Nutrition & Biosciences

DUPONT

Microbial Control
Technical Data Sheet

# BIOBAN™ DXN Antimicrobial

***Preservative for Water-Containing Systems and Emulsions***

## Regional product availability

U.S. Only

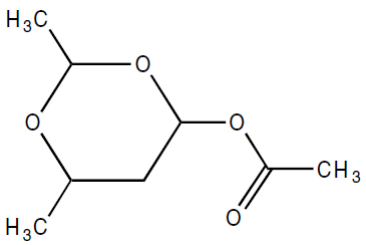
## General

BIOBAN™ DXN Antimicrobial (2,6-Dimethyl-1,3-Dioxan-4-yl Acetate) is a biocide for the protection of water-based industrial products, processes and systems against microbiological growth and spoilage. It is a broad-spectrum biocide with efficacy against both bacteria and fungi.

BIOBAN™ DXN Antimicrobial is for use in emulsions, paints, coatings, specialty industrial products, textile chemicals and finishes, industrial adhesives, leather processing liquors and distillate fuels.

The advantages of using BIOBAN™ DXN Antimicrobial are:
- Broad spectrum efficacy
- Non-formaldehyde release and non-formaldehyde containing
- Soluble in water and in oil (hydrocarbons)
- Effective over a wide pH range (3-8)
- Non-halogenated, non-phenolic and non-metallic
- Compatible with anionic, cationic and non-ionic compounds

## Structure




## Physical properties

The following are typical properties of BIOBAN™ DXN Antimicrobial; **they are not to be considered product specifications.**

| | |
|---|---|
| Active, % | 85.0-95.0 |
| Specific Gravity @ 25/25°C | 1.060-1.075 |
| Refractive Index @ 20°C | 1.430-1.437 |
| Freezing Point | Below 25°C/77°F |
| Flash Point (Tag Closed Cup) | 87°C/189°F |
| Vapor Pressure @ 20°C | 0.218 mm Hg |
| pH @ 25°C | 5 |
| Appearance | Amber-yellow liquid |
| Solubility | 100% soluble in water with agitation. Soluble in organic solvents |

## Antimicrobial activity

Upon addition to aqueous systems, BIOBAN™ DXN Antimicrobial undergoes hydrolysis to its microbiologically active components acetaldehyde, aldol, and acetic acid.

The ability of BIOBAN™ DXN Antimicrobial to inhibit growth of microorganisms is shown in the table of minimum inhibitory concentrations (MIC) for representative spoilage bacteria and fungi. The MIC values indicate the concentration of preservative needed (in ppm) to control a particular organism. 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.

| Bacteria | MIC (ppm product) |
|---|---|
| *Escherichia coli* | 625 |
| *Enterobacter aerogenes* | 625 |
| *Pseudomonas aeruginosa* | 625 |
| *Pseudomonas fluorescens* | 625 |
| *Salmonella choleraesuis* | 312 |
| *Salmonella typhosa* | 625 |
| *Shigella sonnei* | 625 |
| *Bacillus subtilis* | 625 |
| *Brevibacterium ammoniagenes* | 625 |
| Staphylococcus aureus | 1250 |

| Fungi | MIC (ppm product) |
|---|---|
| *Aspergillus flavus* | 1250 |
| *Aspergillus niger* | 1250 |
| *Aspergillus oryzae* | 1250 |
| *Aspergillus terreus* | 1250 |
| *Penicillium piscarium* | 625 |
| *Penicillium sp.* | 1250 |
| *Candida albicans* | 1250 |
| *Pityrosporum ovale* | 625 |
| *Saccharomyces cerevisiae* | 2500 |

## Formulating considerations

BIOBAN™ DXN Antimicrobial functions over a wide pH range of 3-8. The product is not effective in systems with a pH over 9. Limited efficacy is seen between pH 8 and 9.

BIOBAN™ DXN Antimicrobial should not be used in systems containing high levels of ammonia and/or amines. Yellowing and inactivation of BIOBAN™ DXN Antimicrobial occurs under these conditions.

Due to the hydrolysis of BIOBAN™ DXN Antimicrobial to acetic acid, acetaldehyde and aldol, the released acetic acid may cause the pH of the system to drop slightly. If pH drift is of concern, the pH can be adjusted by adding 30g of sodium carbonate for every 100g of BIOBAN™ DXN Antimicrobial. Avoid the use of sodium or potassium hydroxide to adjust the pH as these compounds may result in color formation. Ammonium hydroxide should not be used because it will inactive the biocide. A neutralized solution of 10% BIOBAN™ DXN Antimicrobial in water resulting in a pH of 7.0-7.1 can also be prepared. Call DuPont Technical Service for details.

## Uses

BIOBAN™ DXN Antimicrobial is a microbial growth inhibitor for use only in industrial water-based products. The dosage rate for all label applications is 0.1%-0.2% by weight (1000-2000 ppm).

### Adhesives

BIOBAN™ DXN Antimicrobial is an effective preservative for industrial adhesive formulations. BIOBAN™ DXN Antimicrobial is compatible with most adhesive formulations, including starch and polyvinyl acetate.

### Textile Chemicals and Finishes

Microbial contamination of textile chemical specialties causes breakdown of the working properties of these chemicals as well as foul odors, rancidity, acidity, discoloration, and deterioration of the fibers and fabric. BIOBAN™ DXN Antimicrobial is an especially effective preservative or controlling microbial contamination in various textile chemical specialties. BIOBAN™ DXN Antimicrobial as been used effectively in dye levelers, fiber lubricants, spinning emulsions, softeners, antistats, sizings, dyes, dye dispersions, dye pastes and textile adhesives.

### Specialty Industrial Products

BIOBAN™ DXN Antimicrobial is an effective antimicrobial for use in specialty industrial products such as pigment slurries, thickeners and gums, dyestuffs, inks and lignosulfonates. These products often contain raw materials that are heavily contaminated with various microorganisms or contain ingredients that are excellent nutrients for microbial growth.

### Silicone Emulsions

BIOBAN™ DXN Antimicrobial is particularly effective for the preservation of bulk silicone emulsions. It is also effective for the preservation of silicone and oil-based emulsions that are used in antifoam emulsion systems.

### Paints, Coatings and Polymer Emulsions

BIOBAN™ DXN Antimicrobial inhibits microbiological growth during shelf-life storage of PVC, PVA, acrylic, polyethylene and other latex emulsion concentrates and latex emulsion-based paints.

## Toxicology

For all toxicological and eco-toxicological information on DuPont Biocdes products, please refer directly to the Safety Data Sheet (SDS) available from your local DuPont representative.

## First aid

**If swallowed**, drink a large quantity of water. Do not induce vomiting. Immediately contact a physician or Poison Control Center.

**If inhaled**, remove to fresh air and call physician immediately.

**If on skin**, wash thoroughly with soap and water. Flush with large quantities of water.

I**f in eyes**, flush eyes immediately with plenty of clear water for at least 15 minutes. Immediately contact physician.

**If on clothing**, remove contaminated clothing and wash before reuse.

## Precautionary labeling

Labels for BIOBAN™ DXN Antimicrobial bear these caution statements:

CAUTION!

Harmful if swallowed or absorbed through the skin.

Causes moderate eye irritation.

Avoid contact with eyes, skin or clothing.

Prolonged or frequently repeated skin contact may cause allergic reaction in some individuals.

Wash thoroughly with soap and water after handling.

## Handling and storage

Workers handling BIOBAN™ DXN Antimicrobial should wear impervious gloves, chemical goggles, and an impervious apron. In case of contact, wash exposed skin with plenty of water. If in the eyes, flush the eyes with plenty of water for at least 15 minutes. Hold eyelid open and move eye from side to side to assure complete rinsing. See a physician.

Product should be stored in its original container under normal ambient conditions. Do not store in locations near sources of heat. If spilled, use dikes to prevent the spill from entering bodies of water or sewers. Absorb with appropriate material and send to an approved incinerator.

## Shipping and packaging

BIOBAN™ DXN Antimicrobial does not meet any of the hazard class criteria in the UN Recommendations for the Transport of Dangerous Goods and is therefore not subject to the regulations of the U.S. Department of Transportation (DOT), the International Civil Aviation Organization (ICAO), or the International Maritime Organization (IMO). The bill of lading description used by DuPont is:

DISINFECTANT NOI, OTHER THAN MEDICINAL OR TOILET PREPARATIONS. NO HAZARD CLASS LABEL OR PLACARDS REQUIRED. NMFC ITEM 57100 SUB 3 CLASS 60. TRADE NAME = BIOBAN™ DXN

| Shipping Container | Gross Wt. |
|---|---|
| 5-gallon drum | 35 lb |
| 55-gallon drum | 476 lb |

## Disposal considerations

Dispose of in accordance with all local, state (provincial) and federal regulations. Empty containers may contain hazardous residues. This material and its container must be disposed in a safe and legal manner. It is the user's responsibility to verify that treatment and disposal procedures comply with local, state (provincial) and federal regulations.

## Product stewardship

When considering the use of any DuPont product in a particular application, review the latest Safety Data Sheet (SDS) and country-specific product label to ensure the intended use is within the scope of approved uses. DuPont has a fundamental concern for all who make, distribute, and use its products, and for the environment in which we live. This concern is the basis for our product stewardship philosophy by which we assess the safety, health, and environmental information on our products and then take appropriate steps to protect employee and public health and our environment. The success of our product stewardship program rests with each and every individual involved with DuPont products – from the initial concept and research, to manufacture, use, sale, disposal, and recycle of each product.

## Customer notice

DuPont strongly encourages its customers to review both their manufacturing processes and their applications of DuPont products from the standpoint of human health and environmental quality to ensure that DuPont products are not used in ways for which they are not intended or tested. DuPont personnel are available to answer your questions and to provide reasonable technical support. DuPont product literature, including Safety Data Sheets (SDS), should be consulted prior to use of DuPont products. Current Safety Data Sheets are available from DuPont.

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DuPont strongly encourages its customers to review both their manufacturing processes and their applications of DuPont products from the standpoint of human health and environmental quality to ensure that DuPont products are not used in ways for which they are not intended or tested. DuPont product literature, including safety data sheets, should be consulted prior to use of DuPont products. Current safety data sheets are available from DuPont. DuPont assumes no obligation and hereby DISCLAIMS ALL LIABILITY for the information in this document. References to "DowDuPont" "DuPont" or the "Company" means the DuPont legal entity selling the products to Customer unless otherwise expressly noted. Other than as set forth in a contract of sale, DUPONT MAKES NO WARRANTY, EXPRESS OR IMPLIED, AS TO THE INFORMATION AND/PRODUCTS DESCRIBED HEREIN, INCLUDING THE WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE. Use biocides safely. Always read the label and product information before use.