METHYL ISOCYANATE

MIS

CAUTIONARY RESPONSE INFORMATION

Common Synonyms
Isocyanatomethane
Isocyanic acid, methyl ester
Methane, isocyanato-
Methyl carbonimide
MIC

Liquid | Colorless | Sharp, unpleasant odor

Floats; slowly mixes and slowly reacts with water at 20°C.

KEEP PEOPLE AWAY. AVOID CONTACT WITH LIQUID AND VAPOR.
EVACUATE AREA.
Wear chemical protective suit with self-contained breathing apparatus.
Shut off ignition sources and call fire department.
Stay upwind and use water spray to ``knock down'' vapor.
Notify local health and pollution control agencies.

Fire

FLAMMABLE.
POISONOUS GASES/VAPORS ARE PRODUCED IN FIRE.
Containers may explode in fire.
Flashback along vapor trail may occur.
Vapor may explode if ignited in an enclosed area.
WEAR CHEMICAL PROTECTIVE SUIT WITH SELF-CONTAINED BREATHING APPARATUS.
Extinguish small fires: dry chemical, CO_2, water spray or foam;
large fires: water spray, fog or foam.
Combat fires from safe distance or protected location.
Cool exposed containers with water.

Exposure

CALL FOR MEDICAL AID.

VAPOR
POISONOUS IF INHALED OR IF SKIN EXPOSED.
May cause fatal pulmonary edema.
Respiratory distress cited for most deaths.
Severely irritating to eyes.
Move to fresh air.
If breathing has stopped, give artificial respiration.
If breathing is difficult, give oxygen.
Liquid
POISONOUS IF SWALLOWED OR IF SKIN EXPOSED.
Causes eye injury and skin burns.
Remove contaminated clothing and shoes.
Flush affected areas with plenty of running water for at least 15 minutes.
IF IN EYES, hold eyelids open and flush with plenty of running water.
IF SWALLOWED and victim is CONSCIOUS, have victim drink a large quantity of water and induce vomiting.
IF SWALLOWED and victim is UNCONSCIOUS OR HAVING CONVULSIONS, do nothing except keep victim warm.

Water Pollution

Effect of low concentrations on aquatic life is unknown.
May be dangerous if it enters water intakes.
Notify local health and wildlife officials.
Notify operators of nearby water intakes.

1. CORRECTIVE RESPONSE ACTIONS

Stop discharge

2. CHEMICAL DESIGNATIONS

2.1 CG Compatibility Group: Not listed.
2.2 Formula: CH_3NCO
2.3 IMO/UN Designation: 3.2/2480
2.4 DOT ID No.: 2480
2.5 CAS Registry No.: 624-83-9
2.6 NAERG Guide No.: 155
2.7 Standard Industrial Trade Classification: 51489

3. HEALTH HAZARDS

3.1 Personal Protective Equipment: Positive pressure breathing apparatus and special protective clothing.
3.2 Symptoms Following Exposure: INHALATION: Poisonous; may be fatal if inhaled. Experimental exposure of four human subjects for 1 to 5 minutes to: 0.4 ppm - no effects; 2 ppm - irritation of nose and throat; 4 ppm - irritation more marked; 21 ppm - unbearable irritation of nose and throat. High concentrations can cause burning sensations in the nose and throat, coughing, dyspnea (difficult or painful breathing, gasping for breath), increased secretions, lung injury and subsequent pulmonary edema and uncontrollable vomiting. Most deaths (Bhopal, India, 1984) have been attributed to various forms of respiratory distress such as massive accumulation of fluid in the lungs or spasmodic contrictions of the bronchial tubes.
3.3 Treatment of Exposure: INHALATION: Move victim to fresh air; call emergency medical care. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Remove and isolate contaminated clothing and shoea at the site. EYES AND SKIN: Immediately flush eyes or skin with running water for at least 15 minutes, hold eyelids open occasionally, if appropriate. INGESTION: IF CONSCIOUS, give victim large quantities of water and induce vomiting by having victim touch the back of his throat. IF UNCONSCIOUS, do nothing except keep victim quiet and maintain normal body temperature. Effects may be delayed; keep victim under observation.
3.4 TLV-TWA: 0.02 ppm
3.5 TLV-STEL: Not listed.
3.6 TLV-Ceiling: Not listed.
3.7 Toxicity by Ingestion: Grade 3; LD_{50} = 71 mg/kg (rat)
3.8 Toxicity by Inhalation: Currently not available.
3.9 Chronic Toxicity: Susceptible individuals may become sensitized so that subsequent exposure to extremely low concentrations provoke true asthma attacks. Cross sensitization to other isocyanates could also occur.
3.10 Vapor (Gas) Irritant Characteristics: Vapors cause severe irritation of eyes and throat and can cause eye and lung injury. They cannot be tolerated even at low concentrations.
3.11 Liquid or Solid Characteristics: Severe skin irritant. Causes second and third-degree burns on short contact and is very injurious to the eyes.
3.12 Odor Threshold: Currently not available
3.13 IDLH Value: 3 ppm
3.14 OSHA PEL-TWA: 0.02 ppm
3.15 OSHA PEL-STEL: Not listed.
3.16 OSHA PEL-Ceiling: Not listed.
3.17 EPA AEGL: Not listed

4. FIRE HAZARDS

4.1 Flash Point: Currently not available
4.2 Flammable Limits in Air: 5.3% - 26%
4.3 Fire Extinguishing Agents: Small fires: dry chemical, CO_2, water spray or foam; large fires: water spray, fog or foam.
4.4 Fire Extinguishing Agents Not to Be Used: Not pertinent
4.5 Special Hazards of Combustion Products: Contain toxic and irritating gases, including HCN and NOx.
4.6 Behavior in Fire: Very flammable; may be ignited by heat, sparks or flames. May travel to a source of ignition and flashback. Container may explode violently.
4.7 Auto Ignition Temperature: 995°F.
4.8 Electrical Hazards: Currently not available
4.9 Burning Rate: Currently not available
4.10 Adiabatic Flame Temperature: Currently not available
4.11 Stoichometric Air to Fuel Ratio: 15.5 (calc.)
4.12 Flame Temperature: Currently not available
4.13 Combustion Molar Ratio (Reactant to Product): 4.5 (calc.)
4.14 Minimum Oxygen Concentration for Combustion (MOCC): Not listed

5. CHEMICAL REACTIVITY

5.1 Reactivity with Water: Reacts slowly with water at room temperature (20°C) to produce gaseous CO_2, methylamine (b.p. -6°C.) and heat (about 585 Btu per lb of methyl isocyanate or about 3,700 Btu per lb of water). Resulting pressure increase may cause relief valves to open. Acids, alkalies and amides accelerate the reaction. Reactivity accelerates as temperature rises.
5.2 Reactivity with Common Materials: Avoid contact with all metals other than stainless steel and nickel. The metals may catalyze polymerization reactions. The heat of reaction can cause the trimerization to occur with explosive violence. Also attacks some plastics, rubber and coatings. Glass-lined containers (no pinholes) and fluorocarbon resin-lined transfer hoses are acceptable.
5.3 Stability During Transport: Drums may be stored at ambient temperatures out of direct sun. Keep as cool as practical and away from sources of heat, sparks, or flames. Protected from all contaminants. Cool bulk quantities to about 0°C.
5.4 Neutralizing Agents for Acids and Caustics: Caustic soda
5.5 Polymerization: Pure methyl isocyanate polymerizes spontaneously. Commercial product requires only heat or a trace of catalyst to inititate a potentially violent reaction.
5.6 Inhibitor of Polymerization: No inhibitor identified as such. Residual trace phosgene from production inhibits polymerization and reaction with water.

6. WATER POLLUTION

6.1 Aquatic Toxicity: Currently not available
6.2 Waterfowl Toxicity: Currently not available
6.3 Biological Oxygen Demand (BOD): Currently not available
6.4 Food Chain Concentration Potential: Not pertinent
6.5 GESAMP Hazard Profile:
Bioaccumulation: 0
Damage to living resources: -
Human Oral hazard: 2
Human Contact hazard: II
Reduction of amenities: XXX

7. SHIPPING INFORMATION

7.1 Grades of Purity: Commercial (99%)
7.2 Storage Temperature: It is recommended that bulk quantities be cooled to approximately 0°C. Drums may be stored at ambient temperature out of direct sunlight. Storage temperature should not exceed 30°C.
7.3 Inert Atmosphere: Must be protected by a dry nitrogen (dew point -40°C. or lower) atmosphere.
7.4 Venting: Not listed
7.5 IMO Pollution Category: Currently not available
7.6 Ship Type: Currently not available
7.7 Barge Hull Type: Currently not available

8. HAZARD CLASSIFICATIONS

8.1 49 CFR Category: Poison
8.2 49 CFR Class: 6.1
8.3 49 CFR Package Group: I
8.4 Marine Pollutant: No
8.5 NFPA Hazard Classification: Not listed
8.6 EPA Reportable Quantity: 10 pounds
8.7 EPA Pollution Category: A
8.8 RCRA Waste Number: P064
8.9 EPA FWPCA List: Not listed

9. PHYSICAL & CHEMICAL PROPERTIES

9.1 Physical State at 15° C and 1 atm: Liquid
9.2 Molecular Weight: 57.05
9.3 Boiling Point at 1 atm: 102.4°F. = 39.1°C. = 312.3°K
9.4 Freezing Point: <-112°F. = <-80°C. = <193°K.
9.5 Critical Temperature: 424°F. = 218°C. = 491°K.
9.6 Critical Pressure: 808 psia = 55 atm = 5.6 MN/m^2
9.7 Specific Gravity: 0.9599 at 20°C. (liquid)
9.8 Liquid Surface Tension: Currently not available
9.9 Liquid Water Interfacial Tension: Currently not available
9.10 Vapor (Gas) Specific Gravity: 2.0
9.11 Ratio of Specific Heats of Vapor (Gas): Currently not available
9.12 Latent Heat of Vaporization: 223 Btu/lb = 124 cal/g = 5.19 X 10^5 J/kg
9.13 Heat of Combustion: 8,041 Btu/lb = 4,467 cal/g = 1.87 X 10^7 J/kg
9.14 Heat of Decomposition: Not pertinent
9.15 Heat of Solution: Not pertinent
9.16 Heat of Polymerization: -540 Btu/lb = -300 cal/g = -12.56 X 10^5 J/kg
9.17 Heat of Fusion: Currently not available
9.18 Limiting Value: Currently not available
9.19 Reid Vapor Pressure: Currently not available

NOTES

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9.20 SATURATED LIQUID DENSITY		9.21 LIQUID HEAT CAPACITY		9.22 LIQUID THERMAL CONDUCTIVITY		9.23 LIQUID VISCOSITY	
Temperature (degrees F)	Pounds per cubic foot	Temperature (degrees F)	British thermal unit per pound-F	Temperature (degrees F)	British thermal unit inch per hour-square foot-F	Temperature (degrees F)	Centipoise
68	59.800		CURRENTLY NOT AVAILABLE		CURRENTLY NOT AVAILABLE		CURRENTLY NOT AVAILABLE

9.24 SOLUBILITY IN WATER		9.25 SATURATED VAPOR PRESSURE		9.26 SATURATED VAPOR DENSITY		9.27 IDEAL GAS HEAT CAPACITY	
Temperature (degrees F)	Pounds per 100 pounds of water	Temperature (degrees F)	Pounds per square inch	Temperature (degrees F)	Pounds per cubic foot	Temperature (degrees F)	British thermal unit per pound-F
	REACTS SLOWLY	68	6.730	68	0.06800		CURRENTLY NOT AVAILABLE