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PRODUCT STEWARDSHIP SUMMARY

CAS No. 77-48-5
FORMULA No. C₅H₆Br₂N₂O₂

AviBrom[®], BoviBrom[®], and QuadraBrom[™] DBDMH 1,3-dibromo-5,5-dimethylhydantoin

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Introduction

Albemarle Corporation markets 1,3-dibromo-5,5-dimethylhydantoin (DBDMH) as an antimicrobial agent for use in food processing. DBDMH-based products can be used as antimicrobial interventions for pathogen reduction in poultry, beef and other red meat processing.

DBDMH is sold under the brand names AviBrom[®], BoviBrom[®] and QuadraBrom[™].

Description and Properties

DBDMH is a white to off-white solid (nugget) with a mild halogen odor. This molecule is less odorous than other similar technologies.

DBDMH-based products have long shelf lives: at least three years at normal ambient conditions when properly stored in the original container and exposure to moisture is avoided.

This unique chlorine-free molecule undergoes hydrolysis to form two molecules of hypobromous acid (HOBr) and one molecule of dimethylhydantoin (DMH). The oxidizing action of HOBr kills the bacteria. After undergoing chemical reduction during use, the HOBr converts to an inactive bromide ion (Br⁻). The DMH by-product remains in the water, serves no function and does not react further.

Uses

DBDMH products provide effective antimicrobial washes for the redmeat and poultry processing industries. They reduce E. coli, Campylobacter,





Listeria and Salmonella levels. These products must be dissolved in water before use. The advantages versus other interventions of these products include:

- will not discolor the surface of meat (when used as approved)
- has less halogen odor than chlorine based products, which creates a better environment for plant workers
- is less corrosive to plant equipment and concrete floors than bleach and lactic acid, respectively
- works in a wider range of water pH, so the need for acidifiers is reduced or eliminated
- reduced costs and improved shelf-life

This chemistry is the first bromine-based processing aid. Research and commercial use have shown bromine to be an efficacious, safe to use alternative to conventional food safety technologies.

Health Information

DBDMH is corrosive and can cause irreversible eye damage and skin burns. It is harmful by inhalation and through skin absorption, and may be fatal if swallowed.

Neither OSHA nor ACGIH have established exposure limits for DBDMH.

One important fact to remember is that most personnel do not come into contact with DBDMH solid when it is used as antimicrobial. DBDMH must be hydrolyzed with water to form the antimicrobial compound hypobromous acid

(HOBr). HOBr is applied as a dilute solution in water and this is the material most people encounter when DBDMH is used as an antimicrobial. This dilute solution of HOBr in water does not possess the same health hazards as solid DBDMH.

Exposure Potential

Avoid dusting conditions. Chemical goggles or safety glasses, protective clothing and rubber gloves that are resistant to chemical permeation are advisable to prevent contact with eyes, skin or clothing. Users should wash their hands thoroughly with soap and water after handling and before eating, drinking or using tobacco. Contaminated clothing should be removed and washed separately before reuse.

DBDMH should be used in a well-ventilated area while wearing appropriate personal protective equipment, including a NIOSH-approved dust/mist respirator under dusty or irritating conditions.

Environmental Information

DBDMH is toxic to fish and aquatic organisms.

Do not discharge effluent containing this product into lakes, streams, ponds, estuaries, oceans or public waters unless in accordance with the requirements of a National Pollutant Discharge Elimination System permit and the permitting authority has been notified in writing before discharge.

Do not discharge effluent containing this product into sewer systems without previously notifying the sewage treatment plant authority. For guidance, please contact your state water board or regional office of the United States Environmental Protection Agency (EPA).

Wear appropriate protective clothing and use clean equipment to sweep up spilled material and place it in a clean, dry container for disposal. Wash the spill area with copious amounts of water.

Dispose of in a safe manner in accordance with local and national regulations.

Physical and Chemical Hazards

DBDMH is a stable solid product. All products should be stored in a dry, well-ventilated area.





DBDMH is a strong oxidizing and brominating agent. It should not come into contact with reducing agents, acids, ammonia-containing products, organic materials such as aldehydes and alcohols, other oxidizing agents such as calcium hypochlorite, and common metals such as aluminum, iron, copper, brass and steel. Contact with incompatible materials may promote the exothermic decomposition of DBDMH, possibly leading to the release of carbon oxides and bromine.

DBDMH can be stored in high-density polyethylene (HDPE), low-density polyethylene (LDPE) and polypropylene (PP) containers. It is likely to be compatible with Teflon®, polyvinyl chloride (PVC), Viton®, Kynar®, chlorobutyl rubber and Hypalon®.

In its neat form, DBDMH is incompatible with nylon. This product should not be stored in metal or in fiberboard containers.

Regulatory Information

DBDMH powder complies with the Toxic Substances Control Act, 1976 although the products AviBrom®, Quadrabrom and BoviBrom® are exempt from the act. The Emergency Planning and Community

Right-to-Know Act (also known as SARA Title III or EPCRA) classifies DBDMH as an acute health hazard and a reactive hazard. DBDMH products do not contain any chemicals that are subject to the reporting requirements of the act and Title 40

of the Code of Federal Regulations, Part 372. No ingredients have reportable quantities or threshold planning quantities under SARA or the Comprehensive Environmental Response, Compensation, and Liability Act. No components are subject to “right-to-know” legislation in the following states: California, Massachusetts, New Jersey and Pennsylvania.

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the material safety data sheet contains all the information required by the CPR.

The U.S. Food and Drug Administration (FDA) has issued effective Food Contact Notifications (FCN) for DBDMH in which they have determined that the following applications are safe for the intended use:

- As an antimicrobial in water applied to beef and other red meat, hides, heads, carcasses, trim, parts and organs. The FDA assigned FCN 792 and 1102 for these applications.
- As an antimicrobial intervention in poultry processing plants for use in chillers, inside-outside bird washers, on-line and off-line reprocessing systems, scalders, ice and poultry process water. The associated FCN listings are 334, 357, 453 and 775.

DBDMH has been accepted by the United States Department of Agriculture’s Food Safety Inspection Services (FSIS) for use in the production of meat and poultry. It is listed in FSIS Directive 7120.1: Safe and Suitable



Ingredients Used in the Production of Meat, Poultry, and Egg Products.

DBDMH has been pre-registered under the European Community Regulation “REACH”.

Product Stewardship

Albemarle Corporation is committed to managing AviBrom®, BoviBrom® and QuadraBrom™ so that its customers can use them safely. Our relationships with our customers encourage communication about safety and environmental stewardship, and we work with them to minimize the risks of personnel exposure and spills.

Albemarle is staffed and organized to investigate and provide advice regarding appropriate corrective actions if such incidents should occur.

Conclusion

AviBrom®, BoviBrom®, and QuadraBrom™ are well-established and environmentally sound products that offer customers a range of benefits through pathogen reduction for red meat and poultry processing.

Note

This document provides general information about DBDMH and its trade names AviBrom®, BoviBrom® and QuadraBrom™. It does not supplant or replace required regulatory and/or legal communication documents, nor is it intended to provide an in-depth discussion of health and safety information. Always consult the product's material safety data sheet, product label and technical data sheet before using it.

References

1,3-Dibromo-5,5-Dimethylhydantoin, Material Safety Data Sheet
Albemarle Corporation, March 21, 2012

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Albemarle Corporation is a member of the American Chemistry Council and, through ACC's participation with the International Council of Chemical Associations (ICCA), has prepared this document to improve product stewardship within the chemical industry and with suppliers and customers.

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