

1. PUBLIC HEALTH STATEMENT

1.1 WHAT IS BIS(CHLOROMETHYL) ETHER?

Bis(chloromethyl) ether (BCME) is a man-made chemical with a strong, unpleasant odor. It is a clear liquid at room temperature, but it readily evaporates into air. BCME undergoes chemical reactions easily, so it is broken down very rapidly when it comes into contact with water. Consequently, any BCME that might escape from a chemical plant or a chemical waste site into water or moist soil would be destroyed within a few minutes. BCME that escapes into air is also broken down by reacting with water and other chemicals, but this takes a few hours.

BCME was used in the past to make several types of polymers, resins and textiles. However, because BCME is believed to cause cancer in humans, these uses have been stopped. BCME is now used only in small amounts inside fully enclosed systems in chemical plants. More information on the properties and uses of BCME is presented in Chapters 3 and 4.

1.2 HOW MIGHT I BE EXPOSED TO BIS(CHLOROMETHYL)ETHER?

Since BCME has such limited use in the United States, chances for exposure to BCME are low. Some BCME can form as an impurity during the production of other chemicals, so exposure might occur in chemical plants that make or use these chemicals. Also, some BCME may exist in chemical waste sites, although this is not certain. Because BCME evaporates easily, the most likely way to be exposed to BCME in the workplace or around a waste site is by breathing air containing BCME vapors. However, information on levels of BCME which exist in air is not available.

More information on possible ways that people can be exposed to BCME is presented in Chapter 5.

1.3 HOW CAN BIS(CHLOROMETHYL) ETHER ENTER AND LEAVE MY BODY?

Because BCME is so quickly broken down by water, most BCME that contacts the body is quickly changed into other chemicals (formaldehyde and hydrochloric acid) before it passes through the outermost layer of cells contacted (e.g., the cells that line the nose, windpipe and lungs). Some BCME may enter into the blood or internal tissues, but this has not been studied and the amount may be too small to measure.

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More information on how BCME enters the body is presented in Chapter 2.

1.4 HOW CAN BIS(CHLOROMETHYL) ETHER AFFECT MY HEALTH?

Studies of people exposed to BCME in the workplace show that breathing of BCME vapors causes irritation to the nose, throat, and lungs. Contact with the liquid is also highly irritating to skin. In animals, breathing in high levels of BCME causes swelling and bleeding in the lung and can cause death. Workers exposed to BCME have been shown to have a higher-than-expected incidence of lung cancer. This observation is supported by studies in animals which also show that BCME can cause cancer. More information on the harmful effects of BCME is presented in Chapter 2.

1.5 IS THERE A MEDICAL TEST TO DETERMINE IF I HAVE BEEN EXPOSED TO BIS(CHLOROMETHYL) ETHER?

Because BCME is broken down so rapidly in the body, there are no specific tests to determine if a human has been exposed to this compound. The only available medical tests are physical examination of the nose and throat, chest X-ray, and examination of the sputum for abnormal cell types. Unfortunately, these tests are not specific for this compound, and would reveal effects of the compound only after damage to the tissues had already occurred. More information on ways to measure BCME is provided in Chapter 6.

1.6 WHAT LEVELS OF EXPOSURE HAVE RESULTED IN HARMFUL HEALTH EFFECTS?

Tables 1-1 through 1-4 show the relationship between exposure to BCME and known health effects besides cancer. Chapter 2 provides information on levels that have been shown to cause cancer in animals.

Although no direct information is available from studies in humans, a Minimal Risk Level (MRL) is included in Table 1-1., This MRL was derived from animal data for long-term exposure, as described in Chapter 2 and in Table 2-1. The MRL provides a basis for comparison with levels that people might encounter in the air or in food or drinking water. If a person is exposed to BCME at an amount below the MRL, it is not expected that harmful noncancer health effects will occur. Because this level is based only on information currently

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TABLE 1-1. Human Health Effects from Breathing BCME*

Short-term Exposure (less than or equal to 14 days)		
<u>Levels in Air (ppm)</u>	<u>Length of Exposure</u>	<u>Description of Effects</u>
		The health effects resulting from short-term human exposure to air containing specific levels of BCME are not known.
Long-term Exposure (greater than 14 days)		
<u>Levels in Air (ppm)</u>	<u>Length of Exposure</u>	<u>Description of Effects</u>
0.0003	15 days or more	Estimated minimal risk level (based on studies in animals; see Section 1.6 for discussion).

* See Section 1.2 for a discussion of exposures encountered in daily life.

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TABLE 1-2. Animal Health Effects from Breathing BCME

Short-term Exposure (less than or equal to 14 days)		
<u>Levels in Air (ppm)</u>	<u>Length of Exposure</u>	<u>Description of Effects*</u>
0.7	7 hr	Lung injury in rats and hamsters
1.0	3 days (6 hr/d)	Death in rats and hamsters
Long-term Exposure (greater than 14 days)		
<u>Levels in Air (ppm)</u>	<u>Length of Exposure</u>	<u>Description of Effects*</u>
0.1	6 months	Increased number of deaths in in rats (due to nasal tumors)
1.0	82 days	Impaired breathing, injury to lungs in mice

* These effects are listed at the lowest level at which they were first observed. They may also be seen at higher levels.

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TABLE 1-3. Human Health Effects from Eating or Drinking BCME*

Short-term Exposure (less than or equal to 14 days)		
<u>Levels in Food (ppm)</u>	<u>Length of Exposure</u>	<u>Description of Effects</u>
		The health effects resulting from short-term human exposure to food containing specific levels of BCME are not known. However, because BCME is rapidly destroyed when it comes into contact with other substances, it is unlikely that BCME would be found in food.
<u>Levels in Water (ppm)</u>		BCME is rapidly destroyed in water, so exposure by drinking water containing BCME is of little concern.
Long-term Exposure (greater than 14 days)		
<u>Levels in Food (ppm)</u>	<u>Length of Exposure</u>	<u>Description of Effects</u>
		The health effects resulting from long-term human exposure to food containing specific levels of BCME are not known. However, because BCME is rapidly destroyed when it comes into contact with other substances, it is unlikely that BCME would be found in food.
<u>Levels in Water (ppm)</u>		BCME is rapidly destroyed in water, so exposure by drinking water containing BCME is of little concern.

* See Section 1.2 for a discussion of exposures encountered in daily life.

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TABLE 1-4. Animal Health Effects from Eating or Drinking BCME

Short-term Exposure (less than or equal to 14 days)		
<u>Levels in Food (ppm)</u>	<u>Length of Exposure</u>	<u>Description of Effects</u>
<u>Levels in Water (ppm)</u>		<p>The health effects resulting from short-term animal exposure to food containing specific levels of BCME are not known. However, because BCME is rapidly destroyed when it comes into contact with other substances, it is unlikely that BCME would be found in food.</p> <p>BCME is rapidly destroyed in water, so exposure by drinking water containing BCME is of little concern.</p>
Long-term Exposure (greater than 14 days)		
<u>Levels in Food (ppm)</u>	<u>Length of Exposure</u>	<u>Description of Effects</u>
<u>Levels in Water (ppm)</u>		<p>The health effects resulting from long-term animal exposure to food containing specific levels of BCME are not known. However, because BCME is rapidly destroyed when it comes into contact with other substances, it is unlikely that BCME would be found in food.</p> <p>BCME is rapidly destroyed in water, so exposure by drinking water containing BCME is of little concern.</p>

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available, some uncertainty is always associated with it. Also, because the method for deriving MRLs does not use any information about cancer, a MRL does not imply anything about the presence, absence or level of risk of cancer.

No information exists for either animals or humans on toxic effects following oral exposure (Tables 1-3 and 1-4), but oral exposure is of little concern since BCME breaks down in water or moist foods and exposure is not likely by this route. Direct skin contact with even small amounts (less than a drop) of the liquid form of BCME causes severe skin irritation at the site of contact. Further information on the exposure levels that have been found to cause harmful health effects in humans and animals is presented in Chapter 2.

1.7 WHAT RECOMMENDATIONS HAS THE FEDERAL GOVERNMENT MADE TO PROTECT HUMAN HEALTH?

The government has taken a series of steps to reduce the risk of human exposure to BCME. The Occupational Safety and Health Administration (OSHA) regulates BCME as a potential human carcinogen. An average concentration of 1 part per billion (ppb) is considered to be the highest acceptable level in the workplace, and strict controls have been established to minimize exposure to this compound. The U.S. Environmental Protection Agency (EPA) has developed standards which limit the amount of this compound that can be discharged into water or air or disposed of at waste sites, Further information on regulations concerning BCME is provided in Chapter 7.

1.8 WHERE CAN I GET MORE INFORMATION?

If you have further questions or concerns, please contact your State Health or Environmental Department or:

Agency for Toxic Substances and Disease Registry
Division of Toxicology
1600 Clifton Road, E-29
Atlanta, Georgia 30333

