



BIOBAN CS-1246

Preservative

EPA Reg. No. 464-667

CAS Reg. No. 7747-35-5

EINECS No. 2318104

General

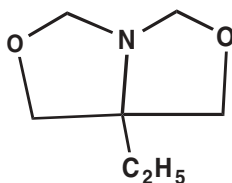
BIOBAN™ CS-1246 is a broad-spectrum bactericide based on oxazolidine (1-aza-3,7-dioxa-5-ethylbicyclo (3.3.0) octane) chemistry and is registered for use in paints, inks, emulsions, slurries, non-food contact adhesives, surfactants, consumer, household and institutional products, and metalworking fluids. These systems, if left untreated, are subject to bacterial degradation resulting in off-odors, changes in color, loss of viscosity and film-forming properties, changes in pH and gas production.

BIOBAN CS-1246 is soluble in both aqueous and oil-based systems and does not contain any metallic or halogenated compounds, or any organic derivatives of sulfur, boron, or phosphorus.

BIOBAN CS-1246 exhibits the following performance benefits:

- Effective broad-spectrum bactericide
- Compatible with a wide range of formulation raw materials
- Effective over wide pH range (7-11)
- Low odor
- Readily incorporated into soluble oil, semisynthetic and synthetic metalworking fluid systems.
- Does not increase detectable formaldehyde in vapor phase/airspace
- Good handling characteristics, including a low freezing point and excellent thermal stability

Structure



Physical Properties

The following are typical properties of BIOBAN CS-1246. They are not to be considered product specifications.

Active Ingredient (%)	97.5
pH (as supplied)	8-9
Specific Gravity @ 30/20°C	1.085
Boiling Point @ 15 mm Hg	71°C/160°F
Freezing Point	0°C/32°F
Surface Tension, dynes/cm @ 25°C/77°F	36.5
Flash Point (Tag Closed Cup)	79°C/175°F
Solubility	Soluble in water, ethanol, benzene, chlorinated hydrocarbons and acetone

Antimicrobial Activity

The ability of BIOBAN CS-1246 preservative to inhibit growth of microorganisms is shown below in a table of minimum inhibitory concentrations (MIC) for representative spoilage bacteria. The MIC values indicate the concentration of preservative needed (in ppm) to control a particular bacterium. The lower the number, the greater the effectiveness of the biocide. Although values shown do not necessarily indicate dosage levels required in the formulated product, they are indicative of the spectrum of antibacterial activity of the preservative. These are “minimum” concentrations and actual dosing should begin much higher and then be optimized, based upon preliminary testing with the product to be preserved.

Organism	MIC (ppm)
<i>Enterobacter aerogenes</i>	250-300
<i>Bacillus megaterium</i>	200-250
<i>Bacillus subtilis</i>	300-350
<i>Bacillus mycoides</i>	200-250
<i>Desulfovibrio desulfuricans</i>	150-200
<i>Desulfovibrio aestuarii</i>	200-250
<i>Escherichia coli</i>	450-500
<i>Gaffkya tetragena</i>	150-200
<i>Lactobacillus acidophilus</i>	200-250
<i>Micrococcus flavus</i>	100-150
<i>Pseudomonas aeruginosa</i>	800-850
<i>Pseudomonas fluorescens</i>	400-450
<i>Proteus vulgaris</i>	300-350
<i>Staphylococcus aureus</i>	200-250
<i>Streptococcus faecalis</i>	400-450
<i>Streptococcus hemolyticus</i>	450-500
<i>Micrococcus luteus</i>	450-500

Applications	Purpose	Suggested Concentration of BIOBAN CS-1246	How to Apply
Adhesives	To protect adhesives based on starch, protein, gums and latex from microbial degradation during manufacture, storage and service life.	400-2000 ppm of BIOBAN CS-1246	Add as a concentrated solution to the formulation at any point during the manufacturing process but generally as the last ingredient. pH should be above 7.0.
Consumer, Household and Industrial Products	To protect from microbial degradation consumer products including dishwashing and laundry liquids, surface cleaners and polishes during the production, storage and use.	400-2000 ppm of BIOBAN CS-1246	Add as a concentrated solution to the formulation at any point during the manufacturing process but generally as the last ingredient. pH should be above 7.0.
Emulsions	For protection of wax and resin emulsion during manufacture and storage.	400-2000 ppm of BIOBAN CS-1246	Add as a concentrated solution to the formulation at any point during the manufacturing process but generally as the last ingredient. pH should be above 7.0.
Inks	For preservation of water-based inks.	400-2000 ppm of BIOBAN CS-1246	Add as a concentrated solution to the formulation at any point during the manufacturing process but generally as the last ingredient. pH should be above 7.0.
Metalworking Fluids	To prevent microbial degradation of oil, emulsifying agents and other components.	400-2000 ppm of BIOBAN CS-1246	Add as a concentrated solution to the formulation at any point during the manufacturing process but generally as the last ingredient. pH should be above 7.0.
Mineral Slurries	To control the growth of microorganisms in mineral slurries such as CaCO ₃ , TiO ₂ and kaolin clays.	400-2000 ppm of BIOBAN CS-1246	Add to the slurry as a concentrated solution during manufacture, loading, shipping or storage of slurry.
Paint	For protection against microbial contamination in water-containing paint systems such as latex paint.	400-2000 ppm of BIOBAN CS-1246	Add as a concentrated solution to the formulation at any point during the manufacturing process but generally as the last ingredient. pH should be above 7.0.
Surfactants	To inhibit microbial spoilage during storage and use of anionic, nonionic, amphoteric and cationic surfactants used in industrial and consumer products.	400-2000 ppm of BIOBAN CS-1246	Add as a concentrated solution to the formulation at any point during the manufacturing process but generally as the last ingredient. pH should be above 7.0.

Uses

BIOBAN CS-1246 may be used in, and is efficacious in, the following applications. BIOBAN CS-1246 is best suited for systems in which the pH is greater than 7. As with all formulations, it is recommended that compatibility of BIOBAN CS-1246 be tested in combination with other formula ingredients.

BIOBAN CS-1246 can be used alone or in combination with other preservatives. The use of multiple preservatives provides additional protection against bacterial and fungal spoilage. In addition, combination systems can be more cost effective. Multiple biocide combinations help prevent the establishment of populations of organisms resistant to a single biocide. BIOBAN CS-1246 alone has limited efficacy against fungi.

Metalworking Fluids

Metalworking fluids usually are formulated as concentrates which are diluted with water when placed in use. These fluids are subject to gross microbial contamination under use conditions. Such contamination provides opportunity for malodor formation as well as adversely affecting fluid stability, causing equipment corrosion, and producing slime.

In laboratory tests, representative metalworking fluids and BIOBAN CS-1246 were placed in a continuous circulating system containing iron chips to simulate industrial use conditions. The system was inoculated initially and at weekly intervals thereafter with a heavily contaminated metalworking fluid. In such tests, most oil-based emulsions, semi-synthetic fluids, and synthetic fluids containing 1000 ppm of BIOBAN CS-1246 resisted gross microbial contamination for at least six weeks.

BIOBAN CS-1246 is an effective tankside and concentrate antimicrobial agent for metalworking fluids. It can be used in soluble, synthetic, and semi-synthetic fluids. The recommended tankside use rate is 400-2000 ppm in the use-diluted fluid. The amount required in the concentrate will vary depending upon the dilution rate. It is recommended that the pH of a metalworking fluid be adjusted to 7.0 or above prior to any tankside addition of BIOBAN CS-1246. Long-term stability studies should be carried out by the fluid manufacturer to ensure compatibility with fluid ingredients.

Paints, Inks and Emulsions

Paints, inks and emulsions contain many raw materials such as defoamers, dispersants, thickening agents, and pigments which are subject to microbial degradation. The results of this degradation may include gas production, loss of viscosity and off odors.

BIOBAN CS-1246 is an effective preservative in water-containing systems such as latex paints, inks (non-food contact), and wax and resin emulsions at concentrations from 0.04-0.2 lb per 100 lb (400-2000 ppm). BIOBAN CS-1246 may be added at any point in the manufacturing process. The recommended dosage rate for preservation of inks, paints and slurries is 0.04-0.2 lb per 100 lb of the formulation. For emulsions, the recommended dosage rate for preservation is approximately 0.1 lb per 100 lb of the formulation.

Adhesives

Adhesives contain a variety of materials which are particularly susceptible to microbial attack including starches, proteins and latexes. Microbial degradation of these raw materials results in gas production, loss of viscosity, pH drop, off odor and other effects which result in loss of adhesive properties.

BIOBAN CS-1246 is approved for control of microbial contamination in adhesives that do not come in contact with food. The dosage rate should be between 0.04 and 0.2 lb per 100 lb (400-2000 ppm) total formulation weight.

Surfactant Preservation

BIOBAN CS-1246 may be used to inhibit bacterial degradation during storage and use of anionic, nonionic, amphoteric and cationic surfactants used in the production of industrial and consumer products. BIOBAN CS-1246 can be added at any point during the manufacturing process, at a dosage rate of 0.04-0.2 lb per 100 lb (400-2000 ppm) based upon the final formulation weight.

Consumer, Household and Institutional Products

BIOBAN CS-1246 may be used for the inhibition of bacterial spoilage during production, shelf-life storage and use of consumer, household and industrial products including dishwashing liquids, surface cleaners, laundry cleaners and polishes. BIOBAN CS-1246 should not be used when food contact will occur. The recommended dosage rate is 0.04 to 0.2 lb per 100 lb (400-2000 ppm).

Slurries

Mineral slurries by their very nature are often highly contaminated with bacteria and fungi.

BIOBAN CS-1246 is effective as a preservative in mineral slurries such as CaCO₃, TiO₂, and in kaolin clay. BIOBAN CS-1246 is particularly suited for these high pH systems due to the excellent stability of the molecule in an alkaline environment. BIOBAN CS-1246 should be dosed at 400-2000 ppm (0.04-0.2 lb per 100 lb). However, excellent performance has been demonstrated at dosage levels of less than 1000 ppm.

Toxicity

Acute Studies

The oral LD₅₀ of BIOBAN CS-1246 in the rat is 5250 mg/kg for males and 3680 mg/kg for females. As determined using rabbits, the dermal LD₅₀ is 1948 mg/kg. Because of its low volatility, little hazard potential is expected from inhalation of vapors of BIOBAN CS-1246. Nevertheless, a four-hour mist inhalation was carried out with rats. The LC₅₀ was determined to be 3.1 mg/L. Based on these data, BIOBAN CS-1246 is considered to be slightly toxic. BIOBAN CS-1246 does not meet the definition for toxic chemicals mandated by the OSHA Hazard Communication Standard (29 CFR 1910.1200 Appendix A).

BIOBAN CS-1246, based on studies using the method of Draize *et al.*, is severely irritating to the eyes and skin. However, it is **not corrosive** as determined by the method prescribed by the U.S. Department of Transportation.

The dermal sensitization potential of BIOBAN CS-1246 was determined in guinea pigs by intradermal injection using the technique of Landsteiner and Jacobs. No sensitization response was observed. Two additional tests were conducted with panels of human volunteers. Of a total of 201 individuals tested, only one individual showed definite sensitization. This is in spite of the fact that 12% of the panel exposed to solutions of 3% by weight of BIOBAN CS-1246 exhibited some degree of skin irritation during the induction period.

Mutagenicity

BIOBAN CS-1246 was judged to be non-mutagenic in the *Salmonella* Plate Incorporation Assay (Ames Test). Testing was conducted with strains, TA98, TA100, TA1535, TA1537, and TA1538 with and without S-9 metabolic activation. Levels of 0 to 600 µg/plate were used in all five *Salmonella* strains.

In the Chromosome Aberration Test with Chinese hamster ovary cells *in vitro*, BIOBAN CS-1246 also was non-mutagenic. Testing was conducted using 0.5 to 4.0 µL/mL of BIOBAN CS-1246 with and without S-9 activation.

Finally, BIOBAN CS-1246 was evaluated in the Unscheduled DNA Synthesis Assay in cultured rat liver cells. Once again, BIOBAN CS-1246 was non-mutagenic when tested at levels of 0.25 to 4.0 µL/mL.

Teratology

In an oral teratology study in rats, a no observed effect level (NOEL) of 250 mg/kg per day was determined for BIOBAN CS-1246. The test animals were dosed at 0, 50, 250, or 650 mg/kg per day on gestation days 6 through 15. Maternal and fetal toxicity was observed only at the high dose.

Subacute Studies

Four groups of 12 rats (6 males and 6 females) were exposed dermally to BIOBAN CS-1246 at doses of 0, 30, 100, or 300 mg/kg for 5 days a week over a 21-day period. Pathological examination of all animals revealed no abnormalities with the exception of eschar formation of the treatment area of the skin of the high-dose animals. A no observed effect level (NOEL) of 100 mg/kg was determined.

A 28-day oral feeding study in rats was conducted using 10 animals per dose group (5 males and 5 females). Dosing was at a constant dose volume of 5 mL/kg of body weight at 0, 100, 300, or 1000 mg/kg/day for 28 consecutive days. At autopsy, various degrees of local alteration were observed in the stomachs of animals dosed at 300 and 1000 mg/kg/day. Decreased body weight gain was noted for the high dose group and a no observed effect level (NOEL) of 100 mg/kg/day was established.

Environmental Effects

Care should be taken to avoid the release of BIOBAN CS-1246 to the environment. However, it is not listed as a hazardous waste under regulations promulgated under the Resource Conservation and Recovery Act, 40 CFR 261.

When diluted or otherwise dispersed in the environment, no significant hazard to wildlife should occur based on the results of the following studies.

The oral LD₅₀ of BIOBAN CS-1246 to bobwhite quail is 1100 mg/kg. No mortality was observed in either bobwhite quail or mallard ducks in 8-day dietary studies of 5000 ppm in the diet.

The 96-hour LC₅₀ determined for BIOBAN CS-1246 is as follows:

Rainbow Trout	240 mg/L
Bluegill Sunfish	130 mg/L
Pink Shrimp	138 mg/L

For *Daphnia magna*, the 48-hour LC₅₀ is 42 mg/L and the 96-hour EC₅₀ for Eastern oysters is 35 mg/L.

First Aid

In case of eye contact, immediately flush with plenty of water for at least 15 minutes. See a physician.

In case of skin contact, immediately flush exposed area with water. Remove and wash contaminated clothing before reuse.

If swallowed, do not induce vomiting. Drink a large amount of water and call a physician.

NOTE TO PHYSICIAN

Probable mucosal damage may contraindicate the use of gastric lavage.

Precautionary Labeling

Labels for BIOBAN CS-1246 bear these caution statements:

DANGER

CAUSES EYE DAMAGE AND SKIN IRRITATION. HARMFUL IF SWALLOWED OR INHALED. MAY BE FATAL IF ABSORBED THROUGH SKIN.

Do not get in eyes, on skin, or on clothing.

Wear goggles or face shield and rubber gloves when handling.

Wash thoroughly with soap and water after handling.

Handling and Storage

Based on the toxicology of BIOBAN CS-1246, the principal exposure route of concern is the direct contact of the liquid with skin and eyes. Workers handling BIOBAN CS-1246 should be equipped with chemical goggles or safety glasses with full-face shield. Rubber gloves and apron should be worn to prevent contact of liquid BIOBAN CS-1246 with the skin.

As is the case with most amine compounds, BIOBAN CS-1246 is corrosive to copper, aluminum, or their alloys. Store in a dry location away from sources of heat. Keep in original container. Keep container closed.

BIOBAN CS-1246 is a combustible liquid by DOT definitions (Tag closed cup flash point, 79°C/174°F). It will burn if exposed to open flame. Extinguish fires involving BIOBAN CS-1246 with water spray, CO₂, foam, or dry chemical extinguisher.

Shipping and Packaging

When shipped in non-bulk packaging with a capacity of 450 liters (119 gallons) or less, BIOBAN CS-1246 is not required to be labeled as a hazardous material in the U.S. Department of Transportation (DOT) regulations, and does not meet the definition of hazardous goods in the international regulations for ocean and air transport.

The bill of lading description used by DOW is:

DISINFECTANT NOI, OTHER THAN MEDICINAL OR TOILET PREPARATIONS.
NMFC ITEM 57100 SUB 3 CLASS 60. TRADE NAME = BIOBAN CS-1246.

Shipping Container	Net Wt.	Gross Wt.
5-gallon poly drum	45 lb	48 lb
55-gallon poly drum	450 lb	477 lb

For further information visit our website: www.dowbiocides.com or call...

United States 1-800-447-4369 (phone)
and Canada: 1-989-832-1560 (phone)
1-989-832-1465 (fax)
Europe: 800-3-694-6367 (phone)
32-3-450-2240 (phone)
32-3-450-2815 (fax)
Pacific: 603-7958-3392 (phone)
603-7958-5598 (fax)
Latin America: 55-11-5188-9555 (phone)
55-11-5188-9937 (fax)
Other Global 1-989-832-1560 (phone)
Areas: 1-989-832-1465 (fax)

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