



# Safety Data Sheet

Dow Chemical Company Ltd

**Product Name:** FROTH-PAK (TM) HFC Isocyanate

**Revision Date:** 2006/10/07

**Print Date:** 11 Jun 2007

Dow Chemical Company Ltd encourages and expects you to read and understand the entire (M)SDS, as there is important information throughout the document. We expect you to follow the precautions identified in this document unless your use conditions would necessitate other appropriate methods or actions.

## 1. Identification of the substance/preparation and of the company/undertaking

**Product Name**

FROTH-PAK (TM) HFC Isocyanate

**Use of the substance/preparation**

Cavity sealing foam. Thermal insulation.

**COMPANY IDENTIFICATION**

Dow Chemical Company Ltd  
2 Heathrow Blvd., 284 Bath Rd  
UB7 0DQ West Drayton, Middlesex, EN  
United Kingdom

Customer Information Number: 0208-917-5000

**EMERGENCY TELEPHONE NUMBER**

**24-Hour Emergency Contact:** +44 (0) 1553 761 251

**Local Emergency Contact:** 00 44 155 37 61 251

## 2. Composition/information on ingredients

Component	Amount	Classification:	CAS #	EC #
Methylenediphenyl diisocyanate, homopolymer	40.0 - 60.0 %	Not classified.	39310-05-9	Polymer
4,4'-Methylenediphenyl diisocyanate; diphenylmethane-4,4'-diisocyanate (MDI)	40.0 - 60.0 %	Xn: R20; Xi: R36/37/38; R42/43	101-68-8	202-966-0
1,1,1,2-Tetrafluoroethane	5.0 - 10.0 %	Not classified.	811-97-2	212-377-0

See Section 16 for full text of R-phrases.

## 3. Hazards Identification

Irritating to eyes, respiratory system and skin.

\* Indicates a Trademark

May cause sensitization by inhalation and skin contact.  
Harmful by inhalation.

May cause slight temporary corneal injury. May stain skin. Material may stick to skin causing irritation upon removal. Excessive exposure may cause irritation to upper respiratory tract (nose and throat) and lungs. May cause pulmonary edema (fluid in the lungs.) Asthma-like symptoms may include coughing, difficult breathing and a feeling of tightness in the chest. Occasionally, breathing difficulties may be life threatening. Symptoms of excessive exposure may be anesthetic or narcotic effects; dizziness and drowsiness may be observed.

#### 4. First-aid measures

**Eye Contact:** Immediately flush eyes with water; remove contact lenses, if present, after the first 5 minutes, then continue flushing eyes for at least 15 minutes. Obtain medical attention without delay, preferably from an ophthalmologist.

**Skin Contact:** Remove material from skin immediately by washing with soap and plenty of water. Remove contaminated clothing and shoes while washing. Seek medical attention if irritation persists. Wash clothing before reuse. An MDI skin decontamination study demonstrated that cleaning very soon after exposure is important, and that a polyglycol-based skin cleanser or corn oil may be more effective than soap and water. Discard items which cannot be decontaminated, including leather articles such as shoes, belts and watchbands.

**Inhalation:** Move person to fresh air. If not breathing, give artificial respiration; if by mouth to mouth use rescuer protection (pocket mask, etc). If breathing is difficult, oxygen should be administered by qualified personnel. Call a physician or transport to a medical facility.

**Ingestion:** If swallowed, seek medical attention. Do not induce vomiting unless directed to do so by medical personnel.

**Notes to Physician:** May cause respiratory sensitization or asthma-like symptoms. Bronchodilators, expectorants and antitussives may be of help. Treat bronchospasm with inhaled beta2 agonist and oral or parenteral corticosteroids. Respiratory symptoms, including pulmonary edema, may be delayed. Persons receiving significant exposure should be observed 24-48 hours for signs of respiratory distress. Maintain adequate ventilation and oxygenation of the patient. If you are sensitized to diisocyanates, consult your physician regarding working with other respiratory irritants or sensitizers. Exposure may increase "myocardial irritability". Do not administer sympathomimetic drugs such as epinephrine unless absolutely necessary. No specific antidote. Treatment of exposure should be directed at the control of symptoms and the clinical condition of the patient.

**Medical Conditions Aggravated by Exposure:** Excessive exposure may aggravate preexisting asthma and other respiratory disorders (e.g. emphysema, bronchitis, reactive airways dysfunction syndrome).

#### 5. Fire Fighting Measures

**Extinguishing Media:** Water fog or fine spray. Dry chemical fire extinguishers. Carbon dioxide fire extinguishers. Foam. Do not use direct water stream. May spread fire. Alcohol resistant foams (ATC type) are preferred. General purpose synthetic foams (including AFFF) or protein foams may function, but will be less effective.

**Fire Fighting Procedures:** Keep people away. Isolate fire and deny unnecessary entry. Stay upwind. Keep out of low areas where gases (fumes) can accumulate. Water is not recommended, but may be applied in large quantities as a fine spray when other extinguishing agents are not available. Fight fire from protected location or safe distance. Consider the use of unmanned hose holders or monitor nozzles. Immediately withdraw all personnel from the area in case of rising sound from venting safety device or discoloration of the container. Do not use direct water stream. May spread fire. Move container from fire area if this is possible without hazard. Use water spray to cool fire-exposed containers and fire-affected zone until fire is out.

**Special Protective Equipment for Firefighters:** Wear positive-pressure self-contained breathing apparatus (SCBA) and protective fire fighting clothing (includes fire fighting helmet, coat, trousers, boots, and gloves). Avoid contact with this material during fire fighting operations. If contact is likely, change to full chemical resistant fire fighting clothing with self-contained breathing apparatus. If this is

not available, wear full chemical resistant clothing with self-contained breathing apparatus and fight fire from a remote location. For protective equipment in post-fire or non-fire clean-up situations, refer to the relevant sections.

**Unusual Fire and Explosion Hazards:** Product reacts with water. Reaction may produce heat and/or gases. This reaction may be violent. Container may rupture from gas generation in a fire situation. Violent steam generation or eruption may occur upon application of direct water stream to hot liquids. Dense smoke is produced when product burns.

**Hazardous Combustion Products:** During a fire, smoke may contain the original material in addition to combustion products of varying composition which may be toxic and/or irritating. Combustion products may include and are not limited to: Nitrogen oxides. Isocyanates. Hydrogen cyanide. Carbon monoxide. Carbon dioxide.

## 6. Accidental Release Measures

**Steps to be Taken if Material is Released or Spilled:** Spills should be contained by, and covered with large quantities of sand, earth or any other readily available absorbent material which is then brushed in vigorously to assist absorption. The mixture can then be collected into drums and removed for disposal. Wash area from residues with soap and water and rinse down.

**Personal Precautions:** Use appropriate safety equipment. For additional information, refer to Section 8, Exposure Controls and Personal Protection. Only trained and properly protected personnel must be involved in clean-up operations. Keep unnecessary and unprotected personnel from entering the area. If available, use foam to suppress vapors. See Section 10 for more specific information.

**Environmental Precautions:** Prevent from entering into soil, ditches, sewers, waterways and/or groundwater. See Section 12, Ecological Information. Should the product enter sewers or drains, it should be pumped into a covered, vented container; the cover should be placed loosely on the container but not made pressure tight. Emergency services may need to be called to assist in the cleanup operation.

## 7. Handling and Storage

### Handling

**General Handling:** Keep away from heat, sparks and flame. Use only with adequate ventilation.

### Storage

Keep in a cool, well-ventilated place. Keep away from sources of ignition. See Section 10 for more specific information.

**Storage Period:**  
15 Months

**Storage temperature:**  
15 - 25 °C

## 8. Exposure Controls / Personal Protection

### Exposure Limits

Component	List	Type	Value
4,4'-Methylenediphenyl diisocyanate; diphenylmethane-4,4'-diisocyanate (MDI)	Ireland OELV	TWA as NCO	0.02 mg/m <sup>3</sup> SEN
	Ireland OELV	STEL as NCO	0.07 mg/m <sup>3</sup> SEN
	ACGIH	TWA	0.005 ppm
	UK WEL	TWA as NCO	0.02 mg/m <sup>3</sup> SEN
	UK WEL	STEL as NCO	0.07 mg/m <sup>3</sup> SEN

1,1,1,2-Tetrafluoroethane	WEEL	TWA	4,240 mg/m <sup>3</sup> 1,000 ppm
	UK WEL	TWA	4,240 mg/m <sup>3</sup> 1,000 ppm

A "SEN" notation following the exposure guideline refers to the potential to produce sensitization, as confirmed by human or animal data.

### Personal Protection

**Eye/Face Protection:** Use chemical goggles. Chemical goggles should be consistent with EN 166 or equivalent. Eye wash fountain should be located in immediate work area.

**Skin Protection:** Use protective clothing chemically resistant to this material. Selection of specific items such as face shield, boots, apron, or full body suit will depend on the task. Remove contaminated clothing immediately, wash skin area with soap and water, and launder clothing before reuse or dispose of properly. Items which cannot be decontaminated, such as shoes, belts and watchbands, should be removed and disposed of properly.

**Hand protection:** Use chemical resistant gloves classified under Standard EN374: Protective gloves against chemicals and micro-organisms. Examples of preferred glove barrier materials include: Butyl rubber. Polyethylene. Chlorinated polyethylene. Ethyl vinyl alcohol laminate ("EVAL"). Examples of acceptable glove barrier materials include: Viton. Neoprene. Natural rubber ("latex"). Polyvinyl chloride ("PVC" or "vinyl"). Nitrile/butadiene rubber ("nitrile" or "NBR"). When prolonged or frequently repeated contact may occur, a glove with a protection class of 5 or higher (breakthrough time greater than 240 minutes according to EN 374) is recommended. When only brief contact is expected, a glove with a protection class of 3 or higher (breakthrough time greater than 60 minutes according to EN 374) is recommended. NOTICE: The selection of a specific glove for a particular application and duration of use in a workplace should also take into account all relevant workplace factors such as, but not limited to: Other chemicals which may be handled, physical requirements (cut/puncture protection, dexterity, thermal protection), potential body reactions to glove materials, as well as the instructions/specifications provided by the glove supplier.

**Respiratory Protection:** Atmospheric levels should be maintained below the exposure guideline. When atmospheric levels may exceed the exposure guideline, use an approved air-purifying respirator equipped with an organic vapor sorbent and a particle filter. For situations where the atmospheric levels may exceed the level for which an air-purifying respirator is effective, use a positive-pressure air-supplying respirator (air line or self-contained breathing apparatus). For emergency response or for situations where the atmospheric level is unknown, use an approved positive-pressure self-contained breathing apparatus or positive-pressure air line with auxiliary self-contained air supply. Use the following CE approved air-purifying respirator: Organic vapor cartridge with a particulate pre-filter, type AP2.

**Ingestion:** Use good personal hygiene. Do not consume or store food in the work area. Wash hands before smoking or eating.

### Engineering Controls

**Ventilation:** Use only with adequate ventilation. Local exhaust ventilation may be necessary for some operations. Provide general and/or local exhaust ventilation to control airborne levels below the exposure guidelines. Exhaust systems should be designed to move the air away from the source of vapor/aerosol generation and people working at this point. The odor and irritancy of this material are inadequate to warn of excessive exposure.

## 9. Physical and Chemical Properties

<b>Physical State</b>	Foam
<b>Color</b>	Brown
<b>Odor</b>	Musty
<b>Flash Point - Closed Cup</b>	No test data available
<b>Flammable Limits In Air</b>	<b>Lower:</b> No test data available <b>Upper:</b> No test data available
<b>Autoignition Temperature</b>	No test data available
<b>Vapor Pressure</b>	No test data available
<b>Boiling Point (760 mmHg)</b>	No test data available.
<b>Vapor Density (air = 1)</b>	3.5 (1,1,1,2-tetrafluoroethane)

<b>Specific Gravity (H2O = 1)</b>	No test data available
<b>Freezing Point</b>	No test data available
<b>Melting Point</b>	No test data available
<b>Solubility in Water (by weight)</b>	reacts with water
<b>pH</b>	No test data available
<b>Dynamic Viscosity</b>	Not applicable

## 10. Stability and Reactivity

### Stability/Instability

Stable under recommended storage conditions. See Storage, Section 7.

**Conditions to Avoid:** Avoid temperatures above 40°C (104°F) Can react with itself at temperatures above 160°C (320°F) Exposure to elevated temperatures can cause product to decompose. Generation of gas during decomposition can cause pressure in closed systems. Pressure build-up can be rapid. Avoid moisture. Material reacts slowly with water, releasing carbon dioxide which can cause pressure buildup and rupture of closed containers. Elevated temperatures accelerate this reaction.

**Incompatible Materials:** Avoid contact with: Acids. Alcohols. Amines. Water. Ammonia. Bases. Metal compounds. Moist air. Strong oxidizers. Diisocyanates react with many materials and the rate of reaction increases with temperature as well as increased contact; these reactions can become violent. Contact is increased by stirring or if the other material mixes with the diisocyanate. Diisocyanates are not soluble in water and sink to the bottom, but react slowly at the interface. The reaction forms carbon dioxide gas and a layer of solid polyurea. Reaction with water will generate carbon dioxide and heat. Avoid contact with metals such as: Aluminum. Zinc. Brass. Tin. Copper. Galvanized metals. Avoid contact with absorbent materials such as: Moist organic absorbents. Avoid unintended contact with polyols. The reaction of polyols and isocyanates generate heat.

### Hazardous Polymerization

Can occur. Can react with itself at temperatures above 160°C (320°F) Polymerization can be catalyzed by: Strong bases. Water.

### Thermal Decomposition

Decomposition products depend upon temperature, air supply and the presence of other materials. Gases are released during decomposition.

## 11. Toxicological Information

### Acute Toxicity

#### Ingestion

Low toxicity if swallowed. Small amounts swallowed incidentally as a result of normal handling operations are not likely to cause injury; however, swallowing larger amounts may cause injury. Observations in animals include: Gastrointestinal irritation.

#### Eye Contact

May cause moderate eye irritation. May cause slight temporary corneal injury.

#### Skin Contact

Prolonged contact may cause skin irritation with local redness. Material may stick to skin causing irritation upon removal. May stain skin.

#### Skin Absorption

Prolonged skin contact is unlikely to result in absorption of harmful amounts.

#### Inhalation

In confined or poorly ventilated areas, vapor can easily accumulate and can cause unconsciousness and death due to displacement of oxygen. Excessive exposure may cause irritation to upper respiratory tract (nose and throat) and lungs. May cause pulmonary edema (fluid in the lungs.) Effects may be delayed. Decreased lung function has been associated with overexposure to

isocyanates. Excessive exposure may increase sensitivity to epinephrine and increase myocardial irritability (irregular heartbeats). May cause central nervous system effects. Symptoms of excessive exposure may be anesthetic or narcotic effects; dizziness and drowsiness may be observed.

### **Sensitization**

#### **Skin**

Skin contact may cause an allergic skin reaction. Animal studies have shown that skin contact with isocyanates may play a role in respiratory sensitization.

#### **Respiratory**

May cause allergic respiratory response. MDI concentrations below the exposure guidelines may cause allergic respiratory reactions in individuals already sensitized. Asthma-like symptoms may include coughing, difficult breathing and a feeling of tightness in the chest. Occasionally, breathing difficulties may be life threatening.

#### **Repeated Dose Toxicity**

Tissue injury in the upper respiratory tract and lungs has been observed in laboratory animals after repeated excessive exposures to MDI/polymeric MDI aerosols.

#### **Chronic Toxicity and Carcinogenicity**

Lung tumors have been observed in laboratory animals exposed to aerosol droplets of MDI/Polymeric MDI (6 mg/m<sup>3</sup>) for their lifetime. Tumors occurred concurrently with respiratory irritation and lung injury. Current exposure guidelines are expected to protect against these effects reported for MDI.

#### **Developmental Toxicity**

In laboratory animals, MDI/polymeric MDI did not cause birth defects; other fetal effects occurred only at high doses which were toxic to the mother. Based on information for component(s): 1,1,1,2-Tetrafluoroethane. Has been toxic to the fetus in lab animals at doses toxic to the mother. Did not cause birth defects in laboratory animals.

#### **Genetic Toxicology**

Genetic toxicity data on MDI are inconclusive. MDI was weakly positive in some in vitro studies; other in vitro studies were negative. Animal mutagenicity studies were predominantly negative.

## **12. Ecological Information**

### **CHEMICAL FATE**

Data for Component: **Methylenediphenyl diisocyanate, homopolymer**

#### **Movement & Partitioning**

In the aquatic and terrestrial environment, movement is expected to be limited by its reaction with water forming predominantly insoluble polyureas.

#### **Persistence and Degradability**

In the aquatic and terrestrial environment, material reacts with water forming predominantly insoluble polyureas which appear to be stable. In the atmospheric environment, material is expected to have a short tropospheric half-life, based on calculations and by analogy with related diisocyanates.

Data for Component: **4,4'-Methylenediphenyl diisocyanate; diphenylmethane-4,4'-diisocyanate (MDI)**

#### **Movement & Partitioning**

In the aquatic and terrestrial environment, movement is expected to be limited by its reaction with water forming predominantly insoluble polyureas.

#### **Persistence and Degradability**

In the aquatic and terrestrial environment, material reacts with water forming predominantly insoluble polyureas which appear to be stable. In the atmospheric environment, material is expected to have a short tropospheric half-life, based on calculations and by analogy with related diisocyanates.

Data for Component: 1,1,1,2-Tetrafluoroethane**Movement & Partitioning**

Bioconcentration potential is low (BCF less than 100 or log Pow less than 3). Potential for mobility in soil is high (Koc between 50 and 150).

**Henry's Law Constant (H):** 5.00E-2 atm\*m3/mole; 25 °C Measured

**Partition coefficient, n-octanol/water (log Pow):** 1.68 Estimated

**Partition coefficient, soil organic carbon/water (Koc):** 97 Estimated

**Persistence and Degradability**

1,1,1,2-Tetrafluoroethane (HFC-134a) has a stratospheric ozone depletion potential (ODP) of zero, relative to CFC 12 (ODP=1). Material is expected to biodegrade only very slowly (in the environment). Fails to pass OECD/EEC tests for ready biodegradability.

**OECD Biodegradation Tests:**

Biodegradation	Exposure Time	Method
4 %	28 d	OECD 301D Test

**ECOTOXICITY**Data for Component: Methylenediphenyl diisocyanate, homopolymer

The measured ecotoxicity is that of the hydrolyzed product, generally under conditions maximizing production of soluble species. Material is not classified as dangerous to aquatic organisms (LC50/EC50/IC50 greater than 100 mg/L in most sensitive species).

**Toxicity to Soil Dwelling Organisms**

LC50, Earthworm Eisenia foetida, adult, 14 d: > 1,000 mg/kg

Data for Component: 4,4'-Methylenediphenyl diisocyanate; diphenylmethane-4,4'-diisocyanate (MDI)

The measured ecotoxicity is that of the hydrolyzed product, generally under conditions maximizing production of soluble species. Material is not classified as dangerous to aquatic organisms (LC50/EC50/IC50 greater than 100 mg/L in most sensitive species).

**Toxicity to Soil Dwelling Organisms**

LC50, Earthworm Eisenia foetida, adult, 14 d: > 1,000 mg/kg

Data for Component: 1,1,1,2-Tetrafluoroethane

Material is not classified as dangerous to aquatic organisms (LC50/EC50/IC50 greater than 100 mg/L in most sensitive species).

**Fish Acute & Prolonged Toxicity**

LC50, rainbow trout (Oncorhynchus mykiss), static, 96 h: 450 mg/l

**Aquatic Invertebrate Acute Toxicity**

EC50, water flea Daphnia magna, immobilization: 980 mg/l

**13. Disposal Considerations**

Contents under pressure. Do not puncture or incinerate container. Relieve all pressure prior to disposal. Do not dump into any sewers, on the ground, or into any body of water. The generation of waste should be avoided or minimized wherever possible. Any disposal practice must be in compliance with all local and national laws and regulations. Refer to manufacturer/supplier for information on recovery/recycling.

**14. Transport Information****ROAD & RAIL**

**Proper Shipping Name:** COMPRESSED GAS, N.O.S.

**Technical Name:** 1,1,1,2-Tetrafluoroethane

**Hazard Class:** 2.2 **ID Number:** UN1956

**Classification:** 1A

**Kemler Code:** 20

**Tremcard Number:** 20G1A

**OCEAN**

**Proper Shipping Name:** COMPRESSED GAS, N.O.S.

**Technical Name:** 1,1,1,2-Tetrafluoroethane

**Hazard Class:** 2.2 **ID Number:** UN1956

**EMS Number:** F-C,S-V

**Marine pollutant.:** No

**AIR**

**Proper Shipping Name:** COMPRESSED GAS, N.O.S.

**Technical Name:** 1,1,1,2-Tetrafluoroethane

**Hazard Class:** 2.2 **ID Number:** UN1956 **Cargo Packing Instruction:** 200

**Passenger Packing Instruction:** 200

**INLAND WATERWAYS**

**Proper Shipping Name:** COMPRESSED GAS, N.O.S.

**Technical Name:** 1,1,1,2-Tetrafluoroethane

**Hazard Class:** 2.2 **ID Number:** UN1956

**Classification:** 1A

**Kemler Code:** 20

**Tremcard Number:** 20G1A

## **15. Regulatory Information**

### **European Inventory of Existing Commercial Chemical Substances (EINECS)**

The components of this product are on the EINECS inventory or are exempt from inventory requirements.

### **EC Classification and User Label Information**

**Hazard Symbol :**

Xn - Harmful.

**Risk Phrases :**

R36/37/38 - Irritating to eyes, respiratory system and skin.

R42/43 - May cause sensitization by inhalation and skin contact.

R20 - Harmful by inhalation.

**Safety Phrases :**

S23 - Do not breathe vapour/gas/fumes/spray.

S45 - In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

S28 - After contact with skin, wash immediately with plenty of water and soap.

S24/25 - Avoid contact with skin and eyes.

S26 - In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

S36/37/39 - Wear suitable protective clothing, gloves and eye/face protection.

S51 - Use only in well-ventilated areas.

S28 - After contact with skin, wash immediately with plenty of water.

**Contains:** 4,4'-Methylenediphenyl diisocyanate; diphenylmethane-4,4'-diisocyanate (MDI)

Contains isocyanates. See information supplied by the manufacturer.

Container is under pressure.

Keep out of reach of children.

Protect from sun and temperatures above 50°C.

To avoid risk for man and the environment, follow the use instructions.



Do not open with force or incinerate even after use.

## 16. Other Information

### Other Information

Protective gloves should be worn when handling freshly-made polyurethane products to avoid skin contact with trace amounts of residual materials, some of which may be hazardous in contact with skin.

### Risk-phrases in Section 2

R20	Harmful by inhalation.
R36/37/38	Irritating to eyes, respiratory system and skin.
R42/43	May cause sensitization by inhalation and skin contact.

### Revision

Identification Number: 82662 / 3005 / Issue Date 2006/10/07 / Version: 4.3

Most recent revision(s) are noted by the bold, double bars in left-hand margin throughout this document.

*Dow Chemical Company Ltd urges each customer or recipient of this (M)SDS to study it carefully and consult appropriate expertise, as necessary or appropriate, to become aware of and understand the data contained in this (M)SDS and any hazards associated with the product. The information herein is provided in good faith and believed to be accurate as of the effective date shown above. However, no warranty, express or implied, is given. Regulatory requirements are subject to change and may differ between various locations. It is the buyer's/user's responsibility to ensure that his activities comply with all federal, state, provincial or local laws. The information presented here pertains only to the product as shipped. Since conditions for use of the product are not under the control of the manufacturer, it is the buyer's/user's duty to determine the conditions necessary for the safe use of this product. Due to the proliferation of sources for information such as manufacturer-specific (M)SDSs, we are not and cannot be responsible for (M)SDSs obtained from any source other than ourselves. If you have obtained an (M)SDS from another source or if you are not sure that the (M)SDS you have is current, please contact us for the most current version.*