Right to Know
Hazardous Substance Fact Sheet

Common Name: **METHYL MERCAPTAN**

Synonyms: Methylthioalcohol; Methyl Sulfhydrate; Mercaptomethane

Chemical Name: Methanethiol

Date: January 2000 Revision: August 2022

CAS Number: 74-93-1
RTK Number: 1275
DOT Number: UN 1064
DOT Hazard: 2.1 (flammable gas)
2.3 (inhalation hazard)

Description and Use

Methyl Mercaptan can exist as a gas, with a disagreeable odor like garlic, or as a white liquid. It is used to give odor to natural gas and to manufacture *Methionine*, pesticides, jet fuel and plastics.

- **ODOR THRESHOLD = 0.002 ppm**
- Odor thresholds are not reliable indicators of exposure.

Reason for Citation

- **Methyl Mercaptan** is on the *Right to Know Hazardous Substance List* because it is regulated by OSHA and cited by ACGIH, DOT, NIOSH, DEP, NFPA and EPA.
- This chemical is on the *Right to Know Special Health Hazard Substance List* because it is **FLAMMABLE**.

SEE GLOSSARY ON PAGE 5

FIRST AID

Eye Contact
- Immediately flush with large amounts of water for at least 15 minutes, occasionally lifting upper and lower lids.

Skin Contact
- Quickly remove contaminated clothing. Immediately wash contaminated skin with large amounts of water.
- Contact with gas or liquid can cause frostbite type injury. Seek medical attention.

Inhalation
- Remove the person from exposure.
- Begin rescue breathing (using universal precautions) if breathing has stopped and CPR if heart action has stopped.
- Transfer promptly to a medical facility.
- Medical observation is recommended for 24 to 48 hours after breathing overexposure, as pulmonary edema may be delayed.

EMERGENCY NUMBERS

Poison Control: 1-800-222-1222
CHEMTREC: 1-800-424-9300
NJDEP Hotline: 1-877-927-6337
National Response Center: 1-800-424-8802

EMERGENCY RESPONDERS >>>> SEE BACK PAGE

Hazard Summary

Hazard Rating	NJDOH	NFPA
HEALTH	-	4
FLAMMABILITY	-	4
REACTIVITY	-	1

HIGHLY FLAMMABLE GAS
DANGEROUS FIRE HAZARD
POISONOUS GASES ARE PRODUCED IN FIRE
CONTAINERS MAY EXPLODE IN FIRE
WATER REACTIVE
POISON INHALATION HAZARD

Hazard Key: 0=minimal; 1=slight; 2=moderate; 3=serious; 4=severe

- **Methyl Mercaptan** can affect you when breathed in.
- Contact can irritate the skin and eyes.
- Contact with gas or liquid can cause frostbite type injury.
- Breathing **Methyl Mercaptan** can irritate the nose, throat and lungs, causing coughing and 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.
- Exposure to **Methyl Mercaptan** can cause headache, nausea, vomiting, dizziness, muscle weakness and loss of coordination.
- Higher levels can cause loss of consciousness and death.
- **Methyl Mercaptan** may damage the liver and kidneys.
- Repeated exposure may affect the blood cells causing anemia.

Workplace Exposure Limits

OSHA: The legal airborne permissible exposure limit (PEL) is **10 ppm**, not to be exceeded at any time.

NIOSH: The recommended airborne exposure limit is **0.5 ppm**, not to be exceeded during any 15-minute work period.

ACGIH: The recommended airborne exposure limit is **0.5 ppm** averaged over an 8-hour work shift.

Determining Exposure

- Read the product label and Material Safety Data Sheet (MSDS) to determine product ingredients and important safety and health information.
- Read the New Jersey Department of Health Hazardous Substance Fact Sheets on the chemicals in the product. The Fact Sheets can be found on the web at http://nj.gov/health/workplacehealthandsafety/right-to-know/ or in your workplace, in either the Right to Know Central File or the Hazard Communication Standard File.
- Public workers in New Jersey have a right to information about the chemicals with which they work under the New Jersey Worker and Community Right to Know Act and PEOSHA. Private workers have the same right under the federal OSHA.
- The New Jersey Worker and Community Right to Know Act and the PEOSHA Hazard Communication Standard require most employers to label chemicals in the workplace and require public employers to provide employees with information and training on chemical hazards and controls. The federal OSHA Hazard Communication Standard requires private employers to provide similar information and training to employees.

Health Hazard Information

Below is a summary of the information available on health hazards that may result from exposure. Duration of exposure, concentration of the substance and other factors can affect individual susceptibility to these effects.

Acute Health Effects

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

- Contact can irritate the skin and eyes.
- Breathing **Methyl Mercaptan** can irritate the nose, throat and lungs, causing coughing and 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.
- Exposure to **Methyl Mercaptan** can cause headache, nausea, vomiting, dizziness, muscle weakness and loss of coordination.
- Higher levels can cause loss of consciousness and death.

Other Health Effects

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

Cancer Hazard

- According to the information presently available to the New Jersey Department of Health, **Methyl Mercaptan** has not been tested for its ability to cause cancer in animals.

Reproductive Hazard

- According to the information presently available to the New Jersey Department of Health, **Methyl Mercaptan** has not been tested for its ability to affect reproduction.

Other Effects

- **Methyl Mercaptan** may damage the liver and kidneys at higher concentrations.
- In one case, prolonged elevated exposure led to a worker developing anemia.
- Repeated exposure may cause bronchitis to develop with cough, phlegm, and shortness of breath.

Medical

Medical evaluations should include a detailed history of past and present symptoms and a physical exam. Medical tests that look for damage already done are not a substitute for controlling exposure.

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

Medical Testing

For those with frequent or potentially high exposure (half the TLV or greater), the following are recommended before beginning work and at regular times after that:

- Liver and kidney function tests

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

- Consider chest x-ray after acute overexposure
- Complete blood count

Mixed Exposures

- Smoking can cause heart disease, lung cancer and respiratory problems. It may worsen respiratory conditions caused by chemical exposure. Even if you have smoked for a long time, stopping now will reduce health risk.
- Drinking even a little alcohol may increase liver damage caused by this substance.
- Persons suffering from a disease of the red blood cells called *Glucose 6 Phosphate Dehydrogenase Deficiency* (G6PD - def.) are at increased risk of suffering damage to their blood upon exposure to **Methyl Mercaptan**.

Workplace Controls and Practices

Substitute less toxic chemicals for chemicals that are very toxic, reproductive hazards or sensitizers. If substitution is impossible, seek the advice of experts on control measures. Control measures include: (1) enclosing chemical processes for severely irritating and corrosive chemicals, (2) using local exhaust ventilation for chemicals that may be harmful with a

single exposure, and (3) using general ventilation to control exposures to skin and eye irritants. For further information on workplace controls, consult the NIOSH document on Control Banding at www.cdc.gov/niosh/topics/ctrlbanding/.

The following practices are recommended:

- Label process containers.
- Train and inform employees about hazards.
- Monitor airborne chemical concentrations.
- Automatically transfer combustible and flammable liquids from storage to process containers.
- Use engineering controls at elevated levels of exposure.
- Provide eye wash fountains and emergency showers.
- Wash skin after contact with a hazardous material.
- Wash at the end of the work shift.
- Do not wear clothing once it becomes contaminated.
- Do not take contaminated clothing home.
- Special training is required to wash contaminated clothing.
- Do not eat, smoke, or drink in areas where chemicals are being handled, processed or stored.
- Wash hands carefully before eating, smoking, drinking, applying cosmetics or using the toilet.

In addition:

- Before entering a confined space where **Methyl Mercaptan** may be present, check to make sure that an explosive concentration does not exist.

Personal Protective Equipment

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 its use. All personal protective equipment (including suits, gloves, footwear and headgear) should be clean, available each day and put on before work.

Consult safety equipment suppliers and manufacturers for specific recommendations. The following recommendations are only guidelines and may not apply to every situation:

Gloves and Clothing

- Avoid skin contact.
- Where exposure to cold equipment, vapors, or liquid may occur, employees should be provided with special clothing designed to prevent the freezing of body tissues.
- Safety equipment manufacturers recommend Neoprene or Butyl gloves and DuPont Tychem® 6000, Tychem® 8000FR, Tychem® and Tychem® Responder CSM as protective materials for clothing.

Eye Protection

- When working with *liquid* **Methyl Mercaptan**, wear indirect-vent, impact-resistant and splash-resistant goggles when working with liquids.
- Wear non-vented, impact-resistant goggles when working with fumes, gases, or vapors.
- Wear a face shield along with impact-resistant goggles when working with corrosive, highly irritating or toxic substances.

Respiratory Protection

Improper use of respirators is dangerous. Respirators should be used only in accordance with a written program that takes into account workplace conditions, worker training, respirator fit testing, and medical exams, as described in the OSHA Respiratory Protection Standard (29 CFR 1910.134). **Only use NIOSH-approved respirators.**

- For outdoor use, check with your supervisor and your safety equipment supplier regarding the appropriate respiratory equipment.
- Leave the area immediately if (1) while wearing a filter or cartridge respirator you can smell, taste, or otherwise detect the chemical substance, (2) while wearing particulate filters abnormal resistance to breathing is experienced, or (3) eye irritation occurs while wearing a full facepiece respirator.
- Consider all potential exposure sources. You may need a combination of filters, pre-filters or cartridges to protect against different forms of a chemical (such as vapor and mist) or against a mixture of chemicals.
- Where the potential exists for exposure over **0.5 ppm,** use a full facepiece respirator with an organic vapor cartridge. Increased protection is obtained from full facepiece powered-air purifying respirators.
- Exposure to **150 ppm** is immediately dangerous to life and health. If the possibility of exposure above **150 ppm** exists, use a self-contained breathing apparatus with a full facepiece operated in a pressure-demand or other positive-pressure mode.

Fire Hazards

Employees who are expected to fight fires must be trained and equipped as stated in the OSHA Fire Brigades Standard (29 CFR 1910.156).

- **Methyl Mercaptan** is a HIGHLY FLAMMABLE GAS.
- DO NOT USE WATER**.**
- Stop flow of gas.
- Fires may be extinguished with dry chemical, foam, or carbon dioxide.
- Use water spray to reduce vapors.
- POISONOUS GASES ARE PRODUCED IN FIRE, including *Sulfur Oxides*.
- CONTAINERS MAY EXPLODE IN FIRE.
- Vapors may travel to a source of ignition and flash back.

Spills and Emergencies

Employees who are required to clean-up spills or leaks must be properly trained and equipped. The OSHA Hazardous Waste Operations and Emergency Response Standard (29 CFR 1910.120) may apply.
It may be necessary to contain and dispose of this substance as HAZARDOUS WASTE. Contact your state Department of Environmental Protection (DEP) or your regional office of the federal Environmental Protection Agency (EPA) for specific recommendations.

In case of accidental release:

- Evacuate personnel.
- Secure and control entrance to the area.
- If it is safe to do so, remove potential ignition sources.
- Ventilate area of leak to disperse the gas.
- Stop flow of gas. If source of leak is a cylinder and the leak cannot be stopped in place, remove the leaking cylinder to a safe place in the open air, and repair leak or allow cylinder to empty.
- Liquid **Methyl Mercaptan** may be absorbed in vermiculite, dry sand, earth, or a similar material and placed in an appropriate container.
- Keep **Methyl Mercaptan** out of a confined space, such as a sewer, because of the possibility of an explosion, unless the sewer is designed to prevent the build-up of explosive concentrations.
- Do not allow this substance to enter waterways, including the sewer system, as it is very toxic to aquatic life with long-lasting effects.

Handling and Storage

Prior to working with this substance, employees should be trained on proper handling and storage.

- Since violent reactions occur, **Methyl Mercaptan** must be stored to avoid contact with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); MERCURY II OXIDE; STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); COPPER or NICKEL and their ALLOYS; ALUMINUM; and BLEACHES since violent reactions occur.
- Store in tightly closed containers in a cool, well-ventilated area away from HEAT, FLAME and STEAM.
- Sources of ignition, such as smoking and open flames, are prohibited where **Methyl Mercaptan** is used, handled, or stored.
- Metal containers involving the transfer of **Methyl Mercaptan** should be grounded and bonded.
- Use only non-sparking tools and equipment, especially when opening and closing containers of **Methyl Mercaptan**.

Occupational Health Resources

The New Jersey Department of Health's Occupational Health Service offers information, resources, educational materials, public presentations, and industrial hygiene and medical investigations and evaluations, among other services.

For more information, please contact:

New Jersey Department of Health – Right to Know
PO Box 368
Trenton, NJ 08625-0368

Phone: 609-984-2202
Fax: 609-984-7407
E-mail: rtk@doh.nj.gov
Web address:
http://nj.gov/health/workplacehealthandsafety/right-to-know/

GLOSSARY

ACGIH is the American Conference of Governmental Industrial Hygienists. It determines Threshold Limit Values (TLVs).

Acute Exposure Guideline Levels (AEGLs) are established by the EPA. They describe the risk to humans resulting from once-in-a lifetime, or rare, exposure to airborne chemicals.

AIHA is the American Industrial Hygiene Association. It provides information and resources to industrial hygienists and occupational health professionals.

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

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

CFR is the Code of Federal Regulations, which are 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 can weaken or destroy human skin or chemical containers.

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.

ERG is the Emergency Response Guidebook, a resource for responding to chemical emergencies during transportation.

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

IARC is the International Agency for Research on Cancer.

IDLH is the level of substance which is Immediately Dangerous to Life or Health.

IRIS is the EPA's Integrated Risk Information System.

LEL or **Lower Explosive Limit**, is the lowest concentration of a substance in air capable of continuing an explosion.

mg/m^3 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 changes the genetic material of cells, and can lead to birth defects, miscarriages, or cancer.

NJDEP is the New Jersey Department of Environmental protection.

NFPA is the National Fire Protection Association. It classifies substances according to the risk of fire and explosion.

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

NTP is the National Toxicology Program, which tests chemicals and reviews evidence to determine carcinogenicity.

OSHA is the Occupational Safety and Health Administration, which adopts and enforces health and safety standards. **OSHA** can also refer to the Occupational Safety and Health Act.

PEL is the permissible exposure. It is established by OSHA.

PEOSHA is the New Jersey Public Employees Occupational Safety and Health Act.

PIH stands for Poison Inhalation Hazard. This classification is established by the DOT.

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

Protective Action Criteria (PAC) are values established by the Department of Energy for chemical emergencies.

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

REL is the recommended exposure limit by NIOSH.

STEL is a Short-Term Exposure Limit, which should never be exceeded during the workday.

TLV is the Threshold Limit Value, an exposure limit for airborne concentrations.

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

UEL or **Upper Explosive Limit** is the concentration of a substance in air above which there is too much fuel to continue an explosion.

WEEL is the Workplace Environmental Exposure Limit established by the AIHA.

RIGHT TO KNOW
HAZARDOUS SUBSTANCE FACT SHEET

Emergency Responders Quick Reference

Common Name: **METHYL MERCAPTAN**

Synonyms: Methylthioalcohol; Methyl Sulfhydrate; Mercaptomethane
CAS Number: 74-93-1
Molecular Formula: CH_4S
RTK Number: 1275
Description: Gas with disagreeable odor like garlic, or white liquid

HAZARD DATA

Hazard Rating		Firefighting	Reactivity
Health:	4	**Methyl Mercaptan** is a HIGHLY FLAMMABLE GAS.	Since violent reactions occur, **Methyl Mercaptan** must be stored to avoid contact with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); MERCURY II OXIDE; STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); COPPER or NICKEL and their ALLOYS; ALUMINUM; and BLEACHES since violent reactions occur.
Fire:	4	Stop flow of gas.	
Reactivity:	1	Fires may be extinguished with dry chemical, foam, or carbon dioxide.	Store in tightly closed containers in a cool, well-ventilated area away from HEAT, FLAME and STEAM.
DOT #:	UN 1064	Use water spray to reduce vapors.	Sources of ignition, such as smoking and open flames, are prohibited where **Methyl Mercaptan** is used, handled, or stored.
ERG #:	117	POISONOUS GASES ARE PRODUCED IN FIRE, including *Sulfur Oxides*.	Metal containers involving the transfer of **Methyl Mercaptan** should be grounded and bonded.
DOT Hazard:	2.1 (flammable gas) 2.3 (inhalation hazard)	CONTAINERS MAY EXPLODE IN FIRE.	Use only non-sparking tools and equipment, especially when opening and closing containers of **Methyl Mercaptan**.
		Vapors may travel to a source of ignition and flash back.	

SPILLS/LEAKS

Isolation Distances:

Small Spill: 30 m (100 ft)
Large Spill: 200 m (600 ft)
Fire: 1600 m (1 mile)

Evacuate personnel.
Secure and control entrance to the area.
If it is safe to do so, remove potential ignition sources.
Ventilate area of leak to disperse the gas.
Stop flow of gas. If source of leak is a cylinder and the leak cannot be stopped in place, remove the leaking cylinder to a safe place in the open air, and repair leak or allow cylinder to empty.
Liquid **Methyl Mercaptan** may be absorbed in vermiculite, dry sand, earth, or a similar material and placed in an appropriate container.
Keep **Methyl Mercaptan** out of a confined space, such as a sewer, because of the possibility of an explosion, unless the sewer is designed to prevent the build-up of explosive concentrations.
Do not allow this substance to enter waterways, including the sewer system, as it is very toxic to aquatic life with long-lasting effects.

PHYSICAL PROPERTIES

Molecular Weight: 48.1
Flash Point: -17 ˚C (0 ˚F) for *liquid* **Methyl Mercaptan**
Vapor Density: 1.66 (air = 1)
Vapor Pressure: 1520 mm Hg at 26 ˚C (79 ˚F)
Specific Gravity: 0.892 at 6 ˚C (42.8 ˚F)
Water Solubility: Soluble
Boiling Point: 5.94 ˚C (42.7 ˚F) at 760 mm Hg
Melting Point: -178.6 ˚C (-189.4 ˚F)
Ionization Potential: 9.44 eV
Odor Threshold: 0.002 ppm
LEL: 3.9 %
UEL: 21.8 %

EXPOSURE LIMITS

The following exposure limits are for **Methyl Mercaptan**:

OSHA: 10 ppm, never to be exceeded
NIOSH: 0.5 ppm, 15 min
ACGIH: 0.5 ppm, 8 h average
IDLH: 150 ppm
PAC: PAC-1 = 0.005 ppm, PAC-2 = 23 ppm, PAC-3 = 68 ppm

PROTECTIVE EQUIPMENT

Gloves: Neoprene or Butyl
Coverall: DuPont Tychem® 6000, Tychem® 8000FR, Tychem® and Tychem® Responder CSM or the equivalent as protective materials for clothing.
Respirator:
< 0.5 ppm - full facepiece respirator with *organic vapor cartridges*
≥ 500 ppm - SCBA

ACUTE HEALTH EFFECTS

Eyes: Irritation
Skin: Irritation
Inhalation: Irritation, coughing, shortness of breath, pulmonary edema, headache, nausea, vomiting, dizziness, muscle weakness, loss of coordination, loss of consciousness, death

FIRST AID AND DECONTAMINATION

Remove the person from exposure.
Quickly remove contaminated clothing.
Immediately wash contaminated skin with large amounts of water.
Immediately flush eyes with large amounts of water for at least 15 minutes, occasionally lifting upper and lower lids.
Contact with *gas* or *liquid* can cause frostbite type injury.
Begin rescue breathing (using universal precautions) if breathing has stopped and CPR if heart action has stopped.
Transfer promptly to a medical facility.
Medical observation is recommended for 24 to 48 hours after breathing overexposure, as pulmonary edema may be delayed.