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Rec'd. Dec. '88

# MATERIAL SAFETY DATA SHEET

Emergency Response (414) 284-7518  
 Transportation CHEMTREC (800) 424-9300  
 Product Information (414) 284-5541

Issue Date: December 1988  
 Supersedes: February 1987

030-2416

## SECTION 1 - PRODUCT IDENTITY

Product Name: Chempol® 030-2416  
 Product Identification: Polymethylene Polyphenylisocyanate  
 DOT Shipping Name: Chemicals  
 DOT Hazard Class: N.O.I., (Isocyanates)  
 DOT ID NUMBER: None  
 Reportable Quantity: Not Applicable

## SECTION 2 - INGREDIENTS

Principal Components	CAS Number	Wt. %	TLV
Polymethylene Polyphenylisocyanate (CAS# 9016-87-9)		Approx. 50	*NE
4,4'-Diphenylmethane Diisocyanate (MDI) (CAS# 26447-40-5)		Approx. 50	0.02 ppm

## SECTION 3 - PHYSICAL DATA

Boiling Point (@ 5mmHg): 406°F (208°C)  
 Vapor Pressure (mm/Hg): <math>10^{-5}</math> @ 77°F  
 Vapor Density (air=1): 8.5  
 Solubility in Water: Reacts with water.  
 Appearance and odor: Dark brown viscous liquid; slightly musty odor.

Specific Gravity (H<sub>2</sub>O=1): 1.23  
 Volatile: Negligible  
 Evaporation Rate: N/A  
 (Butyl Acetate = 1)

## SECTION 4 - FIRE PROTECTION

Flashpoint: 415°F  
 Method: C.O.C.

Flammable Limits (Vol. % in air)	Lower	Upper
	N/A	N/A

Extinguishing Media:  
 Dry chemical (e.g. monoammonium phosphate, potassium sulfate, and potassium chloride), carbon dioxide, high expansion (proteinic) chemical foam, water spray for large fires.

#### SECTION 4 - FIRE PROTECTION - CONTINUED

**Special Fire Fighting Procedures/Unusual Fire or Explosion Hazards:**  
Full emergency equipment with self-contained breathing apparatus and full protective clothing should be worn by firefighters. During a fire, MDI vapors and other irritating, highly toxic gases may be generated by thermal decomposition or combustion. (See Section 6). At temperatures greater than 400°F (204°C), polymeric MDI can polymerize and decompose which can cause pressure build-up in closed containers. Explosive rupture is possible. Therefore, use cold water to cool fire-exposed containers.

#### SECTION 5 - HEALTH HAZARD DATA

HMIS ratings	Health:	2
	Flammability:	1
	Reactivity:	1

**PRIMARY ROUTES OF ENTRY:** Skin Contact from liquid and aerosols (spray application). Inhalation. Although MDI is low in volatility, an inhalation hazard can exist from MDI aerosols or vapors formed during heating, foaming or spraying.

#### **EFFECTS OF OVEREXPOSURE:**

##### **INHALATION:**

Acute Exposure. MDI vapors or mist at concentrations above the TLV can irritate (burning sensation) the mucous membranes in the respiratory tract (nose, throat, lungs) causing runny nose, sore throat, coughing, chest discomfort, shortness of breath and reduced lung function (breathing obstruction). Persons with a preexisting, nonspecific bronchial hyperreactivity can respond to concentrations below the TLV with similar symptoms as well as asthma attack. Exposure well above the TLV may lead to bronchitis, bronchial spasm and pulmonary edema (fluid in lungs). These effects are usually reversible. Chemical or hypersensitive pneumonitis, with flu-like symptoms (e.g., fever, chills) has also been reported. These symptoms can be delayed up to several hours after exposure.

Chronic Exposure. As a result of previous repeated overexposures or a single large dose, certain individuals develop isocyanate sensitization (chemical asthma) which will cause them to react to a later exposure to isocyanate at levels well below the TLV. These symptoms, which can include chest tightness, wheezing, cough, shortness of breath or asthma attack, could be immediate or delayed (up to several hours after exposure). Similar to many non-specific asthmatic responses, there are reports that once sensitized an individual can experience these symptoms upon exposure to dust, cold air or other irritants. This increased lung sensitivity can persist for weeks and in severe cases for several years. Overexposure to isocyanates has also been reported to cause lung damage (including decrease in lung function) which may be permanent. Sensitization can either be temporary or permanent.

SECTION 5 - HEALTH HAZARD DATA - CONTINUED

**SKIN CONTACT:**

Acute Exposure. Isocyanates react with skin protean and moisture and can cause irritation which may include the following symptoms: reddening, swelling, rash, scaling or blistering. Cured material is difficult to remove.

Chronic Exposure. Prolonged contact can cause reddening, swelling, rash, scaling, blistering, and in some cases, skin sensitization. Individuals who have developed a skin sensitization can develop these symptoms as a result of contact with very small amounts of liquid material or as a result of exposure to vapor.

**EYE CONTACT:**

Acute Exposure. Liquid, aerosols or vapors are irritating and can cause tearing, reddening and swelling. If left untreated, corneal damage can occur and injury is slow to heal. However, damage is usually reversible. See "Emergency and First Aid Procedures" section for treatment.

Chronic Exposure. None Found

**INGESTION:**

Acute Exposure. Can result in irritation and corrosive action in the mouth, stomach tissue and digestive tract. Symptoms can include sore throat, abdominal pain, nausea, vomiting and diarrhea.

Chronic Exposure. None Found

**MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE:**

Asthma, other respiratory disorders (bronchitis, emphysema, bronchial hyperreactivity), skin allergies, eczema.

**CARCINOGENICITY:**

Neither MDI or polymeric MDI are listed by the NTP, IARC or regulated by OSHA as carcinogens.

**EXPOSURE LIMITS:**

OSHA PEL: 0.02 ppm Ceiling (MDI)  
ACGIH TLV: 0.02 ppm Ceiling.

**Emergency and First Aid Procedures:**

**Skin contact:** This compound is a known skin sensitizer. Treat symptomatically as for contact dermatitis for thermal burns. If burned, treat as thermal burn.

**Eye contact:** Stain for evidence of corneal injury. If cornea is burned, instill antibiotic steroid preparation frequently. Workplace vapors have produced reversible corneal epithelial edema impairing vision.

**Ingestion:** Treat symptomatically. There is no specific antidote. Inducing vomiting is contraindicated because of the irritating nature of this compound.

SECTION 5 - HEALTH HAZARD DATA - CONTINUED

Emergency and First Aid Procedures - Continued:

**Inhalation:** This compound is a known pulmonary sensitizer. Treatment is essentially symptomatic. An individual having a skin or pulmonary sensitization reaction to this material should be removed from exposure to any isocyanate.

SECTION 6 - REACTIVITY DATA

**Stability:** Unstable \_\_\_\_\_ Stable X

**Conditions to Avoid:**  
Reacts slowly with water under 50°C, heat accelerates reaction.

**Incompatibility (Materials to Avoid):** Water, amines, strong bases, alcohols. Will cause some corrosion to copper alloys and aluminum.

**Hazardous Decomposition Products:**  
By high heat and fire: carbon monoxide, oxides of nitrogen, traces of HCN, MDI vapors or aerosols.

**Hazardous Polymerization:** May Occur X Will Not Occur \_\_\_\_\_

**Conditions to Avoid:**  
Contact with moisture or other materials which react with isocyanates. May occur at temperatures over 400°F (204°C). See Section .

SECTION 7 - SPILL OR LEAK PROCEDURES

**Steps to be taken in case material is released or spilled :**  
Evacuate and ventilate spill area; dike spill to prevent entry into water system; wear full protective equipment, including respiratory equipment during clean-up. (See Section 8).  
**Major Spill:** Call Freeman at 414/284-7518. If transportation spill, call CHEMTREC 800/424-9300. If temporary control of isocyanate vapor is required, a blanket of protein foam (available at most fire departments) may be placed over the spill. Large quantities may be pumped into closed, but not sealed, container for disposal.  
**Minor Spill:** Absorb isocyanates with sawdust or other absorbent, shovel into suitable unsealed containers, transport to well-ventilated area (outside) and treat with neutralizing solution: mixture of water (90%) with concentrated ammonia solution (8%) and liquid detergent (2%). Add about 10 parts of neutralizer per part of isocyanate, with mixing. Allow to stand uncovered for 48 hours to let CO<sub>2</sub> escape.  
**Clean-Up:** Decontaminate floor with neutralizing solution letting stand for at least 15 minutes.

## SECTION 7 - SPILL OR LEAK PROCEDURES - CONTINUED

### Waste Disposal Method:

Waste must be disposed of in accordance with federal, state, and local environmental control regulations. Incineration is the preferred method. Empty containers must be handled with care due to product residue. Decontaminate containers prior to disposal. Empty decontaminated containers should be crushed to prevent reuse. **DO NOT HEAT OR CUT EMPTY CONTAINERS WITH ELECTRIC OR GAS TORCH.** (See Sections 4 and 6) Vapors and gases may be highly toxic.

### RCRA Status:

MDI is not listed as a hazardous waste. To the best of our knowledge, MDI does not meet the criteria of a hazardous waste if discarded in its purchased form. However, under RCRA, it is the responsibility of the user of products to determine, at the time of disposal, whether a product meets any of the criteria for a hazardous waste. This is because product uses, transformations, mixtures, processes, etc., may render the resulting material hazardous, under the criteria of ignitability, corrosivity, reactivity and EP toxicity (40 Code of Federal Regulations 261.20-24).

## SECTION 8 - SPECIAL PROTECTION INFORMATION

### Respiratory protection (specific type):

An air-supplied respirator must be worn during spray applications, during long-term (over 1 hour) exposures, when the product is heated or in environments of high concentrations well above the TLV of 0.02 ppm. For short-term (less than 1 hour) emergency situations at concentrations near the TLV, an air-purifying respirator equipped with organic cartridges or canisters and dust filters can be used. However, due to the poor warning properties of MDI, proper fit and timely replacement of filter elements must be ensured. Observe OSHA regulations for respirator use (29 CFR 1910.134).

### Ventilation:

Local exhaust should be used to maintain levels below the TLV whenever MDI is processed, heated or spray applied. For spray applications, an air-supplied respirator must be worn. Standard reference sources regarding industrial ventilation (i.e., ACGIH Industrial Ventilation) should be consulted for guidance about adequate ventilation.

### Monitoring:

MDI exposure levels must be monitored by accepted monitoring techniques to ensure that the TLV is not exceeded. See Volume 1 (Chapter 17) and Volume 3 (Chapter 3) in Patty's Industrial Hygiene and Toxicology for sampling strategy.

SECTION 8 - SPECIAL PROTECTION INFORMATION - CONTINUED

**Hand Protection:**

Chemical resistant gloves (butyl rubber, nitrile rubber, polyvinyl alcohol). However, please note that PVA degrades in water. Cover as much of the exposed skin area as possible with appropriate clothing. If skin creams are used, keep the area covered by the cream to a minimum.

**Eye Protection:**

Liquid chemical goggles or full-face shield. Contact lenses should not be worn.

**Medical Surveillance:**

Medical supervision of all employees who handle or come in contact with polymeric MDI is recommended. These should include preemployment and periodic medical examinations with respiratory function tests (FEV<sub>1</sub>, FVC as a minimum). Persons with asthmatic-type conditions, chronic bronchitis, other chronic respiratory diseases or recurrent skin eczema or sensitization should be excluded from working with MDI. Once a person is diagnosed as sensitized to MDI, no further exposure can be permitted.

**Other Protective Equipment:**

Safety showers and eyewash stations should be available. Educate and train employees in safe use of product. Follow all label instructions. For additional information, see Freeman Chemical Corporation's Bulletin #1000 U 6/88 "Isocyanates - Handling and Safety Information."

SECTION 9 - SPECIAL PRECAUTIONS & STORAGE DATA

Storage Temperature (Min./Max.): 64°F (18°C)/86°F (30°C)

Average Shelf Life: 6 months

**Special Sensitivity (Heat, Light, Moisture):**

If container is exposed to high heat, 400°F (204°C) it can be pressurized and possibly rupture. MDI reacts slowly with water to form CO<sub>2</sub> gas. This gas can cause sealed containers to expand and possibly rupture.

**Precaution to be taken in handling and storing:**

Store in tightly closed containers to prevent moisture contamination. Do not reseal if contamination is suspected. Avoid contact with skin and eyes. Do not breathe aerosols or vapors. Warning properties (irritation of the eyes, nose and throat or odors) are not adequate to prevent chronic overexposure from inhalation. This material can produce asthmatic sensitization upon either single inhalation exposure to a relatively high concentration or upon repeated inhalation exposures to lower concentrations. Exposure to vapors of heated MDI can be extremely dangerous. Employee education and training in the safe use and handling of this compound are required under the OSHA Hazard Communication Standard.

SECTION 10 - ANIMAL TOXICITY DATA

ACUTE TOXICITY

Oral, LD50: >15,800 mg/kg (rats)  
Dermal, LD50: >7,900 mg/kg (rabbits)  
Inhalation, LC50: Approximately 370-490 mg/m<sup>3</sup> for an aerosol of polymeric MDI (rat). An LC<sub>50</sub> (2 hr) of > 400 mg/m<sup>3</sup> was determined on a dust of monomeric MDI (rat).

Eye Effects: Slightly irritating. A maximum primary eye irritant score for a polymeric MDI of 12.0/110 (24 hr) was obtained. This score is fairly typical for a number of MDI products.

Skin Effects: Slight to moderate irritant. Primary dermal irritation scores are typically below 3.4/8.0 (Draize).

Sensitization: Has been shown to produce dermal sensitization in guinea pigs, rabbits and dogs. Although not well defined in experimental animals models, MDI is known to induce pulmonary and dermal sensitization in humans. In addition, there is some evidence to suggest that cross-sensitization between different types of diisocyanates may occur.

Subchronic/Chronic Toxicity:  
Pulmonary irritation and inflammation of the upper respiratory tract are the primary ill-effects following extended exposures to aerosols or vapors of MDI, both polymeric and monomeric forms. A 90-day inhalation study in rats of a polymeric MDI (50% monomeric MDI) delivered as an aerosol (6 hr/dy, 5 dy/wk) induced moderate to severe hyperplastic/inflammatory lesions of the nasal cavity and lungs at exposures of 8 mg/m<sup>3</sup> and greater. These effects were minimal at 4 mg/m<sup>3</sup>. The NOEL is around 2-3 mg/m<sup>3</sup>.

Other  
Carcinogenicity: The International Isocyanate Institute is sponsoring a lifetime inhalation study on polymeric MDI in rats. This study is currently underway.  
Mutagenicity: Monomeric MDI is positive in the Ames assay (with hepatic microsomal activation). However, it was negative in an in vivo-in vitro micronucleus assay.

Aquatic Toxicity: LC<sub>50</sub> - 24 hr (static): Greater than 500 mg/liter for Daphnia magna, Limnea stagnalis, and Zebra fish (Brachydanio rerio) for both polymeric and monomeric MDI.

SECTION 11 - REGULATORY INFORMATION

TSCA STATUS:  On TSCA Inventory  Not on TSCA Inventory

Reason for issue: Update format.

Approved: Gerald L. Schwebke Date: 12-12-88  
Gerald L. Schwebke, PhD  
Regulatory Affairs

EF: 133:200/26:128/775-F