



MATERIAL SAFETY DATA SHEET

MILES INC.
POLYMERS DIVISION
Mobay Road
Pittsburgh, PA 15205-9741

TRANSPORTATION EMERGENCY
CALL CHEMTREC: 800-424-9300
DISTRICT OF COLUMBIA: 202-483-7616

NON-TRANSPORTATION
MILES EMERGENCY PHONE...: (412) 923-1800
MILES INFORMATION PHONE.: (800) 662-2927

I. PRODUCT IDENTIFICATION:

PRODUCT NAME.....: Baytec MS-080
PRODUCT CODE.....: C-518
CHEMICAL FAMILY.....: Aromatic Isocyanate Prepolymer
CHEMICAL NAME.....: Diphenylmethane Diisocyanate (MDI) Polyester Prepolymer
SYNONYMS.....: Modified Diphenylmethane Diisocyanate (MDI)
CAS NUMBER.....: 26375-23-5
FORMULA.....: Not Applicable

II. HAZARDOUS INGREDIENTS:

INGREDIENT NAME /CAS NUMBER	EXPOSURE LIMITS	CONCENTRATION (%)
4,4'-Diphenylmethane Diisocyanate 101-68-8	OSHA : .020 ppm Ceiling .200 mg/m3 Ceiling ACGIH: .005 ppm TWA .051 mg/m3 TWA	Upper bound 10%
Diphenylmethane Diisocyanate (2,2; 2,4) 26447-40-5	OSHA : Not Established ACGIH: Not Established	Upper bound 10%

III. PHYSICAL PROPERTIES:

PHYSICAL FORM.....: Solid
COLOR.....: Pale yellow when in liquid state
ODOR.....: Slightly musty odor
pH: Not Applicable
BOILING POINT.....: Not Established
MELTING/FREEZING POINT....: Not Established
SOLUBILITY IN WATER: Not Soluble. Reacts slowly with water to liberate CO2 gas.

III. PHYSICAL PROPERTIES (Continued)

SPECIFIC GRAVITY: 1.20 @ 77 F (25 C)
BULK DENSITY.....: 10.01 lbs/gal
% VOLATILE BY VOLUME.....: Negligible
VAPOR PRESSURE: Less than 10-5 mm Hg at 77 F (25 C) for MDI
VAPOR DENSITY: 8.5 (MDI) (Air = 1)

IV. FIRE AND EXPLOSION DATA:

FLASH POINT.....: 435.0 F (223.8 C) Pensky-Martens Closed Cup
(ASTM D-93)
EXTINGUISHING MEDIA.....: Dry Chemical; Carbon Dioxide; Foam; Water
spray for large fires.
SPECIAL FIRE FIGHTING PROCEDURES: 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 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:

ROUTE(S) 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 listed below is for MDI.

ACUTE INHALATION.....: 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 INHALATION.....: 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

V. HUMAN HEALTH DATA (Continued)

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.

CUTE SKIN CONTACT.....: 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 SKIN CONTACT.....: Prolonged contact can cause reddening, swelling, rash, scaling, blistering, and in some cases, skin sensitization. Individuals who have skin sensitization can develop these symptoms from contact with liquid or vapors. Animal tests have indicated that respiratory sensitization can result from skin contact with MDI. This data reinforces the need to prevent direct skin contact with MDI. (See Section XII Animal Toxicity Data, SENSITIZATION.)

ACUTE EYE CONTACT.....: 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 EYE CONTACT.....: None Found

ACUTE INGESTION.....: 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 INGESTION.....: None Found

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

NTP.....: Not listed

IARC.....: Not listed

OSHA.....: Not regulated

OTHER.....: See results of two year inhalation study in Section XII Animal Toxicity Data, CARCINOGENICITY.

MEDICAL CONDITIONS

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

EXPOSURE LIMITS.....: Exposure limits have not been established for this product. Use the exposure limits in Section II of the MSDS for MDI: OSHA PEL: 0.02 ppm Ceiling (MDI). ACGIH TLV: 0.005 ppm (0.051 mg/m³) Time Weighted Average (TWA).

VI. EMERGENCY AND FIRST AID PROCEDURES:

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

FIRST AID FOR SKIN.....: 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 the area is washed.

FIRST AID FOR INHALATION: Move to an area free from risk of further exposure. Administer oxygen or 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.

FIRST AID FOR 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 of 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 REQUIREMENTS.....: Liquid chemical goggles. Vapor resistant goggles should be worn when contact lenses are in use. In a splash hazard environment chemical goggles should be used in combination with a full face-shield.

SKIN PROTECTION REQUIREMENTS.....: Permeation 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.

RESPIRATOR REQUIREMENTS.....: 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 or are not known, respiratory protection must be worn. A supplied air respirator (either positive pressure or continuous flow type) is required. In an emergency situation, a self-contained breathing apparatus may be used. MDI

VII. EMPLOYEE PROTECTION (Continued)

has poor warning properties, since the concentration at which MDI can be smelled is substantially higher than the maximum exposure limit. Observe OSHA regulations for respirator use (29 CFR 1910.134).

VENTILATION REQUIREMENTS.....: Local exhaust should be used to maintain levels below the TLV whenever MDI is processed, heated or spray applied. Standard reference sources regarding industrial ventilation (ie., ACGIH Industrial Ventilation) should be consulted for guidance about adequate ventilation.

MONITORING.....: Isocyanate exposure levels must be monitored. Monitoring of airborne isocyanates in the breathing zone of individuals should become part of the overall employee exposure characterization program. Monitoring techniques have been developed by NIOSH, and OSHA. Upon request, Miles Inc. can make available methods which are modifications of these NIOSH and OSHA methods.

MEDICAL SURVEILLANCE.....: Medical supervision of all employees who handle or come in contact with isocyanates is recommended. These should include preemployment and periodic medical examinations with pulmonary function tests (FEV₁, 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 isocyanates. Once a person is diagnosed as sensitized to an isocyanate, no further exposure can be permitted.

ADDITIONAL PROTECTIVE MEASURES.....: Safety showers and eyewash stations should be available. Educate and train employees in safe use of product. Follow all label instructions. For additional information, contact Miles Product Safety Department for Polymers.

VIII. REACTIVITY DATA:

STABILITY.....: This is a stable material.

HAZARDOUS POLYMERIZATION....: May occur; Contact with moisture, other materials which react with isocyanates, or temperatures above 400 F (204 C), may cause polymerization.

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

INSTABILITY CONDITIONS.....: Contamination with water.

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

IX. SPILL AND LEAK PROCEDURES:

SPILL OR LEAK PROCEDURES.....: 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 VII). Major Spill: Call Miles Inc. at 412/923-1800. If transportation spill, call CHEMTREC

IX. SPILL AND LEAK PROCEDURES (Continued)

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 (80%) with non-ionic surfactant Tergitol TMN-10 (20%), or; water (90%), concentrated ammonia (3-8%) 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.

WASTE DISPOSAL METHOD.....: Waste must be disposed of in accordance with federal, state, and local environmental control regulations. Incineration is the preferred method.

EMPTY CONTAINER PRECAUTIONS.: 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 CONTAINER WITH ELECTRIC OR GAS TORCH. (See Sections IV and VIII). Gases may be highly toxic.

TRANSPORTATION EMERGENCIES..: MILES requires that CHEMTREC be immediately notified (800-424-9300) when this product is unintentionally released from its container during its course of distribution, regardless of the amount released. Distribution includes transportation, storage incidental to transportation, loading and unloading. Such notification must be immediate and made by the person having knowledge of the release.

4. SPECIAL PRECAUTIONS & STORAGE DATA:

STORAGE TEMPERATURE(MIN/MAX): Ambient/120 F (49 C)

SHELF LIFE.....: 6 months

SPECIAL SENSITIVITY.....: 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.

HANDLING/STORAGE PRECAUTIONS: 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 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 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.

SHIPPING INFORMATION:

TECHNICAL SHIPPING NAME.....: Diphenylmethane Diisocyanate (MDI) Polyester
Prepolymer
HAZARD CLASS BULK.....: Chemicals, NOI (Isocyanate)
HAZARD CLASS PACKAGE.....: Chemicals, NOI (Isocyanate), NMFC 60000
PRODUCT LABEL.....: Product Label Established

DOT (HM-181) (DOMESTIC SURFACE)

PROPER SHIPPING NAME.....: Diphenylmethane-4,4'-Diisocyanate Mixture
HAZARD CLASS OR DIVISION: 6.1
N/NA NUMBER.....: UN2489
PACKAGING GROUP: PG III
NET PRODUCT WT lbs (kgs).....: None
HAZARD LABEL(s).....: Keep Away From Food
HAZARD PLACARD(s).....: Keep Away From Food

IMO / IMDG CODE (OCEAN)

PROPER SHIPPING NAME.....: Diphenylmethane-4,4'-Diisocyanate
HAZARD CLASS DIVISION NUMBER...: 6.1
UN NUMBER.....: UN2489
PACKAGING GROUP.....: III
HAZARD LABEL(s).....: Keep Away From Food
HAZARD PLACARD(s).....: Keep Away From Food

ICAO / IATA (AIR)

PROPER SHIPPING NAME.....: Diphenylmethane-4,4'-Diisocyanate
HAZARD CLASS DIVISION NUMBER...: 6.1
UN NUMBER.....: UN2489
SUBSIDIARY RISK.....: None
PACKING GROUP.....: III
HAZARD LABEL(s).....: Keep Away From Food
RADIOACTIVE?.....: Non-Radioactive
PASSENGER AIR - MAX. QTY.: 60 Liters
PASSENGER INSTRUCTION NUMBER...: 611
CARGO AIR - MAX. QTY.: 220 Liters
CARGO AIR INSTRUCTION NUMBER...: 618

XII. ANIMAL TOXICITY DATA:

TOXICITY DATA FOR: Diphenylmethane Diisocyanate (Monomeric and Polymeric)
ACUTE TOXICITY

XII. ANIMAL TOXICITY DATA (Continued)

ORAL LD50.....: Greater than 15,800 mg/kg (Rats)
DERMAL LD50.....: Greater than 7,900 mg/kg (Rabbits)
INHALATION LC50....: Approximately 370-490 mg/m³ for an aerosol of polymeric MDI (Rat 4 Hr.). An LC50 (2 hr.) of greater than 400 mg/m³ was determined on a dust of monomeric MDI (Rat).

EYE EFFECTS.....: Slightly irritating. A maximum primary eye irritation 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.....: MDI has been shown to produce dermal sensitization in several species (guinea pigs, mice, rabbits and dogs). Intradermal or topical application followed by inhalation challenge have resulted in a respiratory sensitization response in guinea pigs. In addition, there is some evidence to suggest that cross-sensitization between different types of diisocyanates may occur.

CHRONIC TOXICITY.....: In a chronic inhalation exposure study, rats were exposed to an aerosol of polymeric MDI for 6 hours per day, 5 days per week for a period for two years. The exposure concentrations were 0, 0.2, 1.0 and 6.0 mg/m³. Microscopic examination of tissues revealed the effects of irritation to the nasal cavity and lungs in animals exposed to 1.0 and 6.0 mg/m³. The No Observable Effect Level (NOEL) was 0.2 mg/m³.

CARCINOGENICITY.....: In the same two year inhalation study described above (See CHRONIC TOXICITY), the occurrence of pulmonary adenomas (benign tumors) and a single pulmonary adenocarcinoma (malignant tumor) was considered to be related to the exposure. These tumors were observed only in rats exposed to the high concentration of 6.0 mg/m³.

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.....: 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.

XIII. FEDERAL REGULATORY INFORMATION:

OSHA STATUS.....: This product is hazardous under the criteria of the Federal OSHA Hazard Communication Standard 29 CFR 1910.1200.

TSCA STATUS.....: On TSCA Inventory

CERCLA REPORTABLE QUANTITY...: 1 lb for 4,4'-Diphenylmethane Diisocyanate, CAS# 101-68-8.

SARA TITLE III:

SECTION 302 EXTREMELY

HAZARDOUS SUBSTANCES...: None

XIII. FEDERAL REGULATORY INFORMATION (Continued)

SECTION 311/312

HAZARD CATEGORIES.....: Immediate Health Hazard; Delayed Health Hazard;
Reactive Hazard

SECTION 313

TOXIC CHEMICALS.....: 4,4'-Diphenylmethane Diisocyanate, CAS# 101-68-8;
Upper Bound 10%

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 toxicity characteristics under the new Toxicity Characteristics Leaching Procedure (TCLP) 40 Code of Federal Regulations 261.20-24.

XIV. OTHER REGULATORY INFORMATION:

The following chemicals are specifically listed by individual states; other product specific health and safety data in other sections of the MSDS may also be applicable for state requirements. For details on your regulatory requirements you should contact the appropriate agency in your state.

COMPONENT NAME

/CAS NUMBER	CONCENTRATION	STATE CODE
4,4'-Diphenylmethane Diisocyanate 101-68-8	Upper bound 10%	PA1, FL, IL, MA, RI, NJ1, NJ4, CN2
Diphenylmethane Diisocyanate (2,2; 2,4) 26447-40-5	Upper bound 10%	PA3, NJ4
Polyester Prepolymer 26375-23-5	Upper bound 95%	PA3, NJ4

- FL = Florida Substance List
- IL = Illinois Toxic Substances List
- MA = Massachusetts Hazardous Substance List
- NJ1 = New Jersey Hazardous Substance List
- NJ4 = New Jersey Other - included in 5 predominant ingredients > 1%
- PA1 = Pennsylvania Hazardous Substance List
- PA3 = Pennsylvania Non-hazardous present at 3% or greater.
- RI = Rhode Island List of Designated Substances
- CN2 = Canada WHMIS Ingredient Disclosure List over 0.1%.

