

Safety Data Sheet

Section 1: Product and Company Information

Trade Name:	VPC-ISO Isocyanate - ISO Component A
Chemical Name:	Diphenylmethane Diisocyanate (MDI)
Chemical Family:	Aromatic Isocyanate
Product Use:	Component of a Polyurethane System

1.2 Name, Address, and Telephone of the Responsible Party

Company, Manufacturer:	Victory Polymers Corp. 1700 Post Oak Boulevard 2 BLVD Place, Suite 600 Houston, TX 77056 U.S.A.
Telephone Number:	1-832-240-7222 / International: 001-832-240-7222
Email:	info@VictoryPolymers.com
Website:	www.VictoryPolymers.com

1.3 Emergency Telephone Number

For Hazardous Materials [or Dangerous Goods] Incident Spill, Leak, Fire, Exposure, or Accident, Call CHEMTREC Day or Night:	1-800-424-9300
Outside USA and Canada (collect calls accepted):	+1-703-527-3887 CCN838152

Section 2: Hazards Identification

Physical State	Liquid
Color	Brown
Odor	Slightly musty

2.2 Emergency Overview/Warning

OSHA/HCS Status	This material is classified hazardous under OSHA Hazard Communication Standard (29 CFR 1910.1200).
Physical/Chemical Hazards	Toxic vapors may be released during burning or thermal decomposition. Closed container may forcibly rupture under extreme heat or when contents have been contaminated with water. Use cold water spray to cool fire exposed containers to minimize the risk of rupture.
Human Health Hazard	Harmful by inhalation. Irritating to eyes, respiratory system and skin. May cause sensitization by inhalation and skin contact. This product is respiratory irritant and potential respiratory sensitizer: repeated inhalation of vapor or aerosol at levels above the occupational exposure limit could cause respiratory sensitization. A hyper-reactive response to even minimal concentrations of MDI may develop in sensitized persons. The onset of the respiratory symptoms may be delayed for several hours after exposure. Lung damage and respiratory sensitization may be permanent.



Section 3: Composition/Information on Ingredients

Ingredients	CAS#	%
Polymeric Diphenylmethane Diisocyanate (pMDI)	9016-87-9	50 - 60
4,4' Diphenylmethane Diisocyanate (MDI)	101-68-8	35 - 45
2,4' Diphenylmethane Diisocyanate (MDI)	5873-54-1	1 - 5

Section 4: First-Aid Measures

Eye Contact	Immediately flush eyes with running water for a minimum of 15 minutes. Use lukewarm water if possible. Hold eyelids open during flushing. Obtain medical attention immediately.
Skin Contact	In case of contact, immediately remove contaminated clothing and shoes. Immediately flush skin with soap and water. Use lukewarm water if possible. Wash contaminated clothing and shoes thoroughly before reuse. For severe exposures, immediately get under safety shower and start rinsing. If the irritation develops, obtain medical attention.
Inhalation	Move to an area free from further exposure. Obtain medical attention immediately. If breathing is difficult, qualified personnel should administer artificial respiration or oxygen. Asthmatic symptoms may develop and may be immediate or delayed up to several hours. Extreme asthmatic reactions can be life threatening.
Ingestion	DO NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If patient is conscious, wash out mouth with water. Get immediate medical attention.
Protection of First-Aiders	No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.
Notes to Physician	Eyes: Stain for evidence of corneal injury. If cornea is burned, instill antibiotic/steroid preparation as needed. Workplace vapors could produce reversible corneal epithelial edema impairing vision. Skin: this compound is a skin sensitizer. Treat symptomatically as for contact dermatitis or thermal burn. Ingestion: treat symptomatically. There is no specific antidote. Inducing vomiting is contraindicated because of the irritating nature of compound. Inhalation: treatment is essentially symptomatic. An individual having a dermal or pulmonary sensitization reaction to this material should be removed from further exposure to any diisocyanate. Following severe exposure, the patient should be kept under medical review for at least 48 hours.

Section 5: Firefighting Measures

Suitable Extinguishing Media	Dry chemical, carbon dioxide (CO ₂), foam, water spray for large fires.
Hazardous Products of Thermal Decomposition	Combustion products may include carbon monoxide, carbon dioxide, nitrogen oxides, hydrocarbons, and HCN.
Special Firefighting Procedures	Firefighter should be equipped with self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode to protect against potentially toxic and irritating fumes generated by thermal decomposition or combustion during a fire. They should wear appropriate protective equipment such as PVC boots, gloves, safety helmet, and protective clothing. Avoid contact with product. Exposure to heated diisocyanate can be extremely dangerous. Decontaminate equipment and clothing prior to reuse.
Unusual Fire/Explosion Hazards	A hazardous pressure buildup could result due to reaction with water producing CO ₂ gas if contaminated containers are resealed. Containers may burst if overheated. Use cold water spray to cool fire exposed containers to minimize the risk of rupture. Large fires can be extinguished with large volumes of water applied from a safe distance, since reaction between water and hot diisocyanate can be vigorous.

Section 6: Accidental Release Measures

Spill and Leak Procedures	Evacuate all non-emergency personnel. Isolate the area and prevent access. Eliminate all sources of ignition. Notify management. Use protective equipment. Control sources of the leak. Ventilate. Clean-up should be performed by trained personnel.
Methods for Cleaning-up	Environmental Precautions: Contain the spill to prevent spread into drains, sewers, water supplies, or soil. Major Spill or Leak: Released material may be pumped into closed, but not sealed metal containers for disposal. Process can generate heat. People dealing with major spillage should wear full protective clothing including respiratory protection. Use suitable protective equipment. Minor Spill or Leak: Cover spill area with sand, earth or any suitable absorbent material. Saturate absorbent material with neutralization solution and mix. Wait 15 minutes. Collect material in open-head metal containers. Repeat applications of decontamination solution, with scrubbing, followed by absorbent until the surface is decontaminated. Check for residual surface contamination. Swipe® test kits have been used for this purpose. Apply lid loosely and allow containers to vent for 72 hours to let carbon dioxide escape. Wash the spillage area with water. Test atmosphere for MDI vapor.
Neutralization Solutions	a mixture of 75% water, 20% non-ionic surfactant and 5% n-propanol a mixture of 80% water with 20% non-ionic surfactant a mixture of 90% water, 3-8% ammonium hydroxide or concentrated ammonia and 2% detergent

Section 7: Handling and Storage

Storage Temperature	50 - 100°F (10 - 38°C)
Storage Life	12 months
Handling	Do not breathe vapor, mists, or dusts. Avoid contact with skin and eyes. Use adequate ventilation to keep airborne isocyanate levels below the exposure limits. The efficiency of the ventilation system must be monitored regularly because of the possibility of blockage. When the product is sprayed, heated, or used in confined space, suitable respiratory protection equipment with positive air supply is required. Keep equipment clean. This material can produce asthmatic sensitization upon either single inhalation exposure to a relatively high concentration or upon repeated inhalation exposures to lower concentrations. Individuals with lung or breathing problems or prior allergic reactions to isocyanates must not be exposed to vapors and mist. Do not breathe smoke and gases created by overheating or burning this material. Decomposition products can be highly toxic and irritating. Keep stocks of decontaminant readily available. Employee education and training in the safe use and handling of this product are required under the OSHA Hazard Communication Standard 29 CFR 1910.1200.
Storage	Store in tightly closed containers to prevent moisture contamination. Due to reaction with water producing CO ₂ gas, a hazardous buildup of pressure could result if contaminated containers are resealed. Do not reseal container if contamination is suspected. Uncontaminated containers, free of moisture, may be resealed only after placing under a nitrogen blanket.
Packaging Containers	Suitable: steel, stainless steel. Unsuitable: copper, copper alloys, or galvanized surfaces.

Section 8: Exposure Control/Personal Protection

Ingredient Name	4,4' Diphenylmethane Diisocyanate
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8.2 Occupational Exposure Limits

US. ACGIH Threshold Limit Values: TWA: 0.005 ppm
US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000): Ceiling Limit Value: 0.02 ppm, 0.2 mg/m ³
US. NIOSH: Pocket Guide to Chemical Hazards: Recommended Exposure Limit REL/TWA: 0.005 ppm, 0.05 mg/m ³ (10 hours, 40 hrs/week)
Ceiling Limit Value and Time Period (if specified): 0.020 ppm, 0.2 mg/m ³ (10 min)

8.3 Environmental Controls

Occupational Exposure Controls	Provide exhaust ventilation or other engineering controls to keep the airborne vapors concentrations below their respective occupational exposure limits. Standard reference sources regarding industrial ventilation (e.g., ACGIH Industrial Ventilation Manual) should be used as a guide about adequate ventilation. To ensure that published exposure limits have not been exceeded, monitoring for airborne diisocyanate should become part of the overall employee exposure characterization program. NIOSH and OSHA have developed sampling and analytical methods and they are available upon request. MDI can only be smelled if the occupational exposure limit has been exceeded considerably.
Environmental Exposure Controls	Emissions from ventilation or work process equipment should be checked to ensure compliance with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters, or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

8.4 Personal Protective Equipment

Eye Protection	Eye protection is required when directly handling liquid product. Safety eye wear such as chemical safety goggles or 8" face shield should be used when there is a greater risk of liquid splash. Contact lenses should not be worn when working with this chemical.
Skin Protection	Avoid all contact with skin. Cover exposed skin area with appropriate clothing to prevent skin contact. Use chemical resistant gloves such as nitrile/butadiene rubber ("nitrile" or "NBR"), butyl rubber, polyvinyl chloride ("PVC" or "vinyl"), polychloroprene (neoprene). Protective gloves should be worn when handling freshly made polyurethane products to avoid contact with trace residual materials that may be hazardous in contact with skin. Wash hands, forearms, and face thoroughly after handling chemical products, before eating, smoking, and using the lavatory, and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Animal tests and other research indicate that skin contact with MDI can play a role in causing isocyanate sensitization and respiratory reaction.
Respiratory Protection	Airborne MDI concentrations greater than the ACGIH TLV-TWA (TWA) or OSHA PEL-C (PEL) can occur in inadequately ventilated environments when MDI is sprayed, aerosolized, or heated. In such cases, respiratory protection must be worn. The type of protection selected must comply with the requirements set forth in OSHA's Respiratory Protection Standard (29 CFR 1910.134). The types of available protection include: 1) an atmosphere-supplying respirator such as a self-contained breathing apparatus (SCBA) or a supplied air respirator (SAR) in the positive pressure or continuous flow mode, or 2) an air purifying respirator (APR). If an APR is selected, then: a) cartridge must be equipped with an end-of-service life indicator (ESLI) certified by NIOSH, or (b) a change out of schedule, based on objective information or data that will ensure that the cartridges are changed out before the end of their service life, must be developed and implemented. The basis for the change out of schedule must be described in the written respirator program. Further, if an APR is selected, the airborne diisocyanate concentration must be no greater than 10 times the TLV or PEL. The recommended APR cartridge is an organic vapor/particulate filter combination cartridge (OV/P100).
Medical Surveillance	All applicants assigned to an isocyanate work area should undergo a pre-placement medical evaluation. A history of asthma, bronchitis, eczema, or respiratory allergies such as hay fever, are possible reasons for medical exclusion from isocyanate areas. Once a worker has been diagnosed as sensitized to any isocyanate, no further exposure can be permitted. The Occupational Exposure Limits do not apply to previously sensitized individuals. A comprehensive annual medical surveillance program should be instituted for all employees who are potentially exposed to diisocyanates.
Additional Protective Measures	Ensure that eyewash stations and safety showers are close to the workstation. Educate and train employees in the safe use and handling of this product. Follow all label instructions.

Section 9: Physical and Chemical Properties

Physical State	Brown liquid
Odor	Slightly musty
Viscosity @ 77°F (25°C)	180 - 220 cps
Specific Gravity @ 77°F (25°C)	1.24
Flash Point	> 388°F (198°C) by ASTM D 93
Auto-Ignition Temperature	> 1112°F (600°C)
Boiling Point	-406°F (208°C)
Bulk Density	1.234 kg/m ³
pH	N/A
Vapor Pressure	< 0.0001 mmHg @ 77°F (25°C) (MDI)
Vapor Density (Air=1)	8.5 for MDI
Solubility in Water	Insoluble. Reacts slowly with water to liberate CO ₂

Section 10: Stability and Reactivity

Incompatibility	Stable at room temperature. This product will react and release heat with any materials containing active hydrogen. The reaction is accelerated and can be violent at higher temperatures if the miscibility of the reaction partners is good or is supported by stirring or by the presence of solvents. MDI is insoluble with and heavier than water and sinks to the bottom, but reacts slowly at the interface. A solid water-insoluble layer of polyurea is formed at the interface by liberating CO ₂ .
Conditions/Materials to Avoid	Avoid high temperatures. Avoid water, alcohols, amines, bases, copper alloys.
Hazardous Polymerization	May occur at elevated temperatures (350°F (177°C)), in the presence of alkalis, tertiary amines, and metal compounds.
Hazardous Products of Decomposition	Isocyanate vapors and other irritating, highly toxic gases such as carbon dioxide, carbon monoxide, nitrogen oxides, hydrocarbons, and HCN.

Section 11: Toxicological Information

	Acute Oral Toxicity, LD50 (Rat)	Acute Inhalation Toxicity, LC50 (Rat)	Acute Dermal Toxicity, LD50 (Rabbit)	Repeated Dose Toxicity (Rat)
VPC-ISO A (data based on comparable products)	> 2000 mg/kg	490 mg/m ³ (4 hr)	slightly irritating	90 days, inhalation: NOAEL: 1 mg/m ³ (6 hrs/day, 5 days/week) Irritation to lungs & nasal cavities
4,4' Diphenylmethane Diisocyanate	N/A	369 mg/m ³ (4 hr) > 2240 mg/m ³ (1 hr)	> 10,000 mg/kg	90 days, inhalation: NOAEL: 0.3 mg/m ³ (18 hrs/day, 5 days/week) Irritation to lungs & nasal cavities

11.2 Potential Acute Health Effects

Eye Contact	Irritating to eyes.
Skin Contact	Irritating to skin. May cause sensitization by skin contact.
Inhalation	Product is a respiratory irritant and potential respiratory sensitizer. Repeated inhalation of vapors or aerosols at levels above the occupational exposure limit could cause respiratory sensitization. Symptoms may include irritation to eyes, nose, throat, and lungs, possibly combined with dryness of the throat, tightness of chest, and difficulty in breathing. The onset of the respiratory symptoms may be delayed for several hours after exposure. A hyper-reactive response to even minimal concentrations of MDI may develop in sensitized persons.
Ingestion	Low oral toxicity. Ingestion may cause irritation of gastrointestinal tract.

11.3 Potential Chronic Health Effects

Target Organs	Lungs, upper respiratory tract, skin.
Carcinogenic Effects	A study was conducted where groups of rats were exposed for 2 years to a respirable polymeric MDI aerosol at concentrations of 0, 0.2, 1, or 6 mg/m ³ . No adverse effects were observed at 0.2 mg/m ³ . At the 1 mg/m ³ , minimal nasal and lung irritant effects were seen. Only at the top concentration (6 mg/m ³) there was an increased incidence of benign tumor of the lung. One malignant pulmonary tumor was seen in the 6 mg/m ³ group. MDI administration to rats in this study did not change the distribution and incidence of tumors from those seen in control animals. The increased incidence of lung tumors is associated with prolonged respiratory irritation and the concurrent accumulation of yellow material in the lung. In the absence of prolonged exposure to high concentrations leading to chronic irritation and lung damage, it is highly unlikely that tumor formation will occur.
Mutagenic Effects	There is no substantial evidence of mutagenic potential.
Reproductive Effects	No adverse reproductive effects are anticipated. No birth defects were seen in two independent animal (rat) studies. Fetotoxicity was observed at doses that were extremely toxic (including lethal) to the mother. Fetotoxicity was not observed at doses that were not maternally toxic. The doses used in these studies were maximal respirable concentrations well in excess of the defined occupational exposure limits.

Section 12: Ecological Information

12.1 Aquatic Toxicity Data for Components Toxicity

VPC-ISO A (data based on comparable products)	Biodegradation: 0%, not degradable (exposure time 28 days) Bioaccumulation: does not accumulate (112 days) (rainbow trout) Acute & Prolonged Toxicity to Fish: LC50: > 1,000 mg/l (96 hrs) (zebra fish) LC50: > 3,000 mg/l (96 hrs) (orange-red killifish) Acute & Prolonged Toxicity to Invertebrates: EC50: > 1,000 mg/l (24 hrs) (daphnia magna) Toxicity to Aquatic Plants: NOEC: 1,640 mg/l (72 hrs) (green algae) Toxicity to Microorganisms: EC50: > 100 mg/l (3 hrs) (activated sludge)
4,4' Diphenylmethane Diisocyanate	Acute & Prolonged Toxicity to Fish: LC50: > 500 mg/l (24 hrs) (zebra fish) Acute & Prolonged Toxicity to Invertebrates: EC50: > 500 mg/l (24 hrs) (daphnia magna)
Mobility	By considering the production and use of substance, it is unlikely that significant environmental exposure in the air or water will arise. Immiscible with water but will react and produce inert and non-biodegradable solids. Conversion to soluble products, including diamino-diphenylmethane (MDA) is very low under the optimal laboratory conditions of good dispersion and low concentration. In air, the predominant degradation process is predicted to be relatively rapid OH attack, by calculation and by analogy with related diisocyanates.
Other Adverse Effects	By comparison with an analogous product, the following values are anticipated. The measured ecotoxicity is that of the hydrolyzed product, generally under conditions maximizing production of soluble species. Even so, the observed ecotoxicity is low/very low. A pond study showed gross contamination caused no significant toxic effects on a wide variety of flora in all trophic levels (including fish), no detectable diamino-diphenylmethane (MDA), and no evidence of bioaccumulation of MDI or MDA.

Section 13: Disposal Consideration

Waste Disposal Method	The generation of waste should be avoided or minimized whenever possible. Waste must be disposed of in compliance with federal, state, provincial, and local environmental control regulations. Dispose of surplus and non-recyclable products via licensed waste disposal contractor. Incineration is the preferred method. If incinerated, toxic and corrosive combustion gases must be properly handled.
Empty Container Precautions	Empty containers retain product residue (liquid and/or vapor) and can be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, static electricity, or other sources of ignition. All containers should be disposed of in an environmentally safe manner and in accordance with governmental regulations.

Victory Polymers has no control over the management practices or manufacturing processes of parties handling or using this material. The information presented here pertains only to the product as shipped in its original condition as described in SDS Section 3 (Ingredients).

Section 14: Transport Information

Technical Shipping Name	VPC-ISO A
Land Transport/DOT Classification	Non-regulated
RSPA/DOT Regulated Components	4,4' Diphenylmethane Diisocyanate Reportable Quantity (RQ) for 4,4 MDI: Single containers with \geq 5,000 lbs Reportable Quantity (RQ) for A-PMDI: Single containers with \geq 11,905 lbs
Additional Transport Information	In individual containers of less than the Reportable Quantity, material ships as non-regulated
Sea Transport/IMDG Classification	Non-regulated
Air Transport/ICAO/IATA Classification	Non-regulated
TDG Classification	Non-regulated
Emergency Telephone Number	CHEMTREC 800-424-9300 or CANUTEC 613-996-6666

Section 15: Regulatory Information
15.1 U.S. Federal Regulations

OSHA Hazcom Standard Rating	This material is classified as hazardous under OSHA Hazard Communication Standard (29 CFR 1910.1200)
HSC Classification	Toxic/Irritant/Sensitizer
US. Toxic Substances Control Act/TSCA	All ingredients are listed on the TSCA Inventory
US. EPA CERCLA Hazardous Substances (40 CFR 302)	4,4' Diphenylmethane Diisocyanate (CAS 101-68-8) has a 5,000 lbs RQ. Any spill or release above the RQ must be reported to the National Response Center (800-424-8802).
SARA Section 311/312 Hazard Categories	Acute Health Hazard, Chronic Health Hazard
US. EPA EPCRA SARA Title III Section 302 Extremely Hazardous Substance (40 CFR 355, Appendix A)	Non-regulated
US. EPA EPCRA SARA Title III Section 313 Toxic Chemicals (40 CFR 372.65) - Supplier Notification Required	Components: Polymeric Diphenylmethane Diisocyanate (pMDI): 50 - 60% 4,4' Diphenylmethane Diisocyanate: 35 - 45%
US. EPA RCRA Composite List of Hazardous Wastes and Appendix VIII Hazardous Constituents (40 CFR 261)	If discarded in its purchased form, this product will not be a hazardous waste either by listing or by characteristic. However, under RCRA, it is the responsibility of the product user to determine at the time of disposal, whether a material containing the product or derived from the product should be classified as a hazardous waste (40 CFR 261.20-24).
State Regulations	The following chemicals are specifically listed by individual states; other product specific health and safety data in other sections of the SDS may also be applicable to state requirements. For details on your regulatory requirements, you should contact appropriate agency in your state.
California Prop. 65	No ingredients listed

15.1 U.S. Federal Regulations (continued)

Massachusetts, New Jersey or Pennsylvania Right to Know Substances Lists

Components	CAS#	Weight %
Polymeric Diphenylmethane Diisocyanate (pMDI)	9016-87-9	50 - 60
4,4' Diphenylmethane Diisocyanate (MDI)	101-68-8	35 - 45
2,4' Diphenylmethane Diisocyanate (MDI)	5873-54-1	1 - 5

New Jersey Environmental Hazardous Substances List and/or New Jersey RTK Special Hazardous Substances Lists

Components	CAS#	Weight %
Polymeric Diphenylmethane Diisocyanate (pMDI)	9016-87-9	40 - 55
4,4' Diphenylmethane Diisocyanate (MDI)	101-68-8	35 - 45

15.2 Canada

WHMIS Class D-1A/Material causing immediate and serious toxic effects (very toxic)
 Class D-2A/Material causing other toxic effects (very toxic)
 Class D-2B/Material causing other toxic effects (toxic)

CEPA (DSL) Canada Inventory: All components are listed or exempted.

Section 16: Other Information

HMIS Rating

Health	Fire Hazard	Reactivity
2	1	1

0 - Minimal; 1 - Slight; 2 - Moderate; 3 - Serious; 4 - Severe

NFPA Rating

Health Hazard	Flammability Hazard	Instability Hazard
2	1	1

0 - Insignificant; 1 - Slight; 2 - Moderate; 3 - High; 4 - Extreme

This product does not contain nor is it manufactured with ozone depleting substances.

Notice: The information herein is presented in good faith and believed to be accurate as of the effective date shown below. However, no warranty expressed or implied is given. Regulatory requirements are subject to change and may differ from one location to another; it is the user's responsibility to ensure that its activities comply with country, state, provincial, and local laws. This product may present hazards and should be used with caution. While certain hazards are described in this publication, no guarantee is made that these are the only hazards that exist. Hazards, toxicity, and behavior of the products may differ when used with other materials and are dependent upon manufacturing circumstances or other processes. Such hazards, toxicity, and behavior should be determined by the user and made known to handlers, processors, and end users.

Prepared By Victory Polymers Corp.