METHYL MERCAPTAN

1. PRODUCT AND COMPANY IDENTIFICATION

Company

Arkema Inc.
2000 Market Street
Philadelphia, Pennsylvania 19103

Thio and Fine Chemicals

Customer Service Telephone Number: (800) 628-4453
(Monday through Friday, 8:30 AM to 5:30 PM EST)

Emergency Information

Transportation: CHEMTREC: (800) 424-9300
(24 hrs., 7 days a week)

Medical: Rocky Mountain Poison Center: (303) 623-5716
(24 hrs., 7 days a week)

Product Information

Product name:	METHYL MERCAPTAN
Synonyms:	METHANETHIOL, MESH
Molecular formula:	CH3SH
Chemical family:	mercaptans
Molecular weight:	48.11 g/mol
Product use:	Chemical intermediate

2. HAZARDS IDENTIFICATION

Emergency Overview

Color:	colourless
Physical state:	gas
Odor:	garlic-like, rotten cabbage

DANGER!
FLAMMABLE GAS
MAY CAUSE FLASH FIRE.
HARMFUL IF INHALED.
CAUSES EYE, SKIN AND RESPIRATORY TRACT IRRITATION.
OBJECTIONABLE ODOR MAY CAUSE NAUSEA, HEADACHE OR DIZZINESS.
MAY CAUSE HEADACHE, NAUSEA, DIZZINESS, DROWSINESS, LOSS OF CONSCIOUSNESS.

Potential Health Effects

Primary routes of exposure:
Inhalation and skin contact.

Signs and symptoms of acute exposure:
Vapor: Central nervous system effects: headache, nausea, dizziness, drowsiness, loss of consciousness. Irritating to eyes, respiratory system and skin. Accumulation of fluid in the lungs may occur and may be delayed for several hours. (severity of effects depends on extent of exposure) Objectionable odor may cause nausea, headache or dizziness.

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Skin:
Irritating.

Inhalation:
Slightly toxic. Irritating. (based on animal studies)

Eyes:
Irritating.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name	CAS-No.	Wt/Wt	OSHA Hazardous
Methanethiol	74-93-1	99.5 %	Y

This material is classified as hazardous under Federal OSHA regulation.

The substance(s) marked with a "Y" in the Hazard column above, are those identified as hazardous chemicals under the criteria of the OSHA Hazard Communication Standard (29 CFR 1910.1200).

4. FIRST AID MEASURES

Inhalation:
If inhaled, remove victim to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention. Call a Poison Control Center.

Skin:
In case of contact, immediately flush skin with plenty of water. Remove contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.

Eyes:
In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention.

Ingestion:
Ingestion is not applicable - product is a gas at ambient temperatures.

Notes to physician:
Exposure to material may cause delayed lung injury resulting in pulmonary edema and pneumonitis. Exposed individuals should be monitored for 72 hours after exposure for the onset of delayed respiratory symptoms.

5. FIRE-FIGHTING MEASURES

Flash point	< 0 °F (< -18 °C) (Tag closed cup)
Auto-ignition temperature:	705 °F (374 °C)
Lower flammable limit (LFL):	3.9 %(V)
Upper flammable limit (UFL):	22 %(V)

Extinguishing media (suitable):
carbon dioxide, Dry chemical, foam

Protective equipment:
Fire fighters and others who may be exposed to products of combustion should wear full fire fighting turn out gear (full Bunker Gear) and self-contained breathing apparatus (pressure demand / NIOSH approved or equivalent).

Further firefighting advice:
Use water spray on person making shut-off.
Fire fighting equipment should be thoroughly decontaminated after use.
Do not allow run-off from fire fighting to enter drains or water courses.

Fire and explosion hazards:
When burned, the following hazardous products of combustion can occur:
hydrogen sulfide
sulfur oxides
carbon dioxide
carbon monoxide

6. ACCIDENTAL RELEASE MEASURES

In case of spill or leak:
Eliminate all ignition sources. Evacuate area of all unnecessary personnel. Use Halogen leak detector or other suitable means to locate leaks or check atmosphere. Prevent further leakage or spillage if you can do so without risk. Keep upwind. Evacuate enclosed spaces and disperse gas with floor-level forced-air ventilation. Avoid dispersal of leaked material. Consult a regulatory specialist to determine appropriate state or local reporting requirements, for assistance in waste characterization and/or hazardous waste disposal and other requirements listed in pertinent environmental permits.

7. HANDLING AND STORAGE

Handling

General information on handling:
Keep away from heat, sparks and flames.
Avoid contact with the skin, eyes and clothing.
Avoid breathing gas.
Keep container closed.
Check that all equipment is properly grounded and installed to satisfy electrical classification requirements.
Use only with adequate ventilation.
Wash thoroughly after handling.
Container hazardous when empty.
Emptied container retains product residue.
Follow label warnings even after container is emptied.
RESIDUAL GASES MAY EXPLODE ON IGNITION.
DO NOT CUT, DRILL, GRIND, OR WELD ON OR NEAR THIS CONTAINER.
Improper disposal or reuse of this container may be dangerous and/or illegal.

Storage

General information on storage conditions:

Ensure that all storage and handling equipment is properly grounded and installed to satisfy electrical classification requirements. Static electricity may accumulate when transferring material. All storage containers, including drums, cylinders and IBCs, must be bonded and grounded during filling and emptying operations. Store in cool, dry, well ventilated area away from sources of ignition such as flame, sparks and static electricity. Observe all federal, state and local regulations and National Fire Protection Association (NFPA) Codes which pertain to the specific local conditions of storage and use, including OSHA 29 CFR 1910.106 and NFPA 30, 70, 77, and 497.

Storage incompatibility – General:
Store away from oxidizers and reactive materials. Store separate from: Strong acids

Bases

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Airborne Exposure Guidelines:

Methanethiol (74-93-1)

US. ACGIH Threshold Limit Values

Time Weighted Average (TWA): 0.5 ppm

US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)

Ceiling Limit Value: 10 ppm (20 mg/m3)

Only those components with exposure limits are printed in this section. Limits with skin contact designation above have skin contact effect. Air sampling alone is insufficient to accurately quantitate exposure. Measures to prevent significant cutaneous absorption may be required. Limits with a sensitizer designation above mean that exposure to this material may cause allergic reactions.

Engineering controls:
Investigate engineering techniques to reduce exposures below airborne exposure limits or to otherwise reduce exposures. Provide ventilation if necessary to minimize exposures or to control exposure levels to below airborne exposure limits (if applicable see above). If practical, use local mechanical exhaust ventilation at sources of air contamination such as open process equipment. Consult ACGIH ventilation manual or NFPA Standard 91 for design of exhaust systems.

Respiratory protection:
Avoid breathing gas. Where airborne exposure is likely or airborne exposure limits are exceeded (if applicable, see above), use NIOSH approved respiratory protection equipment appropriate to the material and/or its components. Full facepiece equipment is recommended and, if used, replaces need for face shield and/or chemical goggles. Consult respirator manufacturer to determine appropriate type equipment for a given application. Observe respirator use limitations specified by NIOSH or the manufacturer. For emergency and other conditions where there may be a potential for significant exposure or where exposure limit may be significantly exceeded, use an approved full face positive-pressure, self-contained breathing apparatus or positive-pressure airline with auxiliary self-contained air supply. Respiratory protection programs must comply with 29 CFR § 1910.134.

Skin protection:
Wear appropriate chemical resistant protective clothing and chemical resistant gloves to prevent skin contact. Consult glove manufacturer to determine appropriate type glove material for given application. Wear chemical goggles, a face shield, and chemical resistant clothing such as a rubber apron when splashing may occur.

Rinse immediately if skin is contaminated. Wash contaminated clothing and clean protective equipment before reuse. Provide a safety shower at any location where skin contact can occur. Wash thoroughly after handling.

Eye protection:
Where there is potential for eye contact, wear chemical goggles and have eye flushing equipment immediately available.

9. PHYSICAL AND CHEMICAL PROPERTIES

Color:	colourless
Physical state:	gas
Odor:	garlic-like, rotten cabbage
Odor threshold:	1 ppb
pH:	not determined
Density:	not determined
Specific Gravity (Relative density):	0.87 (68 °F(20 °C))compressed liquefied gas
Vapor pressure:	1,189 mmHg
Vapor density:	1.7 kg/m3
Boiling point/boiling range:	40.1 - 45.5 °F (4.5 - 7.5 °C)
Freezing point:	-189 °F (-123 °C)
Melting point/range:	not applicable
Evaporation rate:	not determined
Solubility in water:	23.3 g/l 68 °F (20 °C)
Viscosity, dynamic:	0.009 mPa.s 68 °F (20 °C) Vapor
% Volatiles:	100 %
Molecular weight:	48.11 g/mol
Oil/water partition coefficient:	0.65
Critical point:	Critical pressure: 53,254 mmHg Critical temperature: 386.2 °F (196.8 °C)

10. STABILITY AND REACTIVITY

Stability:
This material is chemically stable under normal and anticipated storage, handling and processing conditions.

Materials to avoid:
May cause fire or explosion on contact with:
Strong acids
Strong bases
Strong oxidizing agents
Reactive materials

Conditions / hazards to avoid:
Heat, flames and sparks.

Hazardous decomposition products:

Thermal decomposition giving flammable and toxic products
hydrogen sulfide
sulfur oxides
Carbon dioxide (CO2)
Carbon monoxide

11. TOXICOLOGICAL INFORMATION

Data on this material and/or its components are summarized below.

Data for METHYL MERCAPTAN

Acute toxicity

Inhalation:
Slightly toxic. (rat) 4 h LC50 = 1.3 mg/l (= 675 ppm).

Slightly toxic. (rat) 1 h LC50 = 3.4 mg/l (= 1680 ppm).

(laboratory animal) signs: methemoglobin formation, cyanosis, central nervous system effects, lung effects, rapid respiration, accumulation of fluid in the lungs, weakness, respiratory depression, death (At high concentrations)

Skin Sensitization:
Repeated skin exposure. (guinea pig) (as sodium salt)

Repeated dose toxicity
Repeated inhalation administration to male rat / affected organ(s): liver / signs: changes in body weight

Genotoxicity

Assessment in Vitro:
No genetic changes were observed in laboratory tests using: bacteria, animal cells

Assessment in Vivo;
No genetic changes were observed in laboratory tests using: animals

Human experience

Inhalation:
Nose: The gas deadens the sense of smell. Do not depend on odor to detect presence of gas.
Skin contact:
Blood: hemolytic anemia, death. (individual with G6PD deficiency)

12. ECOLOGICAL INFORMATION

Chemical Fate and Pathway
Data on this material and/or its components are summarized below.

Data for METHYL MERCAPTAN

Biodegradation:
Biodegradable. (under anaerobic conditions)

Readily biodegradable. biodegradation 64 % / similar material

Octanol Water Partition Coefficient:
log Pow = 0.78

Photodegradation:
air reaction with OH radicals Half-life direct photolysis: = 5.8 h

Mobility and Distribution in the Environment:
Slight adsorption / Log Koc = 1.23

Ecotoxicology
Data on this material and/or a similar material are summarized below.

Data for METHYL MERCAPTAN

Aquatic toxicity data:
Moderately toxic. Brachydanio rerio (zebra fish) 96 h LC50 1.8 mg/l (as sodium salt)

Aquatic invertebrates:
Moderately toxic. Daphnia magna (Water flea) 48 h EC50 1.32 - 2.46 mg/l (as sodium salt)

Algae:
Slightly toxic. Pseudokirchneriella subcapitata 72 h ErC50 15 mg/l (as sodium salt)
Moderately toxic. Pseudokirchneriella subcapitata 72 h EbC50 6.3 mg/l (as sodium salt)

Chronic toxicity to aquatic plants:
Practically nontoxic. Algae 7 d NOEC >= 100 mg/l

13. DISPOSAL CONSIDERATIONS

Waste disposal:
Do not vent the container contents, or product residuals, to the atmosphere. Recover and reclaim unused contents or residuals as appropriate. Recovered/reclaimed product can be returned to an approved certified reclaimer or back to the seller depending on the material. Completely emptied disposable containers can be disposed of as recyclable steel. Returnable cylinders must be returned to seller. Dispose of in accordance with federal, state and local regulations. Consult a regulatory specialist to determine appropriate state or local reporting requirements, for assistance in waste characterization and/or hazardous waste disposal and other requirements listed in pertinent environmental permits. Note: Chemical additions to, processing of, or otherwise altering this material may make this waste management information incomplete, inaccurate, or otherwise inappropriate. Furthermore, state and local waste disposal requirements may be more restrictive or otherwise different from federal laws and regulations.

14. TRANSPORT INFORMATION

US Department of Transportation (DOT)

UN Number	:	1064
Proper shipping name	:	Methyl mercaptan
Class	:	2.3
Subsidiary hazard class	:	(2.1)
Marine pollutant	:	yes
Reportable quantity	:	100 lbs (Methyl mercaptan)

Special Shipping Information: Poison-Inhalation Hazard Zone C

International Maritime Dangerous Goods Code (IMDG)

UN Number	:	1064
Proper shipping name	:	METHYL MERCAPTAN
Class	:	2.3
Subsidiary hazard class	:	(2.1)
Marine pollutant	:	yes
Flash point	:	< 0 °F (< -18 °C) Tag closed cup

15. REGULATORY INFORMATION

Chemical Inventory Status

EU. EINECS	EINECS	Conforms to
US. Toxic Substances Control Act	TSCA	The components of this product are all on the TSCA Inventory.
Australia. Industrial Chemical (Notification and Assessment) Act	AICS	Conforms to
Canada. Canadian Environmental Protection Act (CEPA). Domestic Substances List (DSL). (Can. Gaz. Part II, Vol. 133)	DSL	All components of this product are on the Canadian DSL list.
Japan. Kashin-Hou Law List	ENCS (JP)	Conforms to

Korea. Toxic Chemical Control Law (TCCL) List	KECI (KR)	Conforms to
Philippines. The Toxic Substances and Hazardous and Nuclear Waste Control Act	PICCS (PH)	Conforms to
China. Inventory of Existing Chemical Substances	IECSC (CN)	Conforms to
New Zealand. Inventory of Chemicals (NZIoC), as published by ERMA New Zealand	NZIOC	Does not conform

United States – Federal Regulations

SARA Title III – Section 302 Extremely Hazardous Chemicals:

Chemical Name	CAS-No.	SARA Reportable Quantities	SARA Threshold Planning Quantity
Methanethiol	74-93-1	100 lbs	500 lbs

SARA Title III - Section 311/312 Hazard Categories:
Acute Health Hazard, Fire Hazard

SARA Title III – Section 313 Toxic Chemicals:
SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) - Reportable Quantity (RQ):

Chemical Name	CAS-No.	Reportable quantity
Methanol	67-56-1	5000 lbs
Methanethiol	74-93-1	100 lbs

Toxic Substances Control Act – Section 12(b):

Chemical Name	CAS-No.
Methanethiol	74-93-1

OSHA Regulated Carcinogens (NTP, IARC, OSHA Listed):

NTP:
No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

IARC:
No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

OSHA:
No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

United States – State Regulations

Massachusetts Right to Know

Chemical Name	CAS-No.
Methanethiol	74-93-1
Methane, thiobis-	75-18-3
Hydrogen sulfide (H2S)	7783-06-4

Massachusetts Right to Know – Extraordinarily Hazardous Substance(s)

Chemical Name	CAS-No.
Methanethiol	**74-93-1**

Massachusetts Right to Know – Extraordinarily Hazardous Substance(s)

Chemical Name	CAS-No.
Methane, thiobis-	**75-18-3**

Massachusetts Right to Know – Extraordinarily Hazardous Substance(s)

Chemical Name	CAS-No.
Hydrogen sulfide (H2S)	**7783-06-4**

New Jersey Right to Know

Chemical Name	CAS-No.
Methanethiol	74-93-1

New Jersey Right to Know – Special Health Hazard Substance(s)

Chemical Name	CAS-No.
Methanethiol	74-93-1

Pennsylvania Right to Know

Chemical Name	CAS-No.
Methanethiol	74-93-1

Pennsylvania Right to Know – Environmentally Hazardous Substance(s)

Chemical Name	CAS-No.
Methanethiol	74-93-1

California Prop. 65
This product does not contain any chemicals known to the State of California to cause cancer, birth defects, or any other reproductive defects.

16. OTHER INFORMATION

Latest Revision(s):

Revised Section(s):	Revised section 5.
Reference number:	000000035648
Date of Revision:	02/04/2010
Date Printed:	02/04/2010

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