



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/m3 SEN
	Ireland OELV	STEL as NCO	0.07 mg/m3 SEN
	ACGIH	TWA	0.005 ppm
	UK WEL	TWA as NCO	0.02 mg/m3 SEN
	UK WEL	STEL as NCO	0.07 mg/m3 SEN

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

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

Specific Gravity (H₂O = 1)	No test data available
Freezing Point	No test data available
Melting Point	No test data available
Solubility in Water (by weight)	reacts with water
pH	No test data available
Dynamic Viscosity	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/m³) 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

ECOTOXICITYData 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.



Safety Data Sheet

Dow Chemical Company Ltd

Product Name: FROTH-PAK (TM) 30 QR HFC B2 Polyol

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) 30 QR HFC B2 Polyol

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 #
Formulated polyol in pressurized can				
Blend of polyether polyols ("B" + "E")	> 20.0 %	Not classified.	Confidential	Polymers
Propylene glycol-propylene oxide polymer	5.0 - 15.0 %	Not classified.	25322-69-4	500-039-8
Polyester polyol	5.0 - 15.0 %	Not classified.	confidential	Polymer
Diethylene glycol	2.0 - 5.0 %	Xn: R22	111-46-6	203-872-2
1,1,1,2-Tetrafluoroethane	15.0 - 30.0 %	Not classified.	811-97-2	212-377-0
2-ethylhexanoic acid potassium salt	1.0 - 3.0 %	Xi: R36	3164-85-0	221-625-7
Triethyl phosphate	1.0 - 3.0 %	Xn: R22	78-40-0	201-114-5
Tris(1-chloro-2-propyl) phosphate	15.0 - 24.0 %	Xn: R22	13674-84-5	237-158-7

See Section 16 for full text of R-phrases.

* Indicates a Trademark

3. Hazards Identification

Harmful if swallowed.

Symptoms of excessive exposure may be anesthetic or narcotic effects; dizziness and drowsiness may be observed.

4. First-aid measures

Eye Contact: Flush eyes thoroughly with water for several minutes. Remove contact lenses after the initial 1-2 minutes and continue flushing for several additional minutes. If effects occur, consult a physician, preferably an ophthalmologist.

Skin Contact: Wash skin with plenty of water.

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: Due to structural analogy and clinical data, this material may have a mechanism of intoxication similar to ethylene glycol. On that basis, treatment similar to ethylene glycol intoxication may be of benefit. In cases where several ounces (60 - 100 ml) have been ingested, consider the use of ethanol and hemodialysis in the treatment. Consult standard literature for details of treatment. If ethanol is used, a therapeutically effective blood concentration in the range of 100 - 150 mg/dl may be achieved by a rapid loading dose followed by a continuous intravenous infusion. Consult standard literature for details of treatment. 4-Methyl pyrazole (Antizol®) is an effective blocker of alcohol dehydrogenase and should be used in the treatment of ethylene glycol (EG), di- or triethylene glycol (DEG, TEG), ethylene glycol butyl ether (EGBE), or methanol intoxication if available. Fomepizole protocol (Brent, J. et al., New England Journal of Medicine, Feb. 8, 2001, 344:6, p. 424-9): loading dose 15 mg/kg intravenously, follow by bolus dose of 10 mg/kg every 12 hours; after 48 hours, increase bolus dose to 15 mg/kg every 12 hours. Continue fomepizole until serum methanol, EG, DEG, TEG or EGBE are undetectable. The signs and symptoms of poisoning include anion gap metabolic acidosis, CNS depression, renal tubular injury, and possible late stage cranial nerve involvement. 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. In severe poisoning, respiratory support with mechanical ventilation and positive end expiratory pressure may be required. Exposure may increase "myocardial irritability". Do not administer sympathomimetic drugs such as epinephrine unless absolutely necessary. This material is a cholinesterase inhibitor. Treat symptomatically. Atropine, only by injection, is the preferable antidote. Oximes, such as 2-PAM/protopam, may be therapeutic if used early; however, use only in conjunction with atropine. If exposed, plasma and red blood cell cholinesterase tests may indicate significance of exposure (baseline data are useful). In case of severe acute poisoning, use antidote immediately after establishing an open airway and respiration. Attempt seizure control with diazepam 5-10 mg (adults) intravenous over 2-3 minutes. Repeat every 5-10 minutes as needed. Monitor for hypotension, respiratory depression, and need for intubation. Consider second agent if seizures persist after 30 mg. If seizures persist or recur administer phenobarbital 600-1200 mg (adults) intravenous diluted in 60 ml 0.9% saline given at 25-50 mg/minute. Evaluate for hypoxia, dysrhythmia, electrolyte disturbance, hypoglycemia (treat adults with dextrose 100 mg intravenous). If lavage is performed, suggest endotracheal and/or esophageal control. Danger from lung aspiration must be weighed against toxicity when considering emptying the stomach. Treatment of exposure should be directed at the control of symptoms and the clinical condition of the patient.

5. Fire Fighting Measures

Extinguishing Media: In case of fire, use water fog, foam, dry powder, carbon dioxide.

Fire Fighting Procedures: Down-wind personnel must be evacuated. Fire debris must be disposed of in accordance with local regulations. Do not discharge extinguishing waters into streams, rivers and lakes.

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).

Unusual Fire and Explosion Hazards: During a fire, smoke may contain the original material in addition to combustion products of varying composition which may be toxic and/or irritating. Will support combustion. Violent eruption of containers may occur under fire conditions.

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: Carbon dioxide. Carbon monoxide. Hydrogen chloride. Hydrogen fluoride. Phosphorous compounds. Phosphorus oxides.

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. Spilled material may cause a slipping hazard.

Environmental Precautions: Dike to prevent contamination of ground and surface water, then transfer into closed containers. Recover if possible, or dispose of according to applicable regulations.

7. Handling and Storage

Handling

General Handling: Keep equipment clean.

Storage

Keep in a cool place, heat causes an increase in pressure and risk of bursting.

Storage Period: 15 Months
Storage temperature: 15 - 25 °C

8. Exposure Controls / Personal Protection

Exposure Limits

Component	List	Type	Value
Diethylene glycol	Ireland OELV	TWA	100 mg/m ³ 23 ppm
	WEEL	TWA	10 mg/m ³
	UK WEL	TWA	101 mg/m ³ 23 ppm
1,1,1,2-Tetrafluoroethane	WEEL	TWA	4,240 mg/m ³ 1,000 ppm
	UK WEL	TWA	4,240 mg/m ³ 1,000 ppm

Personal Protection

Eye/Face Protection: Use chemical goggles. Chemical goggles should be consistent with EN 166 or equivalent.

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.

Hand protection: Use chemical resistant gloves classified under Standard EN374: Protective gloves against chemicals and micro-organisms. Examples of acceptable glove barrier materials include: Viton. Polyethylene. Chlorinated polyethylene. Polyvinyl alcohol ("PVA"). Ethyl vinyl alcohol laminate ("EVAL"). Examples of preferred glove barrier materials include: Natural rubber ("latex"). Nitrile/butadiene rubber ("nitrile" or "NBR"). Avoid gloves made of: Butyl rubber. When prolonged or frequently repeated contact may occur, a glove with a protection class of 4 or higher (breakthrough time greater than 120 minutes according to EN 374) is recommended. When only brief contact is expected, a glove with a protection class of 1 or higher (breakthrough time greater than 10 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: If tetrafluoroethane levels are above the guideline or unknown, wear supplied air. If tetrafluoroethane levels are below the guideline, but an air purifying cartridge is required for other components of this product, wear the following: 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: Provide general and/or local exhaust ventilation to control airborne levels below the exposure guidelines. Lethal concentrations may exist in areas with poor ventilation.

9. Physical and Chemical Properties

Physical State	Foam
Color	Brown
Odor	Characteristic
Flash Point - Closed Cup	No test data available
Flammable Limits In Air	Lower: No test data available Upper: No test data available
Autoignition Temperature	No test data available
Vapor Pressure	No test data available
Boiling Point (760 mmHg)	No test data available.
Vapor Density (air = 1)	3.5 (1,1,1,2-tetrafluoroethane)
Specific Gravity (H₂O = 1)	No test data available
Freezing Point	No test data available
Melting Point	No test data available
Solubility in Water (by weight)	Moderate
pH	No test data available
Dynamic Viscosity	Not applicable

10. Stability and Reactivity

Stability/Instability

Conditions to Avoid: Exposure to elevated temperatures can cause product to decompose. Because of high vapour pressure, containers are liable to burst if temperature rises.

Hazardous Decomposition Products: Unlikely to be formed under normal industrial use.

Hazardous Polymerization

Will not occur by itself.

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. Single dose oral LD50 has not been determined. Estimated LD50, Rat > 2,000 mg/kg

Eye Contact

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

Skin Contact

Brief contact may cause slight skin irritation with local redness.

Skin Absorption

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

The dermal LD50 has not been determined. Estimated LD50, Rabbit > 2,000 mg/kg

Inhalation

Prolonged excessive exposure may cause adverse effects. In confined or poorly ventilated areas, vapor can easily accumulate and can cause unconsciousness and death due to displacement of oxygen. May cause respiratory irritation and central nervous system depression. Excessive exposure may increase sensitivity to epinephrine and increase myocardial irritability (irregular heartbeats). Symptoms of excessive exposure may be anesthetic or narcotic effects; dizziness and drowsiness may be observed.

Repeated Dose Toxicity

Contains a component which is reported to be a weak organophosphate-type cholinesterase inhibitor. Excessive exposure may produce organophosphate type cholinesterase inhibition. Signs and symptoms of excessive exposure may be headache, dizziness, incoordination, muscle twitching, tremors, nausea, abdominal cramps, diarrhea, sweating, pinpoint pupils, blurred vision, salivation, tearing, tightness in chest, excessive urination, convulsions. For the component(s) tested: In animals, effects have been reported on the following organs: Liver. Bone marrow. Kidney. Central nervous system. Bladder. Gastrointestinal tract. Adrenal gland.

Chronic Toxicity and Carcinogenicity

For the component(s) tested: Did not cause cancer in laboratory animals.

Developmental Toxicity

For the component(s) tested: Has been toxic to the fetus in lab animals at doses toxic to the mother. For similar material(s): Has been toxic to the fetus in lab animals at doses nontoxic to the mother. Did not cause birth defects in laboratory animals. Diethylene glycol has caused toxicity to the fetus and some birth defects at maternally toxic, high doses in animals. Other animal studies have not reproduced birth defects even at much higher doses that caused severe maternal toxicity.

Reproductive Toxicity

For the minor component(s): In laboratory animal studies, effects on reproduction have been seen only at doses that produced significant toxicity to the parent animals.

Genetic Toxicology

In vitro genetic toxicity studies were negative for component(s) tested. For the minor component(s): (triethyl phosphate) In vitro genetic toxicity studies were negative in some cases and positive in other cases. Genetic toxicity studies in animals were negative for component(s) tested. For the minor component(s): (triethyl phosphate) Animal genetic toxicity studies were negative in some cases and positive in other cases.

12. Ecological Information

CHEMICAL FATE

Data for Component: **Propylene glycol-propylene oxide polymer**

Movement & Partitioning

No bioconcentration is expected because of the relatively high molecular weight (MW greater than 1000).

Persistence and Degradability

For this family of materials: Based on stringent OECD test guidelines, this material cannot be considered as readily biodegradable; however, these results do not necessarily mean that the material is not biodegradable under environmental conditions.

Data for Component: Polyester polyol**Movement & Partitioning**

Based largely or completely on data for major component(s): Bioconcentration potential is low (BCF < 100 or Log Pow < 3). Potential for mobility in soil is low (Koc between 500 and 2000). Given its very low Henry's constant, volatilization from natural bodies of water or moist soil is not expected to be an important fate process.

Persistence and Degradability

Based largely or completely on data for major component(s): Biodegradation may occur under aerobic conditions (in the presence of oxygen).

Data for Component: Diethylene glycol**Movement & Partitioning**

Bioconcentration potential is low (BCF less than 100 or log Pow less than 3). Potential for mobility in soil is very high (Koc between 0 and 50). Given its very low Henry's constant, volatilization from natural bodies of water or moist soil is not expected to be an important fate process.

Henry's Law Constant (H): 7.96E-10 atm*m3/mole; 25 °C Estimated

Partition coefficient, n-octanol/water (log Pow): -1.47 Estimated

Partition coefficient, soil organic carbon/water (Koc): < 1 Estimated

Persistence and Degradability

Material is readily biodegradable. Passes OECD test(s) for ready biodegradability. Material is ultimately biodegradable (reaches > 70% mineralization in OECD test(s) for inherent biodegradability).

OECD Biodegradation Tests:

Biodegradation	Exposure Time	Method
92 %	28 d	OECD 301C Test
82 - 98 %	28 d	OECD 302C Test

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

Data for Component: 2-ethylhexanoic acid potassium salt**Movement & Partitioning**

Based largely or completely on information for similar material(s). Bioconcentration potential is low (BCF < 100 or Log Pow < 3). Potential for mobility in soil is very high (Koc between 0 and 50).

Persistence and Degradability

Based largely or completely on information for similar material(s). Material is expected to be readily biodegradable. Material is ultimately biodegradable (reaches > 70% mineralization in OECD test(s) for inherent biodegradability).

Data for Component: **Triethyl phosphate****Movement & Partitioning**

Bioconcentration potential is low (BCF < 100 or Log Pow < 3). Potential for mobility in soil is very high (Koc between 0 and 50). Given its very low Henry's constant, volatilization from natural bodies of water or moist soil is not expected to be an important fate process.

Henry's Law Constant (H): 3.60E-08 atm*m3/mole Measured

Partition coefficient, n-octanol/water (log Pow): 0.80 Measured

Partition coefficient, soil organic carbon/water (Koc): 48 Estimated

Data for Component: **Tris(1-chloro-2-propyl) phosphate****Movement & Partitioning**

Bioconcentration potential is low (BCF < 100 or Log Pow < 3). Potential for mobility in soil is low (Koc between 500 and 2000).

Henry's Law Constant (H): < 1.35E-5 atm*m3/mole; 25 °C Estimated

Partition coefficient, n-octanol/water (log Pow): 2.59 Measured

Partition coefficient, soil organic carbon/water (Koc): 1,300 Estimated

Bioconcentration Factor (BCF): 0.8 - 4.6; common carp (Cyprinus carpio); Measured

Persistence and Degradability

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
14 %	28 d	OECD 301E Test

Data for Component: **Polyether polyol "B"****Movement & Partitioning**

No bioconcentration is expected because of the relatively high molecular weight (MW greater than 1000).

Persistence and Degradability

For this family of materials: Based on stringent OECD test guidelines, this material cannot be considered as readily biodegradable; however, these results do not necessarily mean that the material is not biodegradable under environmental conditions.

Data for Component: **Polyether polyol "E"****Movement & Partitioning**

No bioconcentration is expected because of the relatively high water solubility.

Persistence and Degradability

Based largely or completely on information for similar material(s). Material is inherently biodegradable (reaches > 20% biodegradation in OECD test(s) for inherent biodegradability).

ECOTOXICITYData for Component: **Propylene glycol-propylene oxide polymer**

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

Data for Component: **Polyester polyol**

Not expected to be acutely toxic to aquatic organisms.

Data for Component: **Diethylene glycol**

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*), 96 h: > 1,000 mg/l

Aquatic Invertebrate Acute Toxicity

EC50, water flea *Daphnia magna*, 48 h, immobilization: 48,900 mg/l

Aquatic Plant Toxicity

EC50, diatom *Skeletonema costatum*, biomass growth inhibition, 72 h: > 1,000 mg/l

Toxicity to Micro-organisms

IC50, OECD 209 Test; activated sludge, respiration inhibition, 3 h: > 1,000 mg/l

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

Data for Component: 2-ethylhexanoic acid potassium salt

Based largely or completely on information for similar material(s). Material is harmful to aquatic organisms (LC50/EC50/IC50 between 10 and 100 mg/L in most sensitive species).

Data for Component: Triethyl phosphate

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, Japanese medaka (*Oryzias latipes*), static, 48 h: > 500 mg/l

Data for Component: Tris(1-chloro-2-propyl) phosphate

Material is harmful to aquatic organisms (LC50/EC50/IC50 between 10 and 100 mg/L in most sensitive species).

Fish Acute & Prolonged Toxicity

LC50, bluegill (*Lepomis macrochirus*), 96 h: 84 mg/l

Aquatic Invertebrate Acute Toxicity

EC50, water flea *Daphnia magna*, 48 h, immobilization: 63 mg/l

Aquatic Plant Toxicity

EC50, green alga *Selenastrum capricornutum*, biomass growth inhibition, 96 h: 47 mg/l

EC50, alga *Scenedesmus* sp., biomass growth inhibition, 72 h: 45 mg/l

Toxicity to Micro-organisms

EC50, OECD 209 Test; activated sludge, respiration inhibition, 3 h: 784 mg/l

Aquatic Invertebrates Chronic Toxicity Value:

ChV Value mg/l	Species	Test Type	Endpoint	Exposure Time
> 32 mg/l	water flea <i>Daphnia magna</i>	static renewal	number of offspring	21 d

Data for Component: Polyether polyol "B"

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

Data for Component: Polyether polyol "E"

Based largely or completely on information for similar material(s). Material is not classified as dangerous to aquatic organisms (LC50/EC50/IC50 greater than 100 mg/L in most sensitive species).

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. Refer to manufacturer/supplier for information on recovery/recycling. Any disposal practice must be in compliance with all local and national laws and regulations.

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 :

R22 - Harmful if swallowed.

Safety Phrases :

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

S51 - Use only in well-ventilated areas.

S2 - Keep out of the reach of children.

Container is under pressure.
Keep out of reach of children.
Protect from sun and temperatures above 50 °C.
During shipment and storage the product container must be kept closed and protected against direct sunlight.
Do not open with force or incinerate even after use.
To avoid risk for man and the environment, follow the use instructions.

16. Other Information

Risk-phrases in Section 2

R22	Harmful if swallowed.
R36	Irritating to eyes.
R52	Harmful to aquatic organisms.

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

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