



# New Jersey Department of Health and Senior Services

## HAZARDOUS SUBSTANCE FACT SHEET

Common Name: **MUSTARD GAS**

CAS Number: 505-60-2  
DOT Number: UN 2810  
DOT Hazard Class: 6.1 (Toxic Liquid)

RTK Substance number: 1319  
Date: June 1998 Revision: March 2006

### HAZARD SUMMARY

- \* **Mustard Gas** can affect you when breathed in and by passing through your skin.
- \* **Mustard Gas** is a CARCINOGEN--HANDLE WITH EXTREME CAUTION.
- \* **Mustard Gas** is an EXTREMELY DANGEROUS POISON GAS and contact with the liquid or exposure to high vapor concentrations can cause severe eye burns and permanent eye damage.
- \* **Mustard Gas** can cause severe skin burns and blisters.
- \* Breathing **Mustard Gas** can irritate the lungs causing coughing and/or shortness of breath. Higher exposures can cause a build-up of fluid in the lungs (pulmonary edema), a medical emergency, with severe shortness of breath.
- \* **Mustard Gas** can cause chronic bronchitis to develop.

- \* Exposure to hazardous substances should be routinely evaluated. This may include collecting personal and area air samples. You can obtain copies of sampling results from your employer. You have a legal right to this information under the OSHA Access to Employee Exposure and Medical Records Standard (29 CFR 1910.1020).
- \* If you think you are experiencing any work-related health problems, see a doctor trained to recognize occupational diseases. Take this Fact Sheet with you.

### IDENTIFICATION

**Mustard Gas**, when pure, is a colorless and odorless oily liquid. Warfare Agent grade **Mustard Gas** is yellow to dark brown. The odor may be like burning garlic, horseradish, or sweet and agreeable. It is used as a chemical warfare agent and in organic synthesis.

### REASON FOR CITATION

- \* **Mustard Gas** is on the Hazardous Substance List because it is cited by NTP, DEP, IARC and EPA.
- \* This chemical is on the Special Health Hazard Substance List because it is a CARCINOGEN and MUTAGEN.
- \* Definitions are provided on page 5.

### HOW TO DETERMINE IF YOU ARE BEING EXPOSED

The New Jersey Right to Know Act requires most employers to label chemicals in the workplace and requires public employers to provide their employees with information and training concerning chemical hazards and controls. The federal OSHA Hazard Communication Standard (29 CFR 1910.1200) requires private employers to provide similar training and information to their employees.

### WORKPLACE EXPOSURE LIMITS

No occupational exposure limits have been established for **Mustard Gas** by OSHA, NIOSH or ACGIH. However, the National Advisory Committee for the Agency for Toxic Substances and Disease Registry (ATSDR) has recommended acute exposure guidelines (AEGLs) to protect people from the harmful effects of **Mustard Gas**. The AEGL 1 guidelines are **0.40 mg/m<sup>3</sup> (0.06 ppm)** for a 10-minute exposure to **0.008 mg/m<sup>3</sup> (0.001 ppm)** for an 8-hour exposure.

- \* **Mustard Gas** is a CARCINOGEN in humans. There may be no safe level of exposure to a carcinogen, so all contact should be reduced to the lowest possible level.
- \* The above exposure limits are for air levels only. When skin contact also occurs, you may be overexposed, even though air levels are less than the limit listed above.

### WAYS OF REDUCING EXPOSURE

- \* Enclose operations and use local exhaust ventilation at the site of chemical release. If local exhaust ventilation or enclosure is not used, respirators must be worn.
- \* A regulated, marked area should be established where **Mustard Gas** is handled, used, or stored.
- \* Wear protective work clothing.
- \* Wash thoroughly immediately after exposure to **Mustard Gas** and at the end of the workshift.
- \* Post hazard and warning information in the work area. In addition, as part of an ongoing education and training effort, communicate all information on the health and safety hazards of **Mustard Gas** to potentially exposed workers.

This Fact Sheet is a summary source of information of all potential and most severe health hazards that may result from exposure. Duration of exposure, concentration of the substance and other factors will affect your susceptibility to any of the potential effects described below.

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## HEALTH HAZARD INFORMATION

### Acute Health Effects

The following acute (short-term) health effects may occur immediately or shortly after exposure to **Mustard Gas**:

- \* Contact with the liquid or exposure to high vapor concentrations can cause severe eye burns and permanent eye damage. There is no pain on contact, but hours later redness, swelling and pain occur. Blindness can result.
- \* **Mustard Gas** can cause severe skin burns and blisters.
- \* Breathing **Mustard Gas** can irritate the lungs causing coughing and/or shortness of breath. Higher exposures can cause a build-up of fluid in the lungs (pulmonary edema), a medical emergency, with severe shortness of breath.

### Chronic Health Effects

The following chronic (long-term) health effects can occur at some time after exposure to **Mustard Gas** and can last for months or years:

### Cancer Hazard

- \* **Mustard Gas** is a CARCINOGEN in humans. It has been shown to cause lung, tongue, throat and voice box cancer.

### Reproductive Hazard

- \* There is limited evidence that **Mustard Gas** may damage the male reproductive system including decreasing the sperm count and affecting male fertility.

### Other Long-Term Effects

- \* **Mustard Gas** can cause chronic bronchitis to develop with cough, phlegm and/or shortness of breath.

## MEDICAL

### Medical Testing

If symptoms develop or overexposure is suspected, the following are recommended:

- \* Lung function tests
- \* Exam of the eyes, including slit-lamp
- \* Consider chest x-ray after acute overexposure

Any evaluation should include a careful history of past and present symptoms with an exam. Medical tests that look for damage already done are not a substitute for controlling exposure.

Request copies of your medical testing. You have a legal right to this information under the OSHA Access to Employee Exposure and Medical Records Standard (29 CFR 1910.1020).

## Mixed Exposures

- \* Because smoking can cause heart disease, as well as lung cancer, emphysema, and other respiratory problems, it may worsen respiratory conditions caused by chemical exposure. Even if you have smoked for a long time, stopping now will reduce your risk of developing health problems.

## WORKPLACE CONTROLS AND PRACTICES

Unless a less toxic chemical can be substituted for a hazardous substance, **ENGINEERING CONTROLS** are the most effective way of reducing exposure. The best protection is to enclose operations and/or provide local exhaust ventilation at the site of chemical release. Isolating operations can also reduce exposure. Using respirators or protective equipment is less effective than the controls mentioned above, but is sometimes necessary.

In evaluating the controls present in your workplace, consider: (1) how hazardous the substance is, (2) how much of the substance is released into the workplace and (3) whether harmful skin or eye contact could occur. Special controls should be in place for highly toxic chemicals or when significant skin, eye, or breathing exposures are possible.

In addition, the following control is recommended:

- \* Where possible, automatically pump liquid **Mustard Gas** from drums or other storage containers to process containers.

Good **WORK PRACTICES** can help to reduce hazardous exposures. The following work practices are recommended:

- \* Workers whose clothing has been contaminated by **Mustard Gas** should change into clean clothing promptly.
- \* Do not take contaminated work clothes home. Family members could be exposed.
- \* Contaminated work clothes should be laundered by individuals who have been informed of the hazards of exposure to **Mustard Gas**.
- \* Eye wash fountains should be provided in the immediate work area for emergency use.
- \* If there is the possibility of skin exposure, emergency shower facilities should be provided.
- \* On skin contact with **Mustard Gas**, immediately wash or shower to remove the chemical. At the end of the workshift, wash any areas of the body that may have contacted **Mustard Gas**, whether or not known skin contact has occurred.
- \* Do not eat, smoke, or drink where **Mustard Gas** is handled, processed, or stored, since the chemical can be swallowed. Wash hands carefully before eating, drinking, applying cosmetics, smoking, or using the toilet.

## PERSONAL PROTECTIVE EQUIPMENT

WORKPLACE CONTROLS ARE BETTER THAN PERSONAL PROTECTIVE EQUIPMENT. However, for some jobs (such as outside work, confined space entry, jobs done only once in a while, or jobs done while workplace controls are being installed), personal protective equipment may be appropriate.

The OSHA Personal Protective Equipment Standard (29 CFR 1910.132) requires employers to determine the appropriate personal protective equipment for each hazard and to train employees on how and when to use protective equipment.

The following recommendations are only guidelines and may not apply to every situation.

### Clothing

- \* Avoid skin contact with **Mustard Gas**. Wear protective gloves and clothing. Safety equipment suppliers/manufacturers can provide recommendations on the most protective glove/clothing material for your operation.
- \* Safety equipment manufacturers recommend *Viton/Butyl Rubber*; *Telchem® HPS*; and *Tychem® HPS, BR/LV* and *TK* as protective materials.
- \* All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.

### Eye Protection

- \* Eye protection is included in the recommended respiratory protection.

### Respiratory Protection

#### IMPROPER USE OF RESPIRATORS IS DANGEROUS.

Such equipment should only be used if the employer has a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing, and medical exams, as described in the OSHA Respiratory Protection Standard (29 CFR 1910.134).

- \* For non-routine, emergency situations a full facepiece, tight fitting, air-purifying respirator (APR) with chemical, biological, radiological, and nuclear (CBRN) cartridges have been recommended by NIOSH for protection against **Mustard Gas**.
- \* Exposure to **Mustard Gas** is immediately dangerous to life and health. If the possibility of exposure to **Mustard Gas** exists, use a NIOSH approved self-contained breathing apparatus with a full facepiece operated in a pressure-demand or other positive-pressure mode.

## HANDLING AND STORAGE

- \* Prior to working with **Mustard Gas** you should be trained on its proper handling and storage.
- \* A regulated, marked area should be established where **Mustard Gas** is handled, used, or stored.

- \* **Mustard Gas** will react with WATER or STEAM to produce corrosive *Hydrogen Chloride gas*.
- \* **Mustard Gas** is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) and STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC).
- \* Store in tightly closed containers in a cool, well-ventilated area away from MOISTURE.

## QUESTIONS AND ANSWERS

- Q: If I have acute health effects, will I later get chronic health effects?  
 A: Not always. Most chronic (long-term) effects result from repeated exposures to a chemical.
- Q: Can I get long-term effects without ever having short-term effects?  
 A: Yes, because long-term effects can occur from repeated exposures to a chemical at levels not high enough to make you immediately sick.
- Q: What are my chances of getting sick when I have been exposed to chemicals?  
 A: The likelihood of becoming sick from chemicals is increased as the amount of exposure increases. This is determined by the length of time and the amount of material to which someone is exposed.
- Q: When are higher exposures more likely?  
 A: Conditions which increase risk of exposure include physical and mechanical processes (heating, pouring, spraying, spills and evaporation from large surface areas such as open containers), and "confined space" exposures (working inside vats, reactors, boilers, small rooms, etc.).
- Q: Is the risk of getting sick higher for workers than for community residents?  
 A: Yes. Exposures in the community, except possibly in cases of fires or spills, are usually much lower than those found in the workplace. However, people in the community may be exposed to contaminated water as well as to chemicals in the air over long periods. This may be a problem for children or people who are already ill.
- Q: Don't all chemicals cause cancer?  
 A: No. Most chemicals tested by scientists are not cancer-causing.
- Q: Can men as well as women be affected by chemicals that cause reproductive system damage?  
 A: Yes. Some chemicals reduce potency or fertility in both men and women. Some damage sperm and eggs, possibly leading to birth defects.

- Q: What are the likely health problems from chemicals which cause mutations?
- A: There are two primary health concerns associated with mutagens: (1) cancers can result from changes induced in cells and, (2) adverse reproductive and developmental outcomes can result from damage to the egg and sperm cells.

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The following information is available from:

New Jersey Department of Health and Senior Services  
Occupational Health Service  
PO Box 360  
Trenton, NJ 08625-0360  
(609) 984-1863  
(609) 984-7407 (fax)

Web address: <http://www.state.nj.us/health/eoh/odisweb/>

**Industrial Hygiene Information**

Industrial hygienists are available to answer your questions regarding the control of chemical exposures using exhaust ventilation, special work practices, good housekeeping, good hygiene practices, and personal protective equipment including respirators. In addition, they can help to interpret the results of industrial hygiene survey data.

**Medical Evaluation**

If you think you are becoming sick because of exposure to chemicals at your workplace, you may call personnel at the Department of Health and Senior Services, Occupational Health Service, who can help you find the information you need.

**Public Presentations**

Presentations and educational programs on occupational health or the Right to Know Act can be organized for labor unions, trade associations and other groups.

**Right to Know Information Resources**

The Right to Know Infoline (609) 984-2202 can answer questions about the identity and potential health effects of chemicals, list of educational materials in occupational health, references used to prepare the Fact Sheets, preparation of the Right to Know Survey, education and training programs, labeling requirements, and general information regarding the Right to Know Act. Violations of the law should be reported to (609) 984-2202.

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## DEFINITIONS

**ACGIH** is the American Conference of Governmental Industrial Hygienists. It recommends upper limits (called TLVs) for exposure to workplace chemicals.

A **carcinogen** is a substance that causes cancer.

The **CAS number** is assigned by the Chemical Abstracts Service to identify a specific chemical.

**CFR** is the Code of Federal Regulations, which consists of the regulations of the United States government.

A **combustible** substance is a solid, liquid or gas that will burn.

A **corrosive** substance is a gas, liquid or solid that causes irreversible damage to human tissue or containers.

**DEP** is the New Jersey Department of Environmental Protection.

**DOT** is the Department of Transportation, the federal agency that regulates the transportation of chemicals.

**EPA** is the Environmental Protection Agency, the federal agency responsible for regulating environmental hazards.

A **fetus** is an unborn human or animal.

A **flammable** substance is a solid, liquid, vapor or gas that will ignite easily and burn rapidly.

The **flash point** is the temperature at which a liquid or solid gives off vapor that can form a flammable mixture with air.

**IARC** is the International Agency for Research on Cancer, a scientific group that classifies chemicals according to their cancer-causing potential.

**IRIS** is the Integrated Risk Information System database of the federal EPA.

A **miscible** substance is a liquid or gas that will evenly dissolve in another.

**mg/m<sup>3</sup>** means milligrams of a chemical in a cubic meter of air. It is a measure of concentration (weight/volume).

A **mutagen** is a substance that causes mutations. A **mutation** is a change in the genetic material in a body cell. Mutations can lead to birth defects, miscarriages, or cancer.

**NAERG** is the North American Emergency Response Guidebook. It was jointly developed by Transport Canada, the United States Department of Transportation and the Secretariat of Communications and Transportation of Mexico. It is a guide for first responders to quickly identify the specific or generic hazards of material involved in a transportation incident, and to protect themselves and the general public during the initial response phase of the incident.

**NFPA** is the National Fire Protection Association. It classifies substances according to their fire and explosion hazard.

**NIOSH** is the National Institute for Occupational Safety and Health. It tests equipment, evaluates and approves respirators, conducts studies of workplace hazards, and proposes standards to OSHA.

**NTP** is the National Toxicology Program which tests chemicals and reviews evidence for cancer.

**OSHA** is the Occupational Safety and Health Administration, which adopts and enforces health and safety standards.

**PEL** is the Permissible Exposure Limit which is enforceable by the Occupational Safety and Health Administration.

**PIH** is a DOT designation for chemicals which are Poison Inhalation Hazards.

**ppm** means parts of a substance per million parts of air. It is a measure of concentration by volume in air.

A **reactive** substance is a solid, liquid or gas that releases energy under certain conditions.

**STEL** is a Short Term Exposure Limit which is usually a 15-minute exposure that should not be exceeded at any time during a work day.

A **teratogen** is a substance that causes birth defects by damaging the fetus.

**TLV** is the Threshold Limit Value, the workplace exposure limit recommended by ACGIH.

The **vapor pressure** is a measure of how readily a liquid or a solid mixes with air at its surface. A higher vapor pressure indicates a higher concentration of the substance in air and therefore increases the likelihood of breathing it in.

