

FROTH-PAK(TM) Kit SR

This Kit contains following products:

FROTH-PAK (TM) Isocyanate

FROTH-PAK (TM) Polyol SR



Safety Data Sheet
Dow Chemical Company Ltd
Safety Data Sheet according to Reg. (EC) N. 453/2010

Product Name: FROTH-PAK (TM) Isocyanate

Revision Date: 2013/02/11

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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.

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

1.1 Product identifiers

Product Name

FROTH-PAK™ Isocyanate

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses

Component for polyurethane manufacture.

1.3 Details of the supplier of the safety data sheet

COMPANY IDENTIFICATION

Dow Chemical Company Ltd
Diamond House, Lotus Park
Kingsbury Crescent
TW18 3AG Staines, Middlesex
United Kingdom

Customer Information Number:

0203 139 4000

SDSQuestion@dow.com

1.4 EMERGENCY TELEPHONE NUMBER

24-Hour Emergency Contact:

0031 115 694 982

Local Emergency Contact:

00 31 115 69 4982

Section 2. Hazards Identification

2.1 Classification of the substance or mixture

Classification according to EU Directives 67/548/EEC or 1999/45/EC

	Carcinogen category 3.	R40	Limited evidence of a carcinogenic effect.
Xn		R20	Harmful by inhalation.
Xn		R48/20	Harmful: danger of serious damage to health by prolonged exposure through inhalation.
Xi		R36/37/	Irritating to eyes, respiratory system and

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

2.2 Label elements

Labelling according to EC Directives

Hazard Symbol:

Xn - Harmful.

Risk Phrases :

R40 - Limited evidence of a carcinogenic effect.

R20 - Harmful by inhalation.

R48/20 - Harmful: danger of serious damage to health by prolonged exposure through inhalation.

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

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

Safety Phrases :

S1/2 - Keep locked up out of reach of children.

S23 - Do not breathe spray.

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

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

S51 - Use only in well-ventilated areas.

S56 - Dispose of this material and its container to hazardous or special waste collection point.

Contains: Methylenediphenyl diisocyanate, homopolymer
Diphenylmethane-4,4'-di-isocyanate

Contains isocyanates. See information supplied by the manufacturer.

Pressurized container: protect from sunlight and do not expose to temperatures exceeding 50 °C.
Do not pierce or burn, even after use.

2.3 Other Hazards

No information available.

Section 3. Composition/information on ingredients

3.2 Mixture

This product is a mixture.

CAS-No. / EC-No. / Index	REACH No.	Amount	Component	Classification: REGULATION (EC) No 1272/2008
CAS-No. 39310-05-9 EC-No. NLP	—	40.0 - 60.0 %	Methylenediphenyl diisocyanate, homopolymer	Acute Tox., 4, H332 Skin cor/irr, 2, H315 Eye cor/irr, 2, H319 Resp. Sens., 1, H334 Skin Sens., 1, H317 Carc., 2, H351 STOT SE, 3, H335 STOT RE, 2, H373
CAS-No. 101-68-8 EC-No. 202-966-0 Index 615-005-00-9	—	40.0 - 60.0 %	Diphenylmethane-4,4'-di-isocyanate	Acute Tox., 4, H332 Eye cor/irr, 2, H319 Skin cor/irr, 2, H315 Skin Sens., 1, H317 Resp. Sens., 1, H334 STOT SE, 3, H335 STOT RE, 2, H373

Carc., 2, H351

CAS-No. 811-97-2	—	5.0 - 10.0 %	1,1,1,2- Tetrafluoroethane #	Not classified
EC-No. 212-377-0				

CAS-No. / EC-No. / Index	Amount	Component	Classification: 67/548/EEC
CAS-No. 39310-05-9 EC-No. NLP	40.0 - 60.0 %	Methylenediphenyl diisocyanate, homopolymer	Carc. 3: R40; Xn: R20, R48/20; Xi: R36/37/38; R42/43
CAS-No. 101-68-8 EC-No. 202-966-0 Index 615-005-00-9	40.0 - 60.0 %	Diphenylmethane-4,4'-di-isocyanate	Carc. 3: R40; Xn: R20, R48/20; Xi: R36/37/38; R42/43
CAS-No. 811-97-2 EC-No. 212-377-0	5.0 - 10.0 %	1,1,1,2-Tetrafluoroethane#	Not classified.

Substance(s) with an Occupational Exposure Limit.

For the full text of the H-Statements mentioned in this Section, see Section 16.

See Section 16 for full text of R-phrases.

Section 4. First-aid measures

4.1 Description of first aid measures

General advice: First Aid responders should pay attention to self-protection and use the recommended protective clothing (chemical resistant gloves, splash protection). If potential for exposure exists refer to Section 8 for specific personal protective equipment.

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.

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. Suitable emergency safety shower facility should be available in work area.

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. Suitable emergency eye wash facility should be immediately available.

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

4.2 Most important symptoms and effects, both acute and delayed

Aside from the information found under Description of first aid measures (above) and Indication of immediate medical attention and special treatment needed (below), no additional symptoms and effects are anticipated.

4.3 Indication of immediate medical attention and special treatment needed

Maintain adequate ventilation and oxygenation of the patient. 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. 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. Treatment of exposure should be directed at the control of symptoms and the clinical condition of the patient.

Excessive exposure may aggravate preexisting asthma and other respiratory disorders (e.g. emphysema, bronchitis, reactive airways dysfunction syndrome).

Section 5. Fire Fighting Measures

5.1 Extinguishing Media

Water fog or fine spray. Dry chemical fire extinguishers. Carbon dioxide fire extinguishers. Foam. Alcohol resistant foams (ATC type) are preferred. General purpose synthetic foams (including AFFF) or protein foams may function, but will be less effective.

Extinguishing Media to Avoid: Do not use direct water stream. May spread fire.

5.2 Special hazards arising from the substance or mixture

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 fluoride. Hydrogen halides. Carbon dioxide.

Unusual Fire and Explosion Hazards: Some components of this product will burn in a fire situation. Container may vent and/or rupture due to fire. Vaporizes quickly at room temperature. Dense smoke is produced when product burns.

5.3 Advice for firefighters

Fire Fighting Procedures: Keep people away. Isolate fire and deny unnecessary entry. Stay upwind. Keep out of low areas where gases (fumes) can accumulate. Do not use direct water stream. May spread fire. 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. 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.

Section 6. Accidental Release Measures

6.1 Personal precautions, protective equipment and emergency procedures: Isolate area. Keep unnecessary and unprotected personnel from entering the area. Refer to Section 7, Handling, for additional precautionary measures. Keep personnel out of low areas. Keep upwind of spill. Spilled material may cause a slipping hazard. Ventilate area of leak or spill. If available, use foam to smother or suppress. See Section 10 for more specific information. Use appropriate safety equipment. For additional information, refer to Section 8, Exposure Controls and Personal Protection.

6.2 Environmental precautions: Prevent from entering into soil, ditches, sewers, waterways and/or groundwater. See Section 12, Ecological Information.

6.3 Methods and materials for containment and cleaning up: Contain spilled material if possible. Absorb with materials such as: Dirt. Vermiculite. Sand. Clay. Do NOT use absorbent materials such

as: Cement powder (Note: may generate heat). Collect in suitable and properly labeled open containers. Do not place in sealed containers. Suitable containers include: Metal drums. Plastic drums. Polylined fiber pacs. Wash the spill site with large quantities of water. Attempt to neutralize by adding suitable decontaminant solution: Formulation 1: sodium carbonate 5 - 10%; liquid detergent 0.2 - 2%; water to make up to 100%, OR Formulation 2: concentrated ammonia solution 3 - 8%; liquid detergent 0.2 - 2%; water to make up to 100%. If ammonia is used, use good ventilation to prevent vapor exposure. Contact Dow for clean-up assistance. See Section 13, Disposal Considerations, for additional information.

Section 7. Handling and Storage

7.1 Precautions for safe handling

Handling

General Handling: Use only with adequate ventilation. Avoid breathing vapor. Avoid contact with eyes, skin, and clothing. Avoid prolonged or repeated contact with skin. Wash thoroughly after handling. Keep container tightly closed. Contents under pressure. Do not puncture or incinerate container. Do not enter confined spaces unless adequately ventilated. See Section 8, EXPOSURE CONTROLS AND PERSONAL PROTECTION.

Other Precautions: Spills of these organic materials on hot fibrous insulations may lead to lowering of the autoignition temperatures possibly resulting in spontaneous combustion.

7.2 Conditions for safe storage, including any incompatibilities

Storage

Store in a dry place. Protect from atmospheric moisture. Do not store product contaminated with water to prevent potential hazardous reaction. See Section 10 for more specific information. Additional storage and handling information on this product may be obtained by calling your sales or customer service contact.

Storage Period:
15 Months

Storage temperature:
15 - 25 °C

7.3 Specific end uses

See the technical data sheet on this product for further information.

Section 8. Exposure Controls / Personal Protection

8.1 Control parameters

Exposure Limits

Component	List	Type	Value
Diphenylmethane-4,4'-di-isocyanate	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	AIHA WEEL	TWA	4,240 mg/m3 1,000 ppm
	UK WEL	TWA	4,240 mg/m3 1,000 ppm

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

8.2 Exposure controls

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 preferred glove barrier materials include: Butyl rubber. Polyethylene. Chlorinated polyethylene. Ethyl vinyl alcohol laminate ("EVAL"). Examples of acceptable glove barrier materials include: Viton. Neoprene. 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. In confined or poorly ventilated areas, use an approved 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. Lethal concentrations may exist in areas with poor ventilation.

Section 9. Physical and Chemical Properties

9.1 Information on basic physical and chemical properties

Appearance

Physical State	Liquid.
Color	Yellow
Odor	Characteristic
Odor Threshold	0.4 ppm <i>Based on Literature for MDI.</i> Odor is inadequate warning of excessive exposure.
pH	No test data available
Melting Point	No test data available
Freezing Point	No test data available
Boiling Point (760 mmHg)	No test data available.
Flash Point - Closed Cup	No test data available
Evaporation Rate (Butyl Acetate = 1)	No test data available
Flammability (solid, gas)	Not applicable to liquids
Flammable Limits In Air	Lower: No test data available Upper: No test data available
Vapor Pressure	No test data available
Vapor Density (air = 1)	No test data available
Specific Gravity (H₂O = 1)	No test data available

Solubility in water (by weight)	insoluble, reacts, evolution of CO ₂
Partition coefficient, n-octanol/water (log Pow)	Reacts with water.
Autoignition Temperature	No test data available
Decomposition Temperature	No test data available
Dynamic Viscosity	Not applicable
Explosive properties	Not explosive
Oxidizing properties	No

9.2 Other information

Section 10. Stability and Reactivity

10.1 Reactivity

No dangerous reaction known under conditions of normal use.

10.2 Chemical stability

Stable under recommended storage conditions. See Storage, Section 7. Unstable at elevated temperatures.

10.3 Possibility of hazardous reactions

Can occur. Elevated temperatures can cause hazardous polymerization.

10.4 Conditions to Avoid: Avoid temperatures above 50 °C. Elevated temperatures can cause container to vent and/or rupture. Exposure to elevated temperatures can cause product to decompose.

10.5 Incompatible Materials: Avoid contact with: Acids. Alcohols. Amines. Ammonia. Bases. Metal compounds. Strong oxidizers. Products based on diisocyanates like TDI and MDI react with many materials to release heat. The reaction rate increases with temperature as well as with increased contact; these reactions can become violent. Contact is increased by stirring or if the other material acts as a solvent. Products based on diisocyanates such as TDI and MDI are not soluble in water and will 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.

10.6 Hazardous decomposition products

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

Section 11. Toxicological Information

11.1 Information on toxicological effects

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.

As product: Single dose oral LD₅₀ has not been determined.

Based on information for component(s): Estimated. LD₅₀, rat > 5,000 mg/kg

Aspiration hazard

Based on physical properties, not likely to be an aspiration hazard.

Dermal

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

As product: The dermal LD₅₀ has not been determined.

Based on information for component(s): Estimated. LD₅₀, rabbit > 2,000 mg/kg

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.

As product: The LC50 has not been determined.

Eye damage/eye irritation

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

Skin corrosion/irritation

Prolonged contact may cause skin irritation with local redness. May stain skin.

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 respirable 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. Contains component(s) which did not cause birth defects; however, in laboratory animals, other toxic effects to the fetus have been seen. Did not cause birth defects in laboratory animals.

Reproductive Toxicity

No relevant data found.

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.

Component Toxicology - Methylenediphenyl diisocyanate, homopolymer

Inhalation	LC50, 4 h, Aerosol, rat 0.49 mg/l
Inhalation	For similar material(s): 2,4'-Diphenylmethane diisocyanate (CAS 5873-54-1). LC50, 4 h, Aerosol, rat 0.31 mg/l
Inhalation	For similar material(s): 4,4'-Methylenediphenyl diisocyanate (CAS 101-68-8). LC50, 1 h, Aerosol, rat 2.24 mg/l
Component Toxicology - 4,4' -Methylenediphenyl diisocyanate	
Inhalation	LC50, 1 h, Aerosol, rat 2.24 mg/l
Component Toxicology - 1,1,1,2-Tetrafluoroethane	
Inhalation	LC50, 4 h, rat > 500,000 ppm

Section 12. Ecological Information

12.1 Toxicity

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/LL50/EL50 greater than 100 mg/L in most sensitive species).

Fish Acute & Prolonged Toxicity

Based on information for a similar material: LC50, Danio rerio (zebra fish), static test, 96 h: > 1,000 mg/l

Aquatic Invertebrate Acute Toxicity

Based on information for a similar material: EC50, Daphnia magna (Water flea), static test, 24 h: > 1,000 mg/l

Aquatic Plant Toxicity

Based on information for a similar material: NOEC, Desmodesmus subspicatus (green algae), static test, Growth rate inhibition, 72 h: 1,640 mg/l

Toxicity to Micro-organisms

Based on information for a similar material: EC50, activated sludge test (OECD 209), Respiration inhibition, 3 h: > 100 mg/l

Toxicity to Soil Dwelling Organisms

EC50, Eisenia fetida (earthworms), 14 d: > 1,000 mg/kg

Data for Component: Diphenylmethane-4,4'-di-isocyanate

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/LL50/EL50 greater than 100 mg/L in most sensitive species).

Fish Acute & Prolonged Toxicity

Based on information for a similar material: LC50, Danio rerio (zebra fish), static test, 96 h: > 1,000 mg/l

Aquatic Invertebrate Acute Toxicity

Based on information for a similar material: EC50, Daphnia magna (Water flea), static test, 24 h: > 1,000 mg/l

Aquatic Plant Toxicity

Based on information for a similar material: NOEC, Desmodesmus subspicatus (green algae), static test, Growth rate inhibition, 72 h: 1,640 mg/l

Toxicity to Micro-organisms

Based on information for a similar material: EC50, activated sludge test (OECD 209), Respiration inhibition, 3 h: > 100 mg/l

Toxicity to Soil Dwelling Organisms

EC50, Eisenia fetida (earthworms), 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/LL50/EL50 greater than 100 mg/L in most sensitive species).

Fish Acute & Prolonged Toxicity

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

Aquatic Invertebrate Acute Toxicity

EC50, Daphnia magna (Water flea), 48 h, immobilization: 980 mg/l

12.2 Persistence and Degradability

Data for Component: Methylenediphenyl diisocyanate, homopolymer

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.

OECD Biodegradation Tests: Based on information for a similar material:

Biodegradation	Exposure Time	Method	10 Day Window
0 %	28 d	OECD 302C Test	Not applicable

Data for Component: Diphenylmethane-4,4'-di-isocyanate

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.

OECD Biodegradation Tests: Based on information for a similar material:

Biodegradation	Exposure Time	Method	10 Day Window
0 %	28 d	OECD 302C Test	Not applicable

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

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	10 Day Window
4 %	28 d	OECD 301D Test	fail

12.3 Bioaccumulative potential

Data for Component: Methylenediphenyl diisocyanate, homopolymer

Bioaccumulation: Bioconcentration potential is low (BCF < 100 or Log Pow < 3).

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

Bioconcentration Factor (BCF): Bioconcentration potential is low (BCF < 100 or Log Pow < 3). 92; Cyprinus carpio (Carp)

Data for Component: Diphenylmethane-4,4'-di-isocyanate

Bioaccumulation: Bioconcentration potential is low (BCF < 100 or Log Pow < 3).

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

Bioconcentration Factor (BCF): Bioconcentration potential is low (BCF < 100 or Log Pow < 3). 92; Cyprinus carpio (Carp)

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

Bioaccumulation: Bioconcentration potential is low (BCF < 100 or Log Pow < 3).

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

12.4 Mobility in soil

Data for Component: Methylenediphenyl diisocyanate, homopolymer

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

Data for Component: Diphenylmethane-4,4'-di-isocyanate

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

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

Mobility in soil: Potential for mobility in soil is high (Koc between 50 and 150).

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

Henry's Law Constant (H): 5.00E-02 atm*m3/mole; 25 °C Measured

12.5 Results of PBT and vPvB assessment

Data for Component: Methylenediphenyl diisocyanate, homopolymer

This substance is not considered to be persistent, bioaccumulating and toxic (PBT).

Data for Component: Diphenylmethane-4,4'-di-isocyanate

This substance is not considered to be persistent, bioaccumulating and toxic (PBT).

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

This substance is not considered to be persistent, bioaccumulating and toxic (PBT). This substance is not considered to be very persistent and very bioaccumulating (vPvB).

12.6 Other adverse effects

Product contains no ozone-depleting components.

Section 13. Disposal Considerations

13.1 Waste treatment methods

This product, when being disposed of in its unused and uncontaminated state should be treated as a hazardous waste according to EC Directive 2008/98/EC. Any disposal practices must be in compliance with all national and provincial laws and any municipal or local by-laws governing hazardous waste. For used, contaminated and residual materials additional evaluations may be required. Do not dump into any sewers, on the ground, or into any body of water. Incineration under approved, controlled conditions using incinerators suitable or designed for the disposal of hazardous chemical wastes, is the preferred method for disposal. Small quantities of waste may be pretreated for example with polyol, to neutralise prior to disposal. Empty drums should be decontaminated (see Section 6) and either punctured and scrapped or given to an approved drum reconditioner.

Section 14. Transport Information

ADR/RID

14.1 UN number

UN3500

14.2 UN proper shipping name

Proper Shipping Name: CHEMICAL UNDER PRESSURE, N.O.S.

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

14.3 Transport hazard class(es)

Hazard Class: 2.2

14.4 Packing Group

Not applicable

14.5 Environmental hazards

Not considered environmentally hazardous based on available data

14.6 Special precautions for user

Special Provisions: no data available

Hazard identification No:20

ADNR / ADN

14.1 UN number

UN3500

14.2 UN proper shipping name

Proper Shipping Name: CHEMICAL UNDER PRESSURE, N.O.S.

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

14.3 Transport hazard class(es)

Hazard Class: 2.2

14.4 Packing Group

Not applicable

14.5 Environmental hazards

Not considered environmentally hazardous based on available data

14.6 Special precautions for user

no data available

IMDG

14.1 UN number

UN3500

14.2 UN proper shipping name

Proper Shipping Name: CHEMICAL UNDER PRESSURE, N.O.S.

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

14.3 Transport hazard class(es)

Hazard Class: 2.2

14.4 Packing Group

Not applicable

14.5 Environmental hazards

Not considered environmentally hazardous based on available data

14.6 Special precautions for user

EMS Number: F-C,S-V

14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Not applicable

ICAO/IATA**14.1 UN number**

UN3500

14.2 UN proper shipping name

Proper Shipping Name: CHEMICAL UNDER PRESSURE, N.O.S.

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

14.3 Transport hazard class(es)

Hazard Class: 2.2

14.4 Packing Group

Not applicable

14.5 Environmental hazards

Not considered environmentally hazardous based on available data

14.6 Special precautions for user

no data available

Section 15. Regulatory Information**15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture****European Inventory of Existing Commercial Chemical Substances (EINECS)**

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

15.2 Chemical Safety Assessment

Not applicable.

Section 16. Other Information**Hazard statement in the composition section**

H315	Causes skin irritation.
H317	May cause an allergic skin reaction.
H319	Causes serious eye irritation.
H332	Harmful if inhaled.
H334	May cause allergy or asthma symptoms or breathing difficulties if inhaled.
H335	May cause respiratory irritation.
H351	Suspected of causing cancer.
H373	May cause damage to organs through prolonged or repeated exposure.

Risk-phrases in the Composition section

R20	Harmful by inhalation.
R36/37/38	Irritating to eyes, respiratory system and skin.
R40	Limited evidence of a carcinogenic effect.
R42/43	May cause sensitization by inhalation and skin contact.
R48/20	Harmful: danger of serious damage to health by prolonged exposure through inhalation.

Product Literature

Additional information on this product may be obtained by calling your sales or customer service contact.

Revision

Identification Number: 82662 / 3005 / Issue Date 2013/02/11 / Version: 8.0

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
Safety Data Sheet according to Reg. (EC) N. 453/2010

Product Name: FROTH-PAK (TM) Polyol SR

Revision Date: 2013/02/11

Print Date: 03 Apr 2013

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.

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

1.1 Product identifiers

Product Name

FROTH-PAK™ Polyol SR

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses

Component for polyurethane manufacture. Thermal insulation.

1.3 Details of the supplier of the safety data sheet

COMPANY IDENTIFICATION

Dow Chemical Company Ltd
Diamond House, Lotus Park
Kingsbury Crescent
TW18 3AG Staines, Middlesex
United Kingdom

Customer Information Number:

0203 139 4000

SDSQuestion@dow.com

1.4 EMERGENCY TELEPHONE NUMBER

24-Hour Emergency Contact:

0031 115 694 982

Local Emergency Contact:

00 31 115 69 4982

Section 2. Hazards Identification

2.1 Classification of the substance or mixture

Classification according to EU Directives 67/548/EEC or 1999/45/EC

Xn

R22

Harmful if swallowed.

2.2 Label elements

Labelling according to EC Directives

Hazard Symbol:

®(TM)*Trademark

Xn - Harmful.

Risk Phrases :

R22 - Harmful if swallowed.

Safety Phrases :

S2 - Keep out of the reach of children.

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).

S51 - Use only in well-ventilated areas.

S56 - Dispose of this material and its container to hazardous or special waste collection point.

Contains: Tris(1-chloro-2-propyl) phosphate

Pressurized container: protect from sunlight and do not expose to temperatures exceeding 50 °C.

Do not pierce or burn, even after use.

2.3 Other Hazards

No information available.

Section 3. Composition/information on ingredients

3.2 Mixture

This product is a mixture.

CAS-No. / EC-No. / REACH No. Index	Amount	Component	Classification: REGULATION (EC) No 1272/2008
CAS-No. 811-97-2 EC-No. 212-377-0	— 15.0 - 30.0 %	1,1,1,2-Tetrafluoroethane #	Not classified
CAS-No. Not available EC-No. Polymer	— 15.0 - 30.0 %	Polyether polyol##	Not classified
CAS-No. 13674-84-5 EC-No. 237-158-7	— 15.0 - < 25.0 %	Tris(1-chloro-2-propyl) phosphate	Acute Tox., 4, H302
CAS-No. Confidential EC-No. Polymer	— 10.0 - 20.0 %	Polyester polyol##	Not classified
CAS-No. 111-46-6 EC-No. 203-872-2 Index 603-140-00-6	— 2.5 - < 5.0 %	Diethylene glycol	Acute Tox., 4, H302 STOT RE, 2, H373
CAS-No. 78-40-0 EC-No. 201-114-5 Index	— 1.0 - < 2.5 %	Triethyl phosphate	Acute Tox., 4, H302 Eye cor/irr, 2, H319

015-013-00-7	—	1.0 - < 2.5 %	2-Ethylhexanoic acid potassium salt	Eye cor/irr, 2, H319
CAS-No. 3164-85-0				
EC-No. 221-625-7				

CAS-No. / EC-No. / Index	Amount	Component	Classification: 67/548/EEC
CAS-No. 811-97-2 EC-No. 212-377-0	15.0 - 30.0 %	1,1,1,2-Tetrafluoroethane#	Not classified.
CAS-No. Not available EC-No. Polymer	15.0 - 30.0 %	Polyether polyol##	Not classified.
CAS-No. 13674-84-5 EC-No. 237-158-7	15.0 - < 25.0 %	Tris(1-chloro-2-propyl) phosphate	Xn: R22
CAS-No. Confidential EC-No. Polymer	10.0 - 20.0 %	Polyester polyol##	Not classified.
CAS-No. 111-46-6 EC-No. 203-872-2 Index 603-140-00-6	2.5 - < 5.0 %	Diethylene glycol	Xn: R22
CAS-No. 78-40-0 EC-No. 201-114-5 Index 015-013-00-7	1.0 - < 2.5 %	Triethyl phosphate	Xn: R22
CAS-No. 3164-85-0 EC-No. 221-625-7	1.0 - < 2.5 %	2-Ethylhexanoic acid potassium salt	Xi: R36

Substance(s) with an Occupational Exposure Limit.

Voluntarily disclosed component(s).

For the full text of the H-Statements mentioned in this Section, see Section 16.

See Section 16 for full text of R-phrases.

Section 4. First-aid measures

4.1 Description of first aid measures

General advice: If potential for exposure exists refer to Section 8 for specific personal protective equipment. First Aid responders should pay attention to self-protection and use the recommended protective clothing (chemical resistant gloves, splash protection).

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.

Skin Contact: Wash skin with plenty of water.

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. Suitable emergency eye wash facility should be available in work area.

Ingestion: Do not induce vomiting. Call a physician and/or transport to emergency facility immediately.

4.2 Most important symptoms and effects, both acute and delayed

Aside from the information found under Description of first aid measures (above) and Indication of immediate medical attention and special treatment needed (below), no additional symptoms and effects are anticipated.

4.3 Indication of immediate medical attention and special treatment needed

Maintain adequate ventilation and oxygenation of the patient. 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. In severe poisoning, respiratory support with mechanical ventilation and positive end expiratory pressure may be required. If lavage is performed, suggest endotracheal and/or esophageal control. Danger from lung aspiration must be weighed against toxicity when considering emptying the stomach. Exposure may increase "myocardial irritability". Do not administer sympathomimetic drugs such as epinephrine unless absolutely necessary. Cholinesterase inhibition has been noted in human exposure but is not of benefit in determining exposure and is not correlated with signs of exposure. Treatment of exposure should be directed at the control of symptoms and the clinical condition of the patient.

Section 5. Fire Fighting Measures

5.1 Extinguishing Media

Water fog or fine spray. Dry chemical fire extinguishers. Carbon dioxide fire extinguishers. Foam. Alcohol resistant foams (ATC type) are preferred. General purpose synthetic foams (including AFFF) or protein foams may function, but will be less effective.

Extinguishing Media to Avoid: Do not use direct water stream. May spread fire.

5.2 Special hazards arising from the substance or mixture

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 monoxide. Carbon dioxide. Hydrogen halides.

Unusual Fire and Explosion Hazards: Container may rupture from gas generation in a fire situation. Blowing agent vaporizes quickly at room temperature. Violent steam generation or eruption may occur upon application of direct water stream to hot liquids.

5.3 Advice for firefighters

Fire Fighting Procedures: Keep people away. Isolate fire and deny unnecessary entry. Use water spray to cool fire exposed containers and fire affected zone until fire is out and danger of reignition has passed. 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. Burning liquids may be moved by flushing with water to protect personnel and minimize property damage. Contain fire water run-off if possible. Fire water run-off, if not contained, may cause environmental damage. Review the "Accidental Release Measures" and the "Ecological Information" sections of this (M)SDS.

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.

Section 6. Accidental Release Measures

6.1 Personal precautions, protective equipment and emergency procedures: Isolate area. Keep unnecessary and unprotected personnel from entering the area. Keep personnel out of confined or poorly ventilated areas. Keep upwind of spill. Ventilate area of leak or spill. Confined space entry procedures must be followed before entering the area. Refer to Section 7, Handling, for additional precautionary measures. Use appropriate safety equipment. For additional information, refer to Section 8, Exposure Controls and Personal Protection.

6.2 Environmental precautions: Prevent from entering into soil, ditches, sewers, waterways and/or groundwater. See Section 12, Ecological Information.

6.3 Methods and materials for containment and cleaning up: Contain spilled material if possible. Absorb with materials such as: Dirt. Sand. Sawdust. Collect in suitable and properly labeled containers. Wash the spill site with water. See Section 13, Disposal Considerations, for additional information.

Section 7. Handling and Storage

7.1 Precautions for safe handling

Handling

General Handling: Avoid contact with eyes. Avoid breathing vapor. Wash thoroughly after handling. Use with adequate ventilation. Keep container closed. Do not enter confined spaces unless adequately ventilated. This material is hygroscopic in nature. See Section 8, EXPOSURE CONTROLS AND PERSONAL PROTECTION.

Other Precautions: Spills of these organic materials on hot fibrous insulations may lead to lowering of the autoignition temperatures possibly resulting in spontaneous combustion.

7.2 Conditions for safe storage, including any incompatibilities

Storage

Store in a dry place. Avoid prolonged exposure to heat and air. Protect from atmospheric moisture. Blowing agent may migrate from product and accumulate in some storage situations. Elevated temperatures can cause pressure buildup in closed containers due to the release of blowing agents. See Section 10 for more specific information.

Storage Period:

15 Months

Storage temperature:

5 - 30 °C

7.3 Specific end uses

See the technical data sheet on this product for further information.

Section 8. Exposure Controls / Personal Protection

8.1 Control parameters

Exposure Limits

Component	List	Type	Value
1,1,1,2-Tetrafluoroethane	AIHA WEEL	TWA	4,240 mg/m ³ 1,000 ppm
	UK WEL	TWA	4,240 mg/m ³ 1,000 ppm
Diethylene glycol	AIHA WEEL	TWA	10 mg/m ³
	UK WEL	TWA	101 mg/m ³ 23 ppm
Triethyl phosphate	AIHA WEEL	TWA	7.45 mg/m ³

8.2 Exposure controls

Personal Protection

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

Skin Protection: Wear clean, body-covering clothing.

Hand protection: Use gloves chemically resistant to this material when prolonged or frequently repeated contact could occur. Use chemical resistant gloves classified under Standard EN374: Protective gloves against chemicals and micro-organisms. Examples of preferred glove barrier materials include: Chlorinated polyethylene. Polyethylene. Ethyl vinyl alcohol laminate ("EVAL"). Polyvinyl alcohol ("PVA"). Styrene/butadiene rubber. Viton. Examples of acceptable glove barrier materials include: Butyl rubber. Natural rubber ("latex"). Polyvinyl chloride ("PVC" or "vinyl"). 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: Respiratory protection should be worn when there is a potential to exceed the exposure limit requirements or guidelines. If there are no applicable exposure limit requirements or guidelines, use an approved respirator. When respiratory protection is required, use an approved positive-pressure self-contained breathing apparatus or positive-pressure airline with auxiliary self-contained air supply. For emergency conditions, use an approved positive-pressure self-contained breathing apparatus. In confined or poorly ventilated areas, use an approved self-contained breathing apparatus or positive pressure air line with auxiliary self-contained air supply.

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 engineering controls to maintain airborne level below exposure limit requirements or guidelines. If there are no applicable exposure limit requirements or guidelines, use only in enclosed systems or with local exhaust ventilation. Exhaust systems should be designed to move the air away from the source of vapor/aerosol generation and people working at this point. Lethal concentrations may exist in areas with poor ventilation.

Section 9. Physical and Chemical Properties

9.1 Information on basic physical and chemical properties

Appearance

Physical State	Liquid.
Color	Colorless
Odor	Characteristic
Odor Threshold	No test data available

pH	Not applicable
Melting Point	No test data available
Freezing Point	No test data available
Boiling Point (760 mmHg)	Not applicable.
Flash Point - Closed Cup	No test data available
Evaporation Rate (Butyl Acetate = 1)	No test data available
Flammability (solid, gas)	Not applicable to liquids
Flammable Limits In Air	Lower: No test data available Upper: No test data available
Vapor Pressure	Container is under pressure.
Vapor Density (air = 1)	No test data available
Specific Gravity (H₂O = 1)	1.1 - 1.2 25 °C/25 °C <i>Supplier</i>
Solubility in water (by weight)	partially miscible
Partition coefficient, n-octanol/water (log Pow)	No data available for this product. See Section 12 for individual component data.
Autoignition Temperature	No test data available
Decomposition Temperature	No test data available
Dynamic Viscosity	Not applicable
Kinematic Viscosity	Not applicable
Explosive properties	Not explosive
Oxidizing properties	No

9.2 Other information

Molecular Weight Not applicable

Section 10. Stability and Reactivity

10.1 Reactivity

No dangerous reaction known under conditions of normal use.

10.2 Chemical stability

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

10.3 Possibility of hazardous reactions

Polymerization will not occur by itself.

10.4 Conditions to Avoid: Product can oxidize at elevated temperatures. Elevated temperatures can cause pressure buildup in closed containers due to the release of blowing agents. Generation of gas during decomposition can cause pressure in closed systems.

10.5 Incompatible Materials: Avoid contact with oxidizing materials. Avoid contact with: Strong acids. Strong bases. Avoid unintended contact with isocyanates. The reaction of polyols and isocyanates generates heat.

10.6 Hazardous decomposition products

Decomposition products depend upon temperature, air supply and the presence of other materials. Decomposition products can include and are not limited to: Carbon dioxide. Alcohols. Ethers. Hydrocarbons. Hydrogen halides. Ketones. Polymer fragments.

Section 11. Toxicological Information

11.1 Information on toxicological effects

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. Signs

and symptoms of excessive exposure may include: May cause lacrimation (tears). Salivation. Convulsions. Tremors. Increased activity (hyperactivity).

As product: Single dose oral LD50 has not been determined.

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

Aspiration hazard

Based on available information, aspiration hazard could not be determined.

Dermal

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

As product: The dermal LD50 has not been determined.

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.

As product: The LC50 has not been determined.

Eye damage/eye irritation

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

Skin corrosion/irritation

Prolonged contact may cause slight skin irritation with local redness.

Sensitization

Skin

No relevant data found.

Respiratory

No relevant data found.

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. Contains component(s) which have been reported to cause effects on the following organs in humans: Kidney. Gastrointestinal tract. In animals, effects have been reported on the following organs: Liver.

Chronic Toxicity and Carcinogenicity

No relevant data found.

Developmental Toxicity

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. Contains component(s) which did not cause birth defects in animals; other fetal effects occurred only at doses toxic to the mother. Contains component(s) which, in laboratory animals, have been toxic to the fetus at doses nontoxic to the mother.

Reproductive Toxicity

In animal studies on component(s), effects on reproduction were seen only at doses that produced significant toxicity to the parent animals. Diethylene glycol did not interfere with reproduction in animal studies except at very high doses.

Genetic Toxicology

Contains component(s) which were negative in some in vitro genetic toxicity studies and positive in others. Contains component(s) which were negative in some animal genetic toxicity studies and positive in others.

Component Toxicology - 1,1,1,2-Tetrafluoroethane

Inhalation	LC50, 4 h, rat > 500,000 ppm
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Component Toxicology - Tris(1-chloro-2-propyl) phosphate

Inhalation	LC50, 4 h, Aerosol, rat > 7 mg/l
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Component Toxicology - Diethylene glycol

Inhalation	LC50, 4 h, Aerosol, rat > 4.6 mg/l
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Inhalation	The LC50 value is greater than the Maximum Attainable Concentration. No deaths occurred at this concentration.
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Component Toxicology - Triethyl phosphate

Inhalation	LC50, 4 h, Aerosol, rat > 2.35 mg/l
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Section 12. Ecological Information

12.1 Toxicity

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

Material is not classified as dangerous to aquatic organisms (LC50/EC50/IC50/LL50/EL50 greater than 100 mg/L in most sensitive species).

Fish Acute & Prolonged Toxicity

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

Aquatic Invertebrate Acute Toxicity

EC50, Daphnia magna (Water flea), 48 h, immobilization: 980 mg/l

Data for Component: **Polyether polyol**

For similar material(s): Material is not classified as dangerous to aquatic organisms.

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

Material is not classified as dangerous to aquatic organisms.

Fish Acute & Prolonged Toxicity

LC50, Lepomis macrochirus (Bluegill sunfish), static test, 96 h: 84 mg/l

Aquatic Invertebrate Acute Toxicity

EC50, Daphnia magna (Water flea), 48 h, immobilization: 131 mg/l

Aquatic Plant Toxicity

ErC50, Pseudokirchneriella subcapitata (green algae), static test, Growth rate inhibition, 96 h: 82 mg/l

Toxicity to Micro-organisms

EC50, activated sludge test (OECD 209), Respiration inhibition, 3 h: 784 mg/l

Aquatic Invertebrates Chronic Toxicity Value

Daphnia magna (Water flea), semi-static test, 21 d, number of offspring, NOEC: 32 mg/l

Data for Component: **Polyester polyol**

For similar material(s): Material is not classified as dangerous to aquatic organisms (LC50/EC50/IC50/LL50/EL50 greater than 100 mg/L in most sensitive species).

Data for Component: **Diethylene glycol**

Material is not classified as dangerous to aquatic organisms (LC50/EC50/IC50/LL50/EL50 greater than 100 mg/L in most sensitive species).

Fish Acute & Prolonged Toxicity

LC50, Pimephales promelas (fathead minnow), flow-through test, 96 h: 75,200 mg/l

Aquatic Invertebrate Acute Toxicity

EC50, Daphnia magna (Water flea), static test, 24 h, immobilization: > 10,000 mg/l

Toxicity to Micro-organisms

EC50, OECD 209 Test; activated sludge, Respiration inhibition, 3 h: > 1,000 mg/l

Data for Component: **Triethyl phosphate**

Material is not classified as dangerous to aquatic organisms (LC50/EC50/IC50/LL50/EL50 greater than 100 mg/L in most sensitive species).

Fish Acute & Prolonged Toxicity

LC50, Leuciscus idus (Golden orfe), static test, 48 h: 2,140 mg/l

Aquatic Invertebrate Acute Toxicity

EC50, Daphnia magna (Water flea), static test, 48 h, immobilization: 350 mg/l

Aquatic Plant Toxicity

EC50, Desmodesmus subspicatus (green algae), Growth rate inhibition, 72 h: 900 mg/l

Toxicity to Micro-organisms

EC50, activated sludge test (OECD 209), Respiration inhibition, 30 min: > 2,985 mg/l

Data for Component: **2-Ethylhexanoic acid potassium salt**

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

12.2 Persistence and Degradability

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

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	10 Day Window
4 %	28 d	OECD 301D Test	fail

Data for Component: **Polyether polyol**

Most polyols are expected to degrade only slowly in the environment.

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

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	10 Day Window
14 %	28 d	OECD 301E Test	fail
95 %	64 d	OECD 302A Test	Not applicable

Data for Component: **Polyester polyol**

No relevant data found.

Data for Component: **Diethylene glycol**

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

OECD Biodegradation Tests: Based on analogy.

Biodegradation	Exposure Time	Method	10 Day Window
90 - 100 %	20 d	OECD 301A Test	pass
82 - 98 %	28 d	OECD 302C Test	Not applicable

Data for Component: **Triethyl phosphate**

Material is ultimately biodegradable (reaches > 70% biodegradation in OECD test(s) for inherent biodegradability).

OECD Biodegradation Tests:

Biodegradation	Exposure Time	Method	10 Day Window
> 90 %	28 d	OECD 302B Test	Not applicable

Data for Component: **2-Ethylhexanoic acid potassium salt**

Based on information for a similar material: Material is expected to be readily biodegradable. Material is ultimately biodegradable (reaches > 70% biodegradation in OECD test(s) for inherent biodegradability).

12.3 Bioaccumulative potential

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

Bioaccumulation: Bioconcentration potential is low (BCF < 100 or Log Pow < 3).

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

Data for Component: **Polyether polyol**

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

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

Bioaccumulation: Bioconcentration potential is low (BCF < 100 or Log Pow < 3).

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

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

Data for Component: Polyester polyol

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

Data for Component: Diethylene glycol

Bioaccumulation: Bioconcentration potential is low (BCF < 100 or Log Pow < 3).

Partition coefficient, n-octanol/water (log Pow): -1.98 Estimated.

Bioconcentration Factor (BCF): 100; Fish; Measured

Data for Component: Triethyl phosphate

Bioaccumulation: Bioconcentration potential is low (BCF < 100 or Log Pow < 3).

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

Data for Component: 2-Ethylhexanoic acid potassium salt

Bioaccumulation: For similar material(s): Bioconcentration potential is low (BCF < 100 or Log Pow < 3).

12.4 Mobility in soil

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

Mobility in soil: Potential for mobility in soil is high (Koc between 50 and 150).

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

Henry's Law Constant (H): 5.00E-02 atm*m3/mole; 25 °C Measured

Data for Component: Polyether polyol

Mobility in soil: No relevant data found.

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

Mobility in soil: Potential for mobility in soil is slight (Koc between 2000 and 5000).

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

Henry's Law Constant (H): < 1.35E-05 atm*m3/mole; 25 °C Estimated.

Data for Component: Polyester polyol

Mobility in soil: No data available.

Data for Component: Diethylene glycol

Mobility in soil: 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., Potential for mobility in soil is very high (Koc between 0 and 50).

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

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

Data for Component: Triethyl phosphate

Mobility in soil: 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.

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

Henry's Law Constant (H): 3.60E-08 atm*m3/mole; 25 °C Measured

Data for Component: 2-Ethylhexanoic acid potassium salt

Mobility in soil: For similar material(s)., Potential for mobility in soil is very high (Koc between 0 and 50).

12.5 Results of PBT and vPvB assessment

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

This substance is not considered to be persistent, bioaccumulating and toxic (PBT). This substance is not considered to be very persistent and very bioaccumulating (vPvB).

Data for Component: Polyether polyol

This mixture contains no substance considered to be persistent, bioaccumulating and toxic (PBT).

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

This substance is not considered to be persistent, bioaccumulating and toxic (PBT). This substance is not considered to be very persistent and very bioaccumulating (vPvB).

Data for Component: Polyester polyol

This substance has not been assessed for persistence, bioaccumulation and toxicity (PBT).

Data for Component: Diethylene glycol

This substance is not considered to be persistent, bioaccumulating and toxic (PBT). This substance is not considered to be very persistent and very bioaccumulating (vPvB).

Data for Component: Triethyl phosphate

This substance has not been assessed for persistence, bioaccumulation and toxicity (PBT).

Data for Component: 2-Ethylhexanoic acid potassium salt

This substance has not been assessed for persistence, bioaccumulation and toxicity (PBT).

12.6 Other adverse effects

Product contains no ozone-depleting components.

Section 13. Disposal Considerations**13.1 Waste treatment methods**

Do not dump into any sewers, on the ground, or into any body of water. This product, when being disposed of in its unused and uncontaminated state should be treated as a hazardous waste according to EC Directive 2008/98/EC. Any disposal practices must be in compliance with all national and provincial laws and any municipal or local by-laws governing hazardous waste. For used, contaminated and residual materials additional evaluations may be required.

Section 14. Transport Information**ADR/RID****14.1 UN number**

UN3500

14.2 UN proper shipping name

Proper Shipping Name: CHEMICAL UNDER PRESSURE, N.O.S.

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

14.3 Transport hazard class(es)

Hazard Class: 2.2

14.4 Packing Group

Not applicable

14.5 Environmental hazards

Not considered environmentally hazardous based on available data

14.6 Special precautions for user

Special Provisions: no data available

Hazard identification No:20

ADNR / ADN**14.1 UN number**

UN3500

14.2 UN proper shipping name

Proper Shipping Name: CHEMICAL UNDER PRESSURE, N.O.S.

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

14.3 Transport hazard class(es)

Hazard Class: 2.2

14.4 Packing Group

Not applicable

14.5 Environmental hazards

Not considered environmentally hazardous based on available data

14.6 Special precautions for user

no data available

IMDG**14.1 UN number**

UN3500

14.2 UN proper shipping name

Proper Shipping Name: CHEMICAL UNDER PRESSURE, N.O.S.

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

14.3 Transport hazard class(es)

Hazard Class: 2.2

14.4 Packing Group

Not applicable

14.5 Environmental hazards

Not considered environmentally hazardous based on available data

14.6 Special precautions for user

EMS Number: F-C,S-V

14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Not applicable

ICAO/IATA**14.1 UN number**

UN3500

14.2 UN proper shipping name

Proper Shipping Name: CHEMICAL UNDER PRESSURE, N.O.S.

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

14.3 Transport hazard class(es)

Hazard Class: 2.2

14.4 Packing Group

Not applicable

14.5 Environmental hazards

Not considered environmentally hazardous based on available data

14.6 Special precautions for user

no data available

Section 15. Regulatory Information**15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture****European Inventory of Existing Commercial Chemical Substances (EINECS)**

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

15.2 Chemical Safety Assessment

Not applicable.

Section 16. Other Information**Hazard statement in the composition section**

H302	Harmful if swallowed.
H319	Causes serious eye irritation.
H373	May cause damage to organs through prolonged or repeated exposure.

Risk-phrases in the Composition section

R22	Harmful if swallowed.
R36	Irritating to eyes.

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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

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