



## BIOBAN CS-1135

Preservative

EPA Reg. No. 464-660

CAS Reg. No. 51200-87-4

EINECS No. 257-048-2

### General

BIOBAN™ CS-1135 is a broad-spectrum bactericide based on oxazolidine (4,4-dimethyl-oxazolidine) chemistry. The product is a cost effective antimicrobial that offers both performance and stability in alkaline systems and products such as metalworking fluids, oil and gas production, and mineral slurries. In addition BIOBAN CS-1135 is registered for use as an in-can preservative for paints, inks, emulsions, non-food contact adhesives, surfactants, and in consumer, household and institutional products. BIOBAN CS-1135 helps prevent bacterial degradation in these systems which often result in gas production, off-odors, changes in color and loss of viscosity and film forming properties. Its active component is both water- and oil-soluble. BIOBAN CS-1135 does not contain any metallic or halogenated compounds, or any organic derivatives of sulfur, boron, or phosphorus.

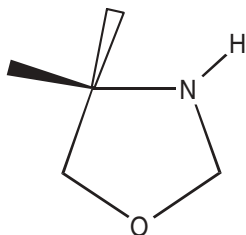
The advantages of using BIOBAN CS-1135 are:

- Antibacterial activity against a broad spectrum of bacteria in a variety of applications
- Effective over a pH range of 7-11
- Effective against sulfate-reducing bacteria
- Low freezing point and excellent thermal and alkaline stability
- Compatible with ionic additives and a variety of other formulation raw materials
- Non skin-sensitizing
- Low cobalt leaching
- No increase in detectable formaldehyde in vapor phase/airspace

In addition to its antibacterial activity, the amine functionality of BIOBAN CS-1135 provides:

- Corrosion inhibition in many systems
- Alkaline buffering capability to prevent pH drift
- Assistance in maintaining optimum viscosity of emulsion formulations

### Structure



## Physical Properties

The following are typical properties of BIOBAN CS-1135; they are not to be considered product specifications.

Active Ingredient (%)	73.7-78.7
pH (as supplied)	10.5-11.5
Neutral Equivalent as a Base	128-133.5
Color, APHA	100 (max.)
Flash Point (Tag Closed Cup)	49°C/120°F
Freezing Point	below -20°C/-4°F
Molecular Weight	101.1
Specific Gravity @ 25/25°C	0.98-0.99
Viscosity @ 25°C	~ 7.5 cps
Weight per U.S. Gallon	8.2 lb
Solubility	soluble in anhydrous alcohols, glycerol, propylene glycol, hydrocarbons and water

The partition coefficient between mineral oil and water is 0.0371 based on measurement of the oxazolidine content in the two phases. The octanol:water partition coefficient is 0.73. Partition coefficient is the ratio of the BIOBAN CS-1135 concentration in oil to that in water.

## Antibacterial Activity

The ability of BIOBAN CS-1135 to inhibit the growth of bacteria is illustrated by the minimum inhibitory concentration (MIC). The tests were conducted *in vitro* by serial-dilution methods. Dilutions of BIOBAN CS-1135 prepared in trypticase soy broth were inoculated with the appropriate organism and incubated at 37°C/98°F. The minimum inhibitory ranges shown are the highest concentration showing growth and the lowest with no growth. They are neither intended as a claim for recommended use concentration nor as a complete list of microorganisms involved in contamination and biodeterioration.

Organism	MIC (ppm)
<i>Enterobacter aerogenes</i>	250-300
<i>Bacillus megaterium</i>	200-250
<i>Bacillus subtilis</i>	200-250
<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>Mycobacterium ranae</i>	250-500
* <i>Pasteurella multocida</i>	31-62
* <i>Yersinia pseudotuberculosis</i>	125-250
<i>Pseudomonas aeruginosa</i>	500-550
<i>Pseudomonas fluorescens</i>	450-500
<i>Proteus vulgaris</i>	300-350
<i>Staphylococcus aureus</i>	150-200
<i>Streptococcus faecalis</i>	300-350
<i>Streptococcus hemolyticus</i>	450-500
* <i>Shigella dysenteriae</i>	125-250
<i>Micrococcus luteus</i>	450-500

\*Pathogenic organisms were tested in an independent laboratory.

<b>Applications</b>	<b>Purpose</b>	<b>Suggested Concentration of BIOBAN CS-1135</b>	<b>How to Apply</b>
<b>Adhesives</b>	To protect adhesives based on starch, protein, gums and latex from microbial degradation during manufacture, storage and service life.	1000-5000 ppm of BIOBAN CS-1135	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.
<b>Consumer, Household &amp; Industrial Products</b>	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-1135	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.
<b>Die Cast Lubricants and Mold Release Agents</b>	To control microbial growth in lubricating solutions used as mold release agents.	1000-2000 ppm of BIOBAN CS-1135 as final use dilute concentration. 250-500 ppm as maintenance dose	May be added to use dilute products or to concentrates. pH should be above 7.0.
<b>Emulsions</b>	For protection of wax and resin emulsion during manufacture and storage.	1000-5000 ppm of BIOBAN CS-1135	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.
<b>Inks</b>	For preservation of water-based inks.	1000-5000 ppm of BIOBAN CS-1135	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.
<b>Metalworking Fluids</b>	To prevent microbial degradation of oil, emulsifying agents and other components.	1000-2000 ppm of BIOBAN CS-1135	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.
<b>Mineral Slurries</b>	To control the growth of microorganisms in mineral slurries such as CaCO <sub>3</sub> , TiO <sub>2</sub> and kaolin clays.	400-2000 ppm of BIOBAN CS-1135	Add to the slurry as a concentrated solution during manufacture, loading, shipping or storage of slurry.
<b>Oilfield Water Systems</b>	To control growth of bacteria in oilfield water systems such as subsurface injection water.	50-150 ppm of BIOBAN CS-1135	Add either continuously or intermittently 2-8 hours per day several days a week.
<b>Oilfield Drilling Muds and Workover &amp; Completion Fluids</b>	To control the growth of microorganisms in oil drilling muds and fluids.	500-1000 ppm of BIOBAN CS-1135	Add to the fluid or mud in a thin stream as the system circulates.
<b>Paint</b>	For protection against microbial contamination in water-containing paint systems such as latex paint.	1000-5000 ppm of BIOBAN CS-1135	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.
<b>Surfactants</b>	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-1135	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-1135 may be used in and is efficacious in the following applications. BIOBAN CS-1135 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-1135 be tested against other formula ingredients.

### **Metalworking Fluids**

Metalworking fluids are formulated as concentrates which are diluted with water for use. These fluids are subject to gross microbial contamination in both the concentrated and use-diluted form. Such contamination provides the opportunity for slime formation, loss of fluid stability, equipment corrosion, dermatitis, and odor formation.

For metalworking-fluid applications where cobalt leaching is a concern, BIOBAN CS-1135 is an excellent choice. BIOBAN CS-1135 will generally not contribute to cobalt leaching when used at recommended treatment levels.

BIOBAN CS-1135 should be dosed in use-diluted fluids at a rate of 1000-2000 ppm (1.0-2.0 pints per 100 gallons of fluid) to control gross microbial contamination. Weekly addition of 250-500 ppm BIOBAN CS-1135 should be sufficient to maintain microbiological control of the system (0.25-0.5 pints for 100 gallons fluid).

BIOBAN CS-1135 may be incorporated into metalworking-fluid concentrates and will remain stable if the pH of the fluid is maintained above pH 7.0. Long term stability studies should be carried out by the manufacturer on specific formulations to ensure compatibility with fluid ingredients. The level in the fluid concentrate should be chosen so that the desired 1000-2000 ppm in the use-diluted fluid is obtained.

### **Die Cast Lubricants and Mold-Release Agents**

BIOBAN CS-1135 is effective for control of microorganisms in lubricating fluids used as mold-release agents in metal die-cast applications and in the manufacture of plastic articles.

The typical treatment level is 1000 to 2000 ppm of BIOBAN CS-1135 in the mold-release agent. Additionally, 250-500 ppm of BIOBAN CS-1135 may be added weekly as required to maintain control in recirculated fluids.

BIOBAN CS-1135 also may be incorporated in concentrates prior to dilution for use. BIOBAN CS-1135 should be stable in such concentrates if the pH of the concentrate is maintained above 7. However, long-term stability tests should be carried out before manufacture of such concentrates to ensure compatibility with BIOBAN CS-1135.

### **Oilfield Water Systems**

BIOBAN CS-1135 is effective in controlling growth of anaerobic sulfate-reducing bacteria, such as *Desulfovibrio desulfuricans*, as well as aerobic slime-forming bacteria, such as *Pseudomonas* sp., or iron-oxidizing bacteria, such as *Gallionella* sp.

For use in oilfield water systems, such as sub-surface injection water, add 5-150 ppm BIOBAN CS-1135 depending on the severity of the bacterial contamination. Additions should be made with a metering pump, either continuously or intermittently, at the free-water knockouts before or after the injection pumps and injection well headers.

When the system is noticeably fouled, add 20-150 ppm BIOBAN CS-1135 (1.7-12.8 gallons BIOBAN CS-1135 per 2000 barrels of water) continuously until the desired degree of control is achieved. Subsequently, use 5-150 ppm BIOBAN CS-1135 (0.43-12.8 gallons BIOBAN CS-1135 per 2000 barrels of water) continuously to maintain control. Alternatively, 20-150 ppm BIOBAN CS-1135 can be injected intermittently for 2-8 hours per day several days per week, depending on the severity of the contamination.

### **Drilling Muds, Workover Fluids, and Completion Fluids**

For control of microbial growth in drilling muds and in workover and completion fluids, add 500-1000 ppm by weight of BIOBAN CS-1135 to the fluid in the form of a thin stream as the system circulates (21-42 gallons of BIOBAN CS-1135 per 1000 barrels of drilling mud). Add additional BIOBAN CS-1135 to the system to maintain dosage if the volume of the system increases.

### **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-1135 is an effective preservative in water-containing systems such as latex paints, inks (non-food contact), and wax and resin emulsions at concentrations from 0.1-0.5 lb per 100 lb (1000-5000 ppm). BIOBAN CS-1135 may be added at any point in the manufacturing process. The recommended dosage rate for preservation of inks and latex paints is 0.1-0.2 lb per 100 lb (1000-2000 ppm) of the formulation. For emulsions, the recommended dosage rate for preservation is approximately 0.2 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-1135 is approved for control of microbial contamination in adhesives that do not come in contact with food. The dosage rate should be between 0.1 and 0.5 lb per 100 lb (1000-5000 ppm) total formulation weight.

### **Surfactant Preservation**

BIOBAN CS-1135 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-1135 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 volume.

### **Consumer, Household and Institutional Products**

BIOBAN CS-1135 may be used for the inhibition of bacterial spoilage during the production, shelf-life storage and use of consumer, household and industrial products including dishwashing liquids, surface cleaners, laundry cleaners and polishes. BIOBAN CS-1135 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).

### **Mineral Slurries**

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

BIOBAN CS-1135 is approved for control of microbial growth in mineral slurries. BIOBAN CS-1135 should be dosed at 400-2000 ppm (0.04-0.2 lb per 100 lb of slurry), to keep microbial growth in check.

## **Toxicity**

Based upon an inhalation study in rats, aerosolized BIOBAN CS-1135 is considered harmful to inhale. Its LC<sub>50</sub> is 2.48 mg/liter. No studies with vapors have been conducted, but BIOBAN CS-1135 evolves pungent penetrating vapors which are irritating to the respiratory tract. Avoid breathing vapor when handling this product.

BIOBAN CS-1135 is an alkaline liquid which will cause severe burns to eyes. In case of contact, flush eyes *immediately* with large volumes of water; get medical attention at once. Protective eye shields should be worn whenever handling BIOBAN CS-1135.

At a concentration of 5000 ppm of BIOBAN CS-1135 in water, there is no discernible effect upon the eyes nor upon the surrounding tissues. Thus at use dilutions, BIOBAN CS-1135 should not damage eyes. However, flush eyes with water if there is eye contact.

The acute dermal LD<sub>50</sub> of BIOBAN CS-1135 in rats is greater than 2000 mg/kg and, therefore, is considered to be essentially nontoxic by contact; however, it is a moderate to severe skin irritant. If left untreated, BIOBAN CS-1135 will cause skin burns and scar formation.

Wash thoroughly after handling. Use protective clothing to prevent skin exposure. Skin which has been exposed to BIOBAN CS-1135 should be flooded promptly with water. Clothing which has become soaked with BIOBAN CS-1135 should be laundered before reuse. Discard contaminated shoes.

BIOBAN CS-1135 in tests with humans at 0.3% concentration under an occluded patch is considered as a skin irritant, but not as a skin sensitizer. BIOBAN CS-1135 is noncorrosive to skin by the DOT test method.

The acute oral LD<sub>50</sub> of BIOBAN CS-1135 in male rats is 1308 mg/kg and in female rats is 1037 mg/kg. BIOBAN CS-1135 therefore may be harmful if swallowed.

In a 90-day dermal study, rats were dosed at 0, 1, 30, and 100 mg/kg/day. The dermal reactions of the high dose animals were so severe (necrosis, sloughing, scab formation) that dosing at this level was discontinued after four weeks. Irritation was observed in females and less commonly in males dosed at 30 mg/kg/day. Treatment related changes in the skin and lymph nodes were observed at this dose. The no-observed-effect-level (NOEL) was 1 mg/kg/day though all effects observed at 30 mg/kg/day are not systemic, but related to the dermal reaction.

In a dermal teratology study of BIOBAN CS-1135, female white rabbits were dosed at 30, 100, and 300 mg/kg/day. Dermal irritation occurred at every dose level, but no developmental effects were noted at any dose level.

BIOBAN CS-1135 was non-mutagenic in the Ames test, but was positive or equivocal in several other *in-vitro* mutagenicity studies; however, it was non-mutagenic in the *in-vivo* mouse micronucleus test.

## **Environmental Effects**

The active ingredients in BIOBAN CS-1135 are toxic to fish and wildlife. Treated effluent or rinsate should not be discharged where it will drain into municipal sewers or into lakes, streams, ponds, or public waters, unless in accordance with an NPDES permit.

The LC<sub>50</sub> at 96 hours of BIOBAN CS-1135 against pink shrimp is estimated to be 230 ppm; against bluegill sunfish to be 59 ppm; against rainbow trout to be 93 ppm. The LC<sub>50</sub> at 48 hours against daphnids is estimated to be 45 ppm. The acute oral LD<sub>50</sub> for mallard ducks is estimated to be 1105 mg/kg.

## **First Aid**

**If in eyes**, hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes. Call a poison control center or doctor for treatment advises.

**If swallowed**, call a poison control center immediately for treatment advice. Have person sip a glass of water if able to swallow. Do not induce vomiting unless told by poison control center or doctor.

**If on skin**, take off contaminated clothing. Rinse skin immediately with plenty of water for 15-20 minutes. Call a poison control center or doctor for treatment.

**If inhaled**, move person to fresh air. If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably mouth to mouth, if possible. Call a poison control center or doctor for further treatment.

### **NOTE TO PHYSICIAN**

Probably mucosal damage may contraindicate the use of gastric lavage. Measures against circulatory shock, respiratory depression, and convulsions may be needed.

## **Precautionary Labeling**

Labels for BIOBAN CS-1135 bear these caution statements:

DANGER!

CAUSES IRREVERSIBLE EYE DAMAGE AND SKIN IRRITATION. HARMFUL IF SWALLOWED, ABSORBED THROUGH SKIN OR INHALED. COMBUSTIBLE LIQUID

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

Avoid breathing vapor or spray mist.

Wear goggles or face shield and chemical resistant rubber gloves when handling.

Wash thoroughly with soap and water immediately after handling.

Remove contaminated clothing and wash before reuse.

Remove personal protective equipment and launder or otherwise decontaminate it immediately after use.

Do not use or store near heat or open flame.

## **Handling and Storage**

BIOBAN CS-1135 should be stored in the original containers in such a manner that the label is readily visible. Do not store near heat or open flame. In case of fire, use water, dry chemical, foam or CO<sub>2</sub> as the extinguishing agent.

Do not store with food or feed. Keep containers closed when not in use. Contents of leaking containers should be transferred to clean, sound drums, and relabeled. Leaks or spills may be removed by flushing area with plenty of water into acceptable disposal system.

After the container has been emptied, it may contain explosive vapors; observe all warnings and precautions listed. Do not cut, puncture, or weld on or near the container. Flush empty drums three times with water before reuse, sale as used containers, or burial in a safe place. Dispose of washings in acceptable disposal system.

## Shipping and Packaging

BIOBAN CS-1135 is classified as a Class 3 (Flammable liquid) hazardous material in the regulations issued by the U.S. Department of Transportation (49CFR), the International Air Transport Association (IATA) and the International Maritime Organization (IMDG Code).

The bill of lading description used by DOW is:

FLAMMABLE LIQUID, N.O.S. (4,4-DIMETHYLOXAZOLIDINE),3,UN1993, III.  
DISINFECTANT NOI, OTHER THAN MEDICINAL OR TOILET PREPARATIONS.  
NMFC ITEM 57100 SUB 3 CLASS 60 TRADE NAME = BIOBAN CS-1135

Shipping Container	Net Wt.	Gross Wt.
5-gallon drum	39 lb	44 lb
55-gallon drum	425 lb	465 lb

**For further information visit our website:  
[www.dowbiocides.com](http://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)  
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Latin America: 55-11-5188-9555 (phone)  
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