% 4,4’-(2-ethyl-nitrotrimethylene dimorpholine) The products are moderately water soluble, have a basic pH (9.5 to 10.0), and have a vapor pressure of less than 20 mm Hg at room temperature. See Product Description.
- BIOBAN P-1487 and FUELSAVER Antimicrobial Agents are used for the preservation of metalworking fluids and hydrocarbon fuels. See Product Uses.
- Occupational exposure to these products may occur by inhalation as well as skin contact. See Exposure Potential.
- BIOBAN P-1487 and FUELSAVER Antimicrobial Agents can cause severe eye burns and severe skin irritation. Vapors or mist may cause irritation if inhaled. Skin contact may also result in an allergic reaction. See Health Information.
- BIOBAN P-1487 and FUELSAVER Antimicrobial Agents are combustible liquids and are capable of becoming unstable at high temperature. Decomposition may result in the release of toxic, flammable gases. See Physical Hazard Information.

**Manufacture of Product**

- **Capacity** – Dow is the only global manufacturer of BIOBAN™ P-1487 and FUELSAVER™ Antimicrobial Agents, with production capacity satisfying worldwide demand for these products.
- **Process** – The process for manufacturing these antimicrobial agents is proprietary.
Product Description\(^1,3\)

BIOBAN™ P-1487 and FUELSAVER™ Antimicrobial Agents are yellow-brown liquids that are moderately soluble in water, and totally soluble in organic hydrocarbons. They are reaction products containing 81% 4-(2-nitrobutyl)-morpholine and 5% 4,4’-(2-ethyl-2-nitromethylene)dimorpholine. The products are moderately water soluble, have a basic pH (9.5 to 10.0), and have a vapor pressure of less than 20 mm Hg at room temperature.

Product Uses\(^2,3,4\)

BIOBAN™ P-1487 Antimicrobial Agent is an effective antibacterial and antifungal agent that provides broad-spectrum activity. It is compatible with soluble, synthetic, semi-synthetic, and straight oils used in the metalworking industry. FUELSAVER™ Antimicrobial Agent partitions at the oil/water interface, making it an effective agent for the control of microbial growth in fuels. Major applications for these antimicrobial agents include:

- **Metal-working fluids** – for the preservation of synthetic, semi-synthetic, soluble, and straight metal-working fluids. The product is sold under the trade name BIOBAN P-1487 Antimicrobial Agent for this application.
- **Hydrocarbon (fuel) preservation** – for the preservation of hydrocarbons such as diesel fuel, kerosene, heating oil, and gasoline. The product is sold under the trade name FUELSAVER Antimicrobial Agent for this application.

Smaller amounts are used in the preservation of die-cast lubricants and mold-release agents.

Exposure Potential

Based on the applications in which BIOBAN™ P-1487 and FUELSAVER™ Antimicrobial Agents are used, the greatest potential for exposure to the active ingredient and/or its breakdown products is occupational exposure. The primary modes of exposure would be skin contact or inhalation. Oral exposure is highly unlikely given the end uses for this product.

- **Workplace exposure\(^5\)** – Professionals working with these antimicrobial agents 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 BIOBAN P-1487 or FUELSAVER Antimicrobial Agents as a preservative, exposure to the active ingredients is minimal since the amount of product used is low (maximum 0.3% by weight of formulation). See Health Information.
- **Environmental releases\(^1\)** – BIOBAN P-1487 and FUELSAVER Antimicrobial Agents are stable to microbial degradation and bioaccumulation in terrestrial or aquatic organisms and are unlikely to persist in either aquatic or terrestrial ecosystems. Although they do not readily biodegrade, they are unlikely to contaminate surface or ground water because they are hydrolytically unstable, with a half life of less than two days. These antimicrobial agents are considered to be very toxic to aquatic organisms and freshwater alga as per U.S. environmental classifications, and highly toxic as per European environmental classifications.

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Given the use patterns for these materials, environmental exposure of these sensitive species is unlikely. 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. If a large spill of BIOBAN™ P-1487 or FUELSAVER™ Antimicrobial Agent 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. Isolate and ventilate the area. 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. 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. Use water spray to cool fire-exposed containers and the fire-affected zone until the fire is out and the danger of re-ignition has passed. Water fog or fine spray, dry-chemical or carbon-dioxide extinguishers, or foam may be used for small fires. Do **not** use a direct water stream as it may spread the fire. Move containers from the fire area if this is possible without hazard. 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 nitrogen oxides, carbon monoxide, and carbon dioxide. Contain fire water run-off if possible. See Environmental, Health, and Physical Hazard Information.

For more information, see the relevant Safety Data Sheet.

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**Health Information**

**Eye and skin contact** – Eye contact with liquid or mist forms of BIOBAN™ P-1487 and FUELSAVER™ Antimicrobial Agents can result in severe burns with corneal injury, which could result in permanent vision impairment, even blindness. Skin contact can result in severe irritation with pain and redness. Prolonged or repeated skin contact may cause pain, severe redness, swelling, and tissue damage. Prolonged or widespread skin contact may result in absorption of harmful amounts. Skin contact may also result in an allergic reaction.

**Inhalation** – Vapor from heated material or mist may cause respiratory irritation.

**Ingestion** – The oral toxicity of these materials is considered to be low. Small amounts swallowed incidental to normal handling are not likely to cause injury. Treatment-related effects were found in the urinary tract during sub-chronic laboratory animal studies.

**Other** – *In vitro* genetic toxicity studies were negative in some cases and positive in others. *In vivo* genetic studies were negative. In laboratory animal testing, the product did not cause birth defects or other effects even at doses that caused toxic effects in the mother.

For more information, see the relevant Safety Data Sheet.

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**Environmental Information**

BIOBAN™ P-1487 and FUELSAVER™ Antimicrobial Agents are stable to microbial degradation and bioaccumulation in terrestrial or aquatic organisms. They are unlikely to persist in either

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aquatic or terrestrial ecosystems. Although they do not biodegrade readily, they are not likely to contaminate surface or ground water because they are hydrolytically unstable, with a half life of less than 2 days. These antimicrobial agents are considered to be very toxic to aquatic organisms and freshwater alga as per U.S. environmental classifications, and highly toxic as per European environmental classifications. However, they are practically nontoxic to birds.

If released to the air, BIOBAN™ P-1487 and FUELSAVER™ Antimicrobial Agents will react with hydroxyl radicals. If released directly to water (the most probable emission route based on physical properties and use patterns), most of the material will remain in the water and will rapidly hydrolyze. If released to soil, the product is expected to rapidly hydrolyze.

For more information, see the relevant Safety Data Sheet.

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Physical Hazard Information

Under recommended storage conditions, these products are stable in their packaging for at least one year. BIOBAN™ P-1487 and FUELSAVER™ Antimicrobial Agents are slightly basic with a pH of 9.5 to 10. The products are 1.1% by weight water-soluble, are combustible, and have no oxidizing or explosive characteristics. Incompatible materials include oxidizing agents and acids. An acidic pH must be avoided since reaction with acid can generate flammable formaldehyde gas.

These products can crystallize at 10°C (50°F). Avoid temperatures above 35°C (95°F). Potentially violent decomposition can occur above 100°C (212°F). Generation of gas during decomposition can cause pressure build-up in closed systems. This pressure build-up can be rapid. The product must be stored in a cool and dry place away from high temperatures, hot pipes, and direct sunlight.

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™ P-1487 and FUELSAVER™ Antimicrobial Agents. 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.

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Additional Information

- Safety Data Sheet (http://www.dow.com/webapps/msds/msdssearch.aspx)
- Contact Us (http://dowac.custhelp.com)
- BIOBAN™ P-1487 Broad Spectrum Antimicrobial Agent, Product Information, The Dow Chemical Company, Form No. 253-01205 (http://www.dow.com/products/)
- Ask Us about Biocides for Metal Working Fluids, The Dow Chemical Company, Form No. 253-01453 (http://www.dow.com/products/)
- FUELSAVER™ Antimicrobial Agent, Product Information, The Dow Chemical Company, Form No. 253-01225 (http://www.dow.com/products/)

For more business information about BIOBAN™ P-1487 and FUELSAVER™ Antimicrobial Agents, visit the Dow Microbial Control web site at http://www.dow.com/microbial.

References

1 BIOBAN™ P-1487 Antimicrobial, Material Safety Data Sheet, The Dow Chemical Company
2 Reregistration Eligibility Decision for BIOBAN P-1487, U.S. Environmental Protection Agency, Office of Prevention, Pesticides and Toxic Substances, EPA739-R-07-005, September 2007
3 BIOBAN P-1487 Broad Spectrum Antimicrobial Agent, Product Information, The Dow Chemical Company, Form No. 253-01205
4 Usage estimates provided by The Dow Chemical Company.
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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