MATERIAL SAFETY DATA SHEET

Bayer MaterialScience

Bayer MaterialScience LLC
Product Safety & Regulatory Affairs
100 Bayer Road
Pittsburgh, PA 15205-9741
USA

TRANSPORTATION EMERGENCY

CALL CHEMTREC:	(800) 424-9300
INTERNATIONAL:	(703) 527-3887

NON-TRANSPORTATION

Bayer Emergency Phone:	(412) 923-1800
Bayer Information Phone:	(800) 662-2927

1. Product and Company Identification

Product Name:	DESMODUR I
Material Number:	480770
Chemical Family:	Cycloaliphatic Diisocyanate
Chemical Name:	Isophorone Diisocyanate
CAS-No.:	4098-71-9
Formula:	C12H18N2O2

2. Hazards Identification

Emergency Overview

DANGER! Color: Clear **Form:** liquid **Odor:** Pungent.

Toxic gases/fumes may be given off 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. Causes respiratory tract irritation. May cause allergic respiratory reaction. Harmful if inhaled. Respiratory sensitizer. Lung damage and respiratory sensitization may be permanent. Causes skin irritation. May cause allergic skin reaction. Skin sensitizer. Animal tests and other research indicate that skin contact with diisocyanates can play a role in causing isocyanate sensitization and respiratory reaction. Causes eye irritation. May cause lung damage.

Potential Health Effects

Primary Routes of Entry:	Skin Contact, Inhalation, Eye Contact
Medical Conditions Aggravated by Exposure:	Skin Allergies, Eczema, Asthma, Respiratory disorders

HUMAN EFFECTS AND SYMPTOMS OF OVEREXPOSURE

Inhalation
Acute Inhalation
For Product: DESMODUR I

Diisocyanate vapors or mist at concentrations above the TLV or PEL 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 or PEL with similar symptoms as well as asthma attack or asthma-like symptoms. Exposure well above the TLV or PEL may lead to bronchitis, bronchial spasm and pulmonary edema (fluid in lungs). Chemical or hypersensitivity pneumonitis, with flu-like symptoms (e.g., fever, chills), has also been reported. These symptoms can be delayed up to several hours after exposure. These effects are usually reversible.

Chronic Inhalation
For Product: DESMODUR I
As a result of previous repeated overexposures or a single large dose, certain individuals may develop sensitization to diisocyanates (asthma or asthma-like symptoms) that may cause them to react to a later exposure to diisocyanates at levels well below the TLV or PEL. These symptoms, which can include chest tightness, wheezing, cough, shortness of breath or asthmatic attack, could be immediate or delayed up to several hours after exposure. Extreme asthmatic reactions can be life threatening. 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. Sensitization can be permanent. Chronic overexposure to diisocyanates has also been reported to cause lung damage (including fibrosis, decrease in lung function) that may be permanent.

Skin
Acute Skin
For Product: DESMODUR I
Causes irritation with symptoms of reddening, itching, and swelling. Can cause sensitization. Persons previously sensitized can experience allergic skin reaction with symptoms of reddening, itching, swelling, and rash. Cured material is difficult to remove.

Chronic Skin
For Product: DESMODUR I
Potent skin sensitizer. Once sensitized , an individual may react to direct skin contact or even to airborne levels below the TLV with reddening, swelling, rash and in severe cases blistering and hives. These symptoms may be immediate or delayed several hours. Animal tests and other research indicate that skin contact with diisocyanates can play a role in causing isocyanate sensitization and respiratory reaction. This data reinforces the need to prevent direct skin contact with isocyanates.

Eye
Acute Eye
For Product: DESMODUR I
Causes irritation with symptoms of reddening, tearing, stinging, and swelling. May cause temporary corneal injury. Vapor may cause irritation with symptoms of burning and tearing.

Chronic Eye
For Product: DESMODUR I
Prolonged vapor contact may cause conjunctivitis.

Ingestion
Acute Ingestion
For Product: DESMODUR I
May cause irritation; Symptoms may include abdominal pain, nausea, vomiting, and diarrhea.

Carcinogenicity:
No Carcinogenic substances as defined by IARC, NTP and/or OSHA

3. Composition/Information on Ingredients

Hazardous Components

Weight %	Components	CAS-No.
100%	Isophorone Diisocyanate(IPDI)	4098-71-9

4. First Aid Measures

Eye Contact
In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Use lukewarm water if possible. Use fingers to ensure that eyelids are separated and that the eye is being irrigated. Then remove contact lenses, if easily removable, and continue eye irrigation for not less than 15 minutes. Get medical attention.

Skin Contact
Immediately remove contaminated clothing and shoes. In case of skin contact, wash affected areas with soap and water. Use lukewarm water if possible. After washing, cover affected skin area with polyethylene glycol (300-500 molecular weight) and wash again immediately with soap and water to thoroughly remove polyethylene glycol and residual isocyanate. Repeat if necessary. Get medical attention immediately. Wash contaminated clothing before reuse.

Inhalation
Move to an area free from further exposure. Get medical attention immediately. Administer oxygen or artificial respiration as needed. 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. Wash mouth out with water. Do not give anything by mouth to an unconscious person. Get medical attention.

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 the 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.

5. Fire-Fighting Measures

Suitable Extinguishing Media: dry chemical, carbon dioxide (CO2), foam, water spray for large fires.

Special Fire Fighting Procedures
Firefighters should wear NFPA compliant structural firefighting protective equipment, including self-contained breathing apparatus and NFPA compliant helmet, hood, boots and gloves. Avoid contact with product. Decontaminate equipment and protective clothing prior to reuse. During a fire, isocyanate vapors and other irritating, highly toxic gases may be generated by thermal decomposition or combustion. Exposure to heated diisocyanate can be extremely dangerous.

Unusual Fire/Explosion Hazards
Closed container may forcibly rupture under extreme heat or when contents are contaminated with water

(CO2 formed). 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.

6. Accidental release measures

Spill and Leak Procedures
Evacuate non-emergency personnel. Isolate the area and prevent access. Remove ignition sources. Notify management. Put on protective equipment. Control source of the leak. Ventilate. Contain the spill to prevent spread into drains, sewers, water supplies, or soil. Call Bayer at 412-923-1800 for assistance and advice. Major Spill or Leak (Standing liquid): To minimize vapor, cover the spillage with fire fighting foam (AFFF). Released material may be pumped into closed, but not sealed, metal container for disposal. Process can generate heat. Minor Spill or Leak (Wet surface): Cover spill area with suitable absorbent material (Kitty Litter, Oil-Dri®, etc). 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. Swype® test kits have been used for this purpose. Apply lid loosely and allow containers to vent for 72 hours to let carbon dioxide (CO2) escape.

Additional Spill Procedures/Neutralization
Neutralization solution: mix equal amounts of the following to total two times the estimated spill volume: (1) mineral spirits 80%, VM&P naphtha 15% and household detergent 5%; and (2) a 50/50 mixture of monoethanolamine and water.

Bayer 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.

7. Handling and Storage

Storage Temperature:

minimum:	-20 °C (-4 °F)
maximum:	50 °C (122 °F)

Storage Period
12 Months: after receipt of material by customer

Handling/Storage Precautions
Do not breathe vapors, mists, or dusts. Use adequate ventilation to keep airborne isocyanate levels below the exposure limits. Wear respiratory protection if material is heated, sprayed, used in a confined space, or if the exposure limit is exceeded. Warning properties (irritation of the eyes, nose and throat or odor) are not adequate to prevent 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. Individuals with lung or breathing problems or prior allergic reactions to isocyanates must not be exposed to vapor or spray mist. Avoid contact with skin and eyes. Wear appropriate eye and skin protection. Wash thoroughly after handling. Do not breathe smoke and gases created by overheating or burning this material. Decomposition products can be highly toxic and irritating. Store in tightly closed containers to prevent moisture contamination. Do not reseal if contamination is suspected.

Further Info on Storage Conditions

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.

8. Exposure Controls / Personal Protection

Isophorone Diisocyanate(IPDI) (4098-71-9)

US. ACGIH Threshold Limit Values

Time Weighted Average (TWA): 0.005 ppm

Industrial Hygiene/Ventilation Measures

Local exhaust should be used to maintain levels below the TLV whenever this diisocyanate is heated, sprayed, or aerosolized. Standard reference sources regarding industrial ventilation (e.g., ACGIH Industrial Ventilation Manual) should be consulted for guidance 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, OSHA, Bayer, and others have developed sampling and analytical methods. Bayer methods can be made available, upon request.

Respiratory Protection

Airborne IPDI concentrations greater than the appropriate standard/guideline can occur in inadequately ventilated environments when IPDI is sprayed, aerosolized, or heated. In such cases, respiratory protection must be worn. The type of respiratory protection selected must comply with the requirements set forth in OSHA's Respiratory Protection Standard (29 CFR1910.134). The type of respiratory protection available includes (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, the following conditions must be met:(1) (a) the cartridge must be equipped with an end-of-service life indicator (ESLI) certified by NIOSH, or (1) (b) a change out 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 schedule must be described in the written respirator program, and (2) the airborne IPDI concentration must be no greater than 10 times the appropriate standard/guideline. The recommended APR cartridge is an organic vapor/particulate filter combination cartridge (OV/P100).

Hand Protection

Gloves should be worn., Nitrile rubber gloves., Butyl rubber gloves., Neoprene gloves

Eye Protection

When directly handling liquid product, eye protection is required. Examples of eye protection include a chemical safety goggle, or chemical safety goggle in combination with a full face shield when there is a greater risk of splash.

Skin and body protection

Any area of skin that could potentially come in contact with this diisocyanate, or a formulation containing this diisocyanate, must be covered by a permeation resistant barrier (e.g., butyl or nitrile rubber gloves, neoprene apron, chemical suit, etc.). When there is potential for a major splash directly onto the skin, such as when breaking into lines, a full chemical suit is required. When the application results in airborne vapor or mist, a full permeation resistant suit, including head covering, faceshield, gloves and overshoes, is required.

Medical Surveillance

All applicants who are assigned to an isocyanate work area should undergo a pre-placement medical evaluation. A history of eczema or respiratory allergies such as hay fever, are possible reasons for medical exclusion from isocyanate areas. Applicants who have a history of adult asthma should be restricted from work with isocyanates. Applicants with a history of prior isocyanate sensitization should be excluded from further work with isocyanates. A comprehensive annual medical surveillance program should be instituted

for all employees who are potentially exposed to diisocyanates. Once a worker has been diagnosed as sensitized to any isocyanate, no further exposure can be permitted. Refer to the Bayer pamphlet (Medical Surveillance Program for Isocyanate Workers) for additional guidance.

Additional Protective Measures
Emergency showers and eye wash stations should be available. Educate and train employees in the safe use and handling of this product. Follow all label instructions.

9. Physical and chemical properties

Form:	liquid
Color:	Clear
Odor:	Pungent
Freezing Point:	-60 °C (-76 °F)
Boiling Point/Range:	157.78 °C (316 °F) @ 15 mmHg
Flash Point:	155 °C (311.0 °F) (Pensky-Martens Closed Cup (ASTM D-93))
Lower Explosion Limit:	Not Established
Upper Explosion Limit:	Not Established
Vapor Pressure:	0.00048 mmHg @ 20 °C (68 °F)
Specific Gravity:	1.06 @ 20 °C (68 °F)
Solubility in Water:	Insoluble - Reacts slowly with water to liberate CO2 gas
Autoignition Temperature:	430 °C (806 °F)
Viscosity, Dynamic:	Approximately 10 mPa.s @ 25 °C (77 °F)
Bulk Density:	8.84 lb/gal
Molecular Weight:	222.32

10. Stability and Reactivity

Hazardous Reactions
Contact with moisture, other materials that react with isocyanates, or temperatures above 350 F (177 C), may cause polymerization.

Materials to avoid
Water, Amines, Strong bases, Alcohols, copper alloys

Hazardous decomposition products
By Fire and High Heat: Carbon dioxide (CO2), carbon monoxide (CO), oxides of nitrogen (NOx), dense black smoke, Hydrogen cyanide, Isocyanate, Isocyanic Acid, Other undetermined compounds

11. Toxicological Information

Toxicity Data for DESMODUR I
Acute Oral Toxicity
LD50: 5,490 mg/kg (Rat)

Acute Inhalation Toxicity
LC50: 40 mg/m3, aerosol, 4 h (Rat)

Skin Irritation
rabbit, Severely irritating
Extremely corrosive and destructive to tissue.

Eye Irritation
Rat, Severely irritating
Severe eye irritation

Sensitization
sensitizer (guinea pig)

Toxicity Data for Isophorone Diisocyanate(IPDI)
Acute Oral Toxicity
LD50: 5,490 mg/kg (Rat)

Acute Inhalation Toxicity
LC50: 40 mg/m3, aerosol, 4 hrs (Rat)
LC50: 260 mg/m3, 1 hrs (Rat)
RD50: 0.218 ppm, 3 hrs (mouse)

Acute dermal toxicity
LD50: 4,780 mg/kg (rabbit)

Skin Irritation
rabbit, Draize, Severely irritating

Eye Irritation
rabbit, Draize, Severely irritating

Sensitization
dermal: sensitizer (guinea pig, Maximisation Test (GPMT))
dermal: sensitizer (guinea pig, Buehler Test)
inhalation: sensitizer (Human, Other method)
dermal: sensitizer (Human, Patch Test)

Repeated Dose Toxicity
28 Days, Inhalation: NOAEL: 0.00064 mg/l, (Rat, male, daily)
1 Week, inhalation: NOAEL: 1.04 mg/m3, (Rat, Male/Female, 6 hrs/day 5 days/week)

Mutagenicity
Genetic Toxicity in Vitro:
Ames: negative (Salmonella typhimurium, Metabolic Activation: with/without)

Toxicity to Reproduction/Fertility
inhalation, 6 hrs/day 7 days/week, (Rat, Female) NOAEL (parental): 1 mg/m3 air/day, NOAEL (F2): 1 mg/m3 air/day

12. Ecological Information

Ecological Data for DESMODUR I
Additional Ecotoxicological Remarks
No data available for this product.

Ecological Data for Isophorone Diisocyanate(IPDI)
Biodegradation
aerobic, 62 %, Exposure time: 28 Days

Acute and Prolonged Toxicity to Fish
LC50: 1.8 mg/l (Golden orfe (Leuciscus idus), 48 hrs)

Acute Toxicity to Aquatic Invertebrates
EC50: 27 - 83.7 mg/l (Water flea (Daphnia magna), 24 hrs)

Toxicity to Aquatic Plants
EC50: 118.7 mg/l, End Point: growth (Green algae (Scenedesmus subspicatus), 72 hrs)

Toxicity to Microorganisms
EC10: 554 mg/l, (Pseudomonas putida, 6 hrs)

13. Disposal considerations

Waste Disposal Method
Waste disposal should be in accordance with existing federal, state and local environmental control laws. Incineration is the preferred method.

Empty Container Precautions
Empty containers retain product residue; observe all precautions for product. Do not heat or cut empty container with electric or gas torch because highly toxic vapors and gases are formed. Do not reuse without thorough commercial cleaning and reconditioning. If container is to be disposed, ensure all product residues are removed prior to disposal.

14. Transportation information

Land transport (DOT)

Proper Shipping Name:	Isophorone diisocyanate
Hazard Class or Division:	6.1
UN/NA Number:	UN2290
Packaging Group:	III
Hazard Label(s):	Toxic

Sea transport (IMDG)

Proper Shipping Name:	ISOPHORONE DIISOCYANATE
Hazard Class or Division:	6.1
UN-No:	UN2290
Packaging Group:	III
Hazard Label(s):	Toxic

Air transport (ICAO/IATA)

Proper Shipping Name:	Isophorone diisocyanate
Hazard Class or Division:	6.1
UN-No:	UN2290
Packaging Group:	III
Hazard Label(s):	Toxic

15. Regulatory Information

United States Federal Regulations

OSHA Hazcom Standard Rating: Hazardous

US. Toxic Substances Control Act: Listed on the TSCA Inventory.

US. EPA CERCLA Hazardous Substances (40 CFR 302):
Components
None

SARA Section 311/312 Hazard Categories:
Acute Health Hazard, Chronic Health Hazard, Reactivity Hazard

US. EPA Emergency Planning and Community Right-To-Know Act (EPCRA) SARA Title III Section 302 Extremely Hazardous Substance (40 CFR 355, Appendix A):
Components
Isophorone Diisocyanate(IPDI)

US. EPA Emergency Planning and Community Right-To-Know Act (EPCRA) SARA Title III Section 313 Toxic Chemicals (40 CFR 372.65) - Supplier Notification Required:
Components
Isophorone Diisocyanate(IPDI)

US. EPA Resource Conservation and Recovery Act (RCRA) Composite List of Hazardous Wastes and Appendix VIII Hazardous Constituents (40 CFR 261):
If discarded in its purchased form, this product would 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 Right-To-Know 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.

Massachusetts, New Jersey or Pennsylvania Right to Know Substance Lists:

Weight %	Components	CAS-No.
100%	Isophorone Diisocyanate(IPDI)	4098-71-9

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

Weight %	Components	CAS-No.
100%	Isophorone Diisocyanate(IPDI)	4098-71-9

California Prop. 65:
To the best of our knowledge, this product does not contain any of the listed chemicals, which the state of California has found to cause cancer, birth defects or other reproductive harm.

16. Other Information

NFPA 704M Rating

Health	4
Flammability	1

Reactivity	1
Other	

0=Insignificant 1=Slight 2=Moderate 3=High 4=Extreme

HMIS Rating

Health	4*
Flammability	1
Physical Hazard	1

0=Minimal 1=Slight 2=Moderate 3=Serious 4=Severe
* = Chronic Health Hazard

The method of hazard communication for Bayer MaterialScience LLC is comprised of Product Labels and Material Safety Data Sheets. HMIS and NFPA ratings are provided by Bayer MaterialScience LLC as a customer service.

The handling of products containing reactive IPDI polyisocyanate/prepolymer and/or monomeric IPDI requires appropriate protective measures referred to in this MSDS. These products are therefore recommended only for use in industrial or trade (commercial) applications. They are not suitable for use in Do-It-Yourself applications.

Contact Person: Product Safety Department
Telephone: (412) 777-2835
MSDS Number: R301023
Version Date: 10/11/2007
Report Version: 2.0

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Changes since the last version will be highlighted in the margin. This version replaces all previous versions.