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IV. FIRE & EXPLOSION DATA

FLASH POINT OF °C.....: Decomposes @ 500°F (260°C) Pensky-Martens Closed Cup

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.

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 fire fighters. During a fire, MDI vapors and other irritating, highly toxic gases may be generated by thermal decomposition of combustion. (See Section VIII). 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.

V. HUMAN HEALTH DATA

PRIMARY ROUTE 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.

HUMAN EFFECTS AND SYMPTOMS OF OVEREXPOSURE - Data has not been established for this product. Data is listed for MDI.

INHALATION:

Acute Exposure. MDI vapors or mist at concentrations above 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.

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SKIN CONTACT:

Acute Exposure: Isocyanates react with skin protein 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 Section VI for treatment.

CHRONIC EXPOSURE:

Chronic Exposure: None Found

Ingestion: None Found

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:MEDICAL CONDITIONS

AGGRAVATED BY EXPOSURE: Asthma, other respiratory disorders (bronchitis, emphysema, bronchial hyperreactivity), skin allergies, eczema.

CARCINOGENICITY: Neither MDI nor polymeric MDI are listed by the NTP, IARC, or regulated by OSHA as carcinogens.

EXPOSURE LIMITS: Exposure limits have not been established for this product. Use the exposure limited listed in Section II of the MSDS and below for MDI.

OSHA PEL: 0.02 ppm (0.2 MG/m³) Ceiling (MDI)

ACGIH TLV: 0.005 ppm (0.055 mg/m³) Time Weighted Average (MDI)

VI. EMERGENCY & FIRST AID PROCEDURES

EYE CONTACT: Flush with copious amount of water, preferably lukewarm water for at least 15 minutes, holding eyelids open at the time. Refer individual to physician or ophthalmologist for immediate follow-up.

SKIN CONTACT: Remove contaminated clothing. Wash affected skin thoroughly with soap and water. Wash contaminated clothing thoroughly before reuse. For severe exposures get under safety shower after removing clothing, then get medical attention. For lesser exposures, seek medical attention if irritation develops or persists after exposure is washed.

INHALATION: Administer oxygen to an area free from risk of further exposure. Administer artificial respiration as needed. Obtain medical attention. Asthmatic-type symptoms may develop and may be immediate or delayed up to several hours. Consult physician should this occur.

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V. HUMAN HEALTH DATA - Continued

INGESTION.....: DO NOT INDUCE VOMITING. Give 1 to 2 cups of milk or water to drink. DO NOT GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON. Consult physician.

NOTE TO PHYSICIAN.....: Eyes. Stain for evidence for corneal injury. If cornea is burned, instill antibiotic steroid preparation frequently. Workplace vapors have produced reversible corneal epithelial edema impairing vision. Skin. This compound is a known skin sensitizer. Treat symptomatically as for contact dermatitis or thermal burns. If burned, treat as thermal burn. Ingestion. Treat symptomatically. There is no specific antidote. Inducing vomiting is contraindicated because of the irritating nature of this compound. Respiratory. 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.

VII. EMPLOYEE PROTECTION RECOMMENDATIONS

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

SKIN 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.

RESPIRATORY PROTECTION.: Concentrations greater than the TLV can occur when MDI is sprayed, heated or used in a poorly ventilated area. In such cases, or whenever concentrations of MDI exceed the TLV, respiratory protection must be worn. A supplied-air respirator or a self-contained breathing apparatus is recommended. In situations where MDI is not sprayed or heated and a supplied-air or self-contained apparatus is unavailable or its use impractical, at least an air purifying respirator equipped with a particulate filter must be worn. HOWEVER, THIS SHOULD BE PERMITTED ONLY FOR SHORT PERIODS OF TIME (LESS THAN ONE HOUR) AT RELATIVELY LOW CONCENTRATIONS (AT OR NEAR THE TLV). 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 (ie., 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. For guidance-See Volume 1 (Chapter 17) and Volume 3 (Chapter 3) in Patty's Industrial Hygiene and Toxicology for sampling strategy.

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VII. EMPLOYEE PROTECTION RECOMMENDATIONS - Continued

MEDICAL SURVEILLANCE...: Medical supervision of all employees who handle or come in contact with polymeric MDI is recommended. These should include pre-employment and periodic medical examinations with respiratory function tests (FEV₁, P₅₀ 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...: Educate and train employees in safe use of product. Follow all available instructions.

VIII. REACTIVITY DATA

STABILITY...: Stable under normal conditions.

POLYMERIZATION...: May occur if in contact with moisture or other materials which react with isocyanates. May occur at temperatures over 4000F (2040C). See Section IV.

INCOMPATIBILITY...: Water, amines, strong bases, alcohols. Will cause some corrosion to copper alloys and aluminum.

HAZARDOUS DECOMPOSITION...: By high heat and fire: carbon monoxide, oxides of nitrogen, traces of HCN, MDI vapors or aerosols.

IX. 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 VI)

Major Spill: 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 sealed containers, transport to well-ventilated area (outside) and treat with neutralizing solution: mixture of water (80%) with non-ionic surfactant wetting agent TMN-10 (20%) or: water (90%) with ammonia (3-5%) and detergent (2%). Add about 10 parts of neutralizer per part of isocyanate, with mixing. Allow to stand uncovered for 48 hours to let CO₂ escape.

Clean-up: Decontaminate floor with decontamination solution letting stand for at least 15 minutes.

CERCLA (SUPERFUND) REPORTABLE QUANTITY: None Reported

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IX. 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 or decontaminated containers should be crushed to prevent reuse. **DO NOT HEAT OR CUT EMPTY CONTAINER WITH ELECTRIC OR GAS TORCH.** (See Sections IV and VIII). 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, transfer formations, 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).

SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA), TITLE III:
 Section 302 - Extremely Hazardous Substances: None
 Section 313 - Toxic Chemicals: 4,4'-Diphenylmethane Diisocyanate
 (CAS# 101-68-8) - 14-15%

X. SPECIAL PRECAUTIONS & STORAGE DATA

STORAGE TEMPERATURE
 (MIN./MAX.): Ambient/90°F (32°C)

AVERAGE SHELF LIFE: 2 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 CO₂ gas. This gas can cause sealed containers to expand and possibly rupture.

PRECAUTIONS TO BE TAKEN
IN HANDLING & STORAGE: Store in tightly closed containers to prevent moisture contamination. Do not reseat 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 odor) 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 exposure 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.

XI. SHIPPING DATA

D.O.T. SHIPPING NAME: None
 TECHNICAL SHIPPING NAME: Modified Diphenylmethane Diisocyanate (MDI)
 UN/NA NO. HAZARD CLASS: None
 PRODUCT REPORTABLE QTY: None
 D.O.T. LABELS REQUIRED: None
 D.O.T. PLACARDS: None
 FREIGHT CLASS BULK: None
 FREIGHT CLASS PKG: Chemicals, NOI (Isocyanate), NMFC 60000
 PRODUCT LABEL: OZ-22 Product Label

XII. ANIMAL TOXICITY DATA

ACUTE TOXICITY - Data has not been established for this product. Data listed is for MDI.

ORAL LD50: Greater than 15,800 mg/kg (Rats)
 DERMAL LD50: Greater than 7,900 mg/kg (Rabbits)
 INHALATION, LC50: Approximately 570-490 mg/m³ for an aerosol of polymer MDI (Rat) > An LC50 of greater than 400 mg/m³ was determined on a dust of monomeric MDI (Rat). A maximum primary eye irritation score for a polymer MDI of 12.0/110 (24 hr) was obtained. This score is fairly typical for a number of MDI products.
 SKIN EFFECTS: Slightly irritating. 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 exposure to aerosols 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/day, 5 day/wk) induced moderate to severe degenerative inflammation of the nasal cavity and lungs at hexaplasia of 2 mg/m³ and greater. These effects were minimal at the NOEL is around 2-3 mg/m³. The NOEL is around 2-3 mg/m³.

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XII. ANIMAL TOXICITY DATA - Continued

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 Ames assay (with hepatic microsomal activation). However, it was negative in an in vivo-vitro micronucleus assay.

AQUATIC TOXICITY.....: LC₅₀ - 24 hr (static): Greater than 500 mg/liter for *Daphnia magna*, *Limnea stagnalis*, and Zebra fish (*Brachydanio rerio*) for both polymeric and monomeric MDI.

XXI. APPROVALS.

PREPARED BY: STEVE LONGACRE

APPROVED BY: WALTER SMITH

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