

## (Z)-1,2,3,3,3-Pentafluoropropene

### Apollo Scientific

Chemwatch Hazard Alert Code: 2

Part Number: PC2923

Version No: 1.1

Safety Data Sheet (Conforms to Annex II of REACH (1907/2006) - Regulation 2020/878)

Issue Date: 26/05/2023

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S.REACH.GB-NIR.EN

## SECTION 1 Identification of the substance / mixture and of the company / undertaking

### 1.1. Product Identifier

Product name	(Z)-1,2,3,3,3-Pentafluoropropene
Synonyms	Not Available
Proper shipping name	LIQUEFIED GAS, N.O.S.
Other means of identification	Not Available

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

Relevant identified uses	Use according to manufacturer's directions.
Uses advised against	No specific uses advised against are identified.

### 1.3. Details of the manufacturer or supplier of the safety data sheet

Registered company name	Apollo Scientific
Address	Whitefield Road, Bredbury SK62QR United Kingdom
Telephone	01614060505
Fax	0161 406 0506
Website	<a href="http://www.apolloscientific.co.uk/">http://www.apolloscientific.co.uk/</a>
Email	sales@apolloscientific.co.uk

### 1.4. Emergency telephone number


Association / Organisation	Not Available
Emergency telephone numbers	Not Available
Other emergency telephone numbers	Not Available

## SECTION 2 Hazards identification

### 2.1. Classification of the substance or mixture

Classification according to regulation (EC) No 1272/2008 [CLP] and amendments [1]	H336 - Specific Target Organ Toxicity - Single Exposure (Narcotic Effects) Category 3, H319 - Serious Eye Damage/Eye Irritation Category 2, H280 - Gases Under Pressure
Legend:	1. Classified by Chemwatch; 2. Classification drawn from Regulation (EU) No 1272/2008 - Annex VI

### 2.2. Label elements

Hazard pictogram(s)	
Signal word	Warning

### Hazard statement(s)

H336	May cause drowsiness or dizziness.
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<b>H319</b>	Causes serious eye irritation.
<b>H280</b>	Contains gas under pressure; may explode if heated.

**Supplementary Phrases**

<b>EUH044</b>	Risk of explosion if heated under confinement.
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**Precautionary statement(s) Prevention**

<b>P271</b>	Use only outdoors or in a well-ventilated area.
<b>P261</b>	Avoid breathing dust/fumes.
<b>P280</b>	Wear protective gloves, protective clothing, eye protection and face protection.
<b>P264</b>	Wash all exposed external body areas thoroughly after handling.

**Precautionary statement(s) Response**

<b>P305+P351+P338</b>	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
<b>P312</b>	Call a POISON CENTER/doctor/physician/first aider/if you feel unwell.
<b>P337+P313</b>	If eye irritation persists: Get medical advice/attention.
<b>P304+P340</b>	IF INHALED: Remove person to fresh air and keep comfortable for breathing.

**Precautionary statement(s) Storage**

<b>P405</b>	Store locked up.
<b>P410+P403</b>	Protect from sunlight. Store in a well-ventilated place.
<b>P403+P233</b>	Store in a well-ventilated place. Keep container tightly closed.

**Precautionary statement(s) Disposal**

<b>P501</b>	Dispose of contents/container to authorised hazardous or special waste collection point in accordance with any local regulation.
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**2.3. Other hazards**

REACH - Art.57-59: The mixture does not contain Substances of Very High Concern (SVHC) at the SDS print date.

**SECTION 3 Composition / information on ingredients**

**3.1.Substances**

See 'Composition on ingredients' in Section 3.2

**3.2.Mixtures**

1. CAS No 2.EC No 3.Index No 4.REACH No	%[weight]	Name	Classification according to regulation (EC) No 1272/2008 [CLP] and amendments	SCL / M-Factor	Nanoform Particle Characteristics
Not Available	100	(Z)-1,2,3,3,3-Pentafluoropropene	Not Applicable	Not Applicable	Not Available

**Legend:** 1. Classified by Chemwatch; 2. Classification drawn from Regulation (EU) No 1272/2008 - Annex VI; 3. Classification drawn from C&L; \* EU IOELVs available; [e] Substance identified as having endocrine disrupting properties

**SECTION 4 First aid measures**

**4.1. Description of first aid measures**

<b>Eye Contact</b>	<ul style="list-style-type: none"> <li>▶ If product comes in contact with eyes remove the patient from gas source or contaminated area.</li> <li>▶ Take the patient to the nearest eye wash, shower or other source of clean water.</li> <li>▶ Open the eyelid(s) wide to allow the material to evaporate.</li> <li>▶ Gently rinse the affected eye(s) with clean, cool water for at least 15 minutes. Have the patient lie or sit down and tilt the head back. Hold the eyelid(s) open and pour water slowly over the eyeball(s) at the inner corners, letting the water run out of the outer corners.</li> <li>▶ The patient may be in great pain and wish to keep the eyes closed. It is important that the material is rinsed from the eyes to prevent further damage.</li> <li>▶ Ensure that the patient looks up, and side to side as the eye is rinsed in order to better reach all parts of the eye(s)</li> <li>▶ Transport to hospital or doctor.</li> <li>▶ Even when no pain persists and vision is good, a doctor should examine the eye as delayed damage may occur.</li> <li>▶ If the patient cannot tolerate light, protect the eyes with a clean, loosely tied bandage.</li> <li>▶ Ensure verbal communication and physical contact with the patient.</li> </ul> <p><b>DO NOT</b> allow the patient to rub the eyes <b>DO NOT</b> allow the patient to tightly shut the eyes <b>DO NOT</b> introduce oil or ointment into the eye(s) without medical advice <b>DO NOT</b> use hot or tepid water.</p>
<b>Skin Contact</b>	<p>If skin or hair contact occurs:</p> <ul style="list-style-type: none"> <li>▶ Flush skin and hair with running water (and soap if available).</li> <li>▶ Seek medical attention in event of irritation.</li> </ul> <p>In case of cold burns (frost-bite):</p> <ul style="list-style-type: none"> <li>▶ Move casualty into warmth before thawing the affected part; if feet are affected carry if possible</li> <li>▶ Bathe the affected area immediately in luke-warm water (not more than 35 deg C) for 10 to 15 minutes, immersing if possible and without rubbing</li> </ul>

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	<ul style="list-style-type: none"> <li>▶ <b>DO NOT</b> apply hot water or radiant heat.</li> <li>▶ Apply a clean, dry, light dressing of "fluffed-up" dry gauze bandage</li> <li>▶ If a limb is involved, raise and support this to reduce swelling</li> <li>▶ If an adult is involved and where intense pain occurs provide pain killers such as paracetamol</li> <li>▶ Transport to hospital, or doctor</li> <li>▶ Subsequent blackening of the exposed tissue indicates potential of necrosis, which may require amputation.</li> </ul>
<b>Inhalation</b>	<ul style="list-style-type: none"> <li>▶ Following exposure to gas, remove the patient from the gas source or contaminated area.</li> <li>▶ NOTE: Personal Protective Equipment (PPE), including positive pressure self-contained breathing apparatus may be required to assure the safety of the rescuer.</li> <li>▶ Prostheses such as false teeth, which may block the airway, should be removed, where possible, prior to initiating first aid procedures.</li> <li>▶ If the patient is not breathing spontaneously, administer rescue breathing.</li> <li>▶ If the patient does not have a pulse, administer CPR.</li> <li>▶ If medical oxygen and appropriately trained personnel are available, administer 100% oxygen.</li> <li>▶ Summon an emergency ambulance. If an ambulance is not available, contact a physician, hospital, or Poison Control Centre for further instruction.</li> <li>▶ Keep the patient warm, comfortable and at rest while awaiting medical care.</li> <li>▶ <b>MONITOR THE BREATHING AND PULSE, CONTINUOUSLY.</b></li> <li>▶ Administer rescue breathing (preferably with a demand-valve resuscitator, bag-valve mask-device, or pocket mask as trained) or CPR if necessary.</li> </ul>
<b>Ingestion</b>	Not considered a normal route of entry.

**4.2 Most important symptoms and effects, both acute and delayed**

See Section 11

**4.3. Indication of any immediate medical attention and special treatment needed**

For gas exposures:

## BASIC TREATMENT

- ▶ Establish a patent airway with suction where necessary.
- ▶ Watch for signs of respiratory insufficiency and assist ventilation as necessary.
- ▶ Administer oxygen by non-rebreather mask at 10 to 15 l/min.
- ▶ Monitor and treat, where necessary, for pulmonary oedema .
- ▶ Monitor and treat, where necessary, for shock.
- ▶ Anticipate seizures.

## ADVANCED TREATMENT

- ▶ Consider orotracheal or nasotracheal intubation for airway control in unconscious patient or where respiratory arrest has occurred.
- ▶ Positive-pressure ventilation using a bag-valve mask might be of use.
- ▶ Monitor and treat, where necessary, for arrhythmias.
- ▶ Start an IV D5W TKO. If signs of hypovolaemia are present use lactated Ringers solution. Fluid overload might create complications.
- ▶ Drug therapy should be considered for pulmonary oedema.
- ▶ Hypotension with signs of hypovolaemia requires the cautious administration of fluids. Fluid overload might create complications.
- ▶ Treat seizures with diazepam.
- ▶ Proparacaine hydrochloride should be used to assist eye irrigation.

BRONSTEIN, A.C. and CURRANCE, P.L.

EMERGENCY CARE FOR HAZARDOUS MATERIALS EXPOSURE: 2nd Ed. 1994

**SECTION 5 Firefighting measures****5.1. Extinguishing media****SMALL FIRE:** Use extinguishing agent suitable for type of surrounding fire.**LARGE FIRE:** Cool cylinder.**DO NOT** direct water at source of leak or venting safety devices as icing may occur.**5.2. Special hazards arising from the substrate or mixture**

<b>Fire Incompatibility</b>	None known.
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**5.3. Advice for firefighters**

<b>Fire Fighting</b>	<p>-----</p> <p>GENERAL</p> <p>-----</p> <ul style="list-style-type: none"> <li>▶ Alert Fire Brigade and tell them location and nature of hazard.</li> <li>▶ Wear breathing apparatus and protective gloves.</li> <li>▶ Fight fire from a safe distance, with adequate cover.</li> <li>▶ Use water delivered as a fine spray to control fire and cool adjacent area.</li> <li>▶ <b>DO NOT</b> approach cylinders suspected to be hot.</li> <li>▶ Cool fire exposed cylinders with water spray from a protected location.</li> <li>▶ If safe to do so, remove cylinders from path of fire.</li> </ul> <p>-----</p> <p>SPECIAL REQUIREMENTS:</p> <p>-----</p> <ul style="list-style-type: none"> <li>▶ Excessive pressures may develop in a gas cylinder exposed in a fire; this may result in explosion.</li> <li>▶ Cylinders with pressure relief devices may release their contents as a result of fire and the released gas may constitute a further source of hazard for the fire-fighter.</li> <li>▶ Cylinders without pressure-relief valves have no provision for controlled release and are therefore more likely to explode if exposed to fire.</li> </ul> <p>-----</p> <p>FIRE FIGHTING REQUIREMENTS:</p> <p>-----</p>
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	----- The need for proximity, entry and special protective clothing should be determined for each incident, by a competent fire-fighting safety professional.
<b>Fire/Explosion Hazard</b>	<ul style="list-style-type: none"> <li>▶ Containers may explode when heated - Ruptured cylinders may rocket</li> <li>▶ Fire exposed containers may vent contents through pressure relief devices.</li> <li>▶ High concentrations of gas may cause asphyxiation without warning.</li> <li>▶ May decompose explosively when heated or involved in fire.</li> <li>▶ Contact with gas may cause burns, severe injury and/ or frostbite.</li> </ul> <p>Decomposition may produce toxic fumes of: <b>Contains low boiling substance:</b> Closed containers may rupture due to pressure buildup under fire conditions.</p>

## SECTION 6 Accidental release measures

### 6.1. Personal precautions, protective equipment and emergency procedures

See section 8

### 6.2. Environmental precautions

See section 12

### 6.3. Methods and material for containment and cleaning up

<b>Minor Spills</b>	<ul style="list-style-type: none"> <li>▶ Avoid breathing vapour and any contact with liquid or gas. Protective equipment including respirator should be used.</li> <li>▶ <b>DO NOT enter confined spaces where gas may have accumulated.</b></li> <li>▶ Increase ventilation.</li> <li>▶ Clear area of personnel.</li> <li>▶ Stop leak only if safe to do so.</li> <li>▶ Remove leaking cylinders to safe place. Release pressure under safe controlled conditions by opening valve.</li> <li>▶ Do not exert excessive pressure on the valve; do not attempt to operate a damaged valve</li> <li>▶ Orientate cylinder so that the leak is gas, not liquid, to minimise rate of leakage</li> <li>▶ Keep area clear of personnel until gas has dispersed.</li> </ul>
<b>Major Spills</b>	<ul style="list-style-type: none"> <li>▶ Clear area of all unprotected personnel and move upwind.</li> <li>▶ Alert Emergency Authority and advise them of the location and nature of hazard.</li> <li>▶ Wear breathing apparatus and protective gloves.</li> <li>▶ Prevent by any means available, spillage from entering drains and water-courses.</li> <li>▶ Consider evacuation.</li> <li>▶ Increase ventilation.</li> <li>▶ No smoking or naked lights within area.</li> <li>▶ Stop leak only if safe to do so.</li> <li>▶ Water spray or fog may be used to disperse vapour.</li> <li>▶ <b>DO NOT enter confined space where gas may have collected.</b></li> <li>▶ Keep area clear until gas has dispersed.</li> <li>▶ Remove leaking cylinders to a safe place.</li> <li>▶ Fit vent pipes. Release pressure under safe, controlled conditions</li> <li>▶ Burn issuing gas at vent pipes.</li> <li>▶ <b>DO NOT exert excessive pressure on valve; DO NOT attempt to operate damaged valve.</b></li> </ul>

### 6.4. Reference to other sections

Personal Protective Equipment advice is contained in Section 8 of the SDS.

## SECTION 7 Handling and storage

### 7.1. Precautions for safe handling

<b>Safe handling</b>	<ul style="list-style-type: none"> <li>· Consider use in closed pressurised systems, fitted with temperature, pressure and safety relief valves which are vented for safe dispersal. Use only properly specified equipment which is suitable for this product, its supply pressure and temperature</li> <li>· The tubing network design connecting gas cylinders to the delivery system should include appropriate pressure indicators and vacuum or suction lines.</li> <li>· Fully-welded types of pressure gauges, where the bourdon tube sensing element is welded to the gauge body, are recommended.</li> <li>· Before connecting gas cylinders, ensure manifold is mechanically secure and does not contain another gas. Before disconnecting gas cylinder, isolate supply line segment proximal to cylinder, remove trapped gas in supply line with aid of vacuum pump</li> <li>· When connecting or replacing cylinders take care to avoid airborne particulates violently ejected when system pressurises.</li> <li>· Consider the use of doubly-contained piping; diaphragm or bellows sealed, soft seat valves; backflow prevention devices; flash arrestors; and flow monitoring or limiting devices. Gas cabinets, with appropriate exhaust treatment, are recommended, as is automatic monitoring of the secondary enclosures and work areas for release.</li> <li>· Use a pressure reducing regulator when connecting cylinder to lower pressure (&lt;100 psig) piping or systems</li> <li>· Use a check valve or trap in the discharge line to prevent hazardous back-flow into the cylinder</li> <li>· Check regularly for spills or leaks. Keep valves tightly closed but do not apply extra leverage to hand wheels or cylinder keys.</li> <li>· Open valve slowly. If valve is resistant to opening then contact your supervisor</li> <li>· Valve protection caps must remain in place unless container is secured with valve outlet piped to use point.</li> <li>· Never insert a pointed object (e.g hooks) into cylinder cap openings as a means to open cap or move cylinder. Such action can inadvertently turn the valve and gas a gas leak. Use an adjustable strap instead of wrench to free an over-tight or rusted cap.</li> <li>· A bubble of gas may buildup behind the outlet dust cap during transportation, after prolonged storage, due to defective cylinder valve or if a dust cap is inserted without adequate evacuation of gas from the line. When loosening dust cap, preferably stand cylinder in a suitable enclosure and take cap off slowly. Never face the dust cap directly when removing it; point cap away from any personnel or any object that may pose a hazard. under negative pressure (relative to atmospheric gas)</li> <li>· Suck back of water into the container must be prevented. Do not allow backfeed into the container.</li> <li>· Do NOT drag, slide or roll cylinders - use a suitable hand truck for cylinder movement</li> <li>· Test for leakage with brush and detergent - <b>NEVER use a naked flame.</b></li> <li>· <b>Do NOT heat cylinder by any means to increase the discharge rate of product from cylinder.</b></li> <li>· Leaking gland nuts may be tightened if necessary.</li> </ul>
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	<ul style="list-style-type: none"> <li>· If a cylinder valve will not close completely, remove the cylinder to a well ventilated location (e.g. outside) and, when empty, tag as FAULTY and return to supplier.</li> <li>· Obtain a work permit before attempting any repairs.</li> <li>· <b>DO NOT attempt repair work on lines, vessels under pressure.</b></li> <li>· Atmospheres must be tested and O.K. before work resumes after leakage. <ul style="list-style-type: none"> <li>▸ <b>DO NOT transfer gas from one cylinder to another.</b></li> </ul> </li> </ul>
<b>Fire and explosion protection</b>	See section 5
<b>Other information</b>	<ul style="list-style-type: none"> <li>▸ Cylinders should be stored in a purpose-built compound with good ventilation, preferably in the open.</li> <li>▸ Such compounds should be sited and built in accordance with statutory requirements.</li> <li>▸ The storage compound should be kept clear and access restricted to authorised personnel only.</li> <li>▸ Cylinders stored in the open should be protected against rust and extremes of weather.</li> <li>▸ Cylinders in storage should be properly secured to prevent toppling or rolling.</li> <li>▸ Cylinder valves should be closed when not in use.</li> <li>▸ Where cylinders are fitted with valve protection this should be in place and properly secured.</li> <li>▸ Gas cylinders should be segregated according to the requirements of the Dangerous Goods Act.</li> <li>▸ Preferably store full and empty cylinders separately.</li> <li>▸ Check storage areas for hazardous concentrations of gases prior to entry.</li> <li>▸ Full cylinders should be arranged so that the oldest stock is used first.</li> <li>▸ Cylinders in storage should be checked periodically for general condition and leakage.</li> <li>▸ Protect cylinders against physical damage. Move and store cylinders correctly as instructed for their manual handling.</li> </ul> <p><b>NOTE:</b> A 'G' size cylinder is usually too heavy for an inexperienced operator to raise or lower.</p>

## 7.2. Conditions for safe storage, including any incompatibilities

<b>Suitable container</b>	<ul style="list-style-type: none"> <li>▸ Cylinder:</li> <li>▸ Ensure the use of equipment rated for cylinder pressure.</li> <li>▸ Ensure the use of compatible materials of construction.</li> <li>▸ Valve protection cap to be in place until cylinder is secured, connected.</li> <li>▸ Cylinder must be properly secured either in use or in storage.</li> <li>▸ Cylinder valve must be closed when not in use or when empty.</li> <li>▸ Segregate full from empty cylinders.</li> </ul> <p><b>WARNING:</b> Suckback into cylinder may result in rupture. Use back-flow preventive device in piping.</p>
<b>Storage incompatibility</b>	<ul style="list-style-type: none"> <li>▸ Compressed gases may contain a large amount of kinetic energy over and above that potentially available from the energy of reaction produced by the gas in chemical reaction with other substances</li> </ul>
<b>Hazard categories in accordance with Regulation (EC) No 1272/2008</b>	Not Available
<b>Qualifying quantity (tonnes) of dangerous substances as referred to in Article 3(10) for the application of</b>	Not Available

## 7.3. Specific end use(s)

See section 1.2

## SECTION 8 Exposure controls / personal protection

### 8.1. Control parameters

Ingredient	DNELs Exposure Pattern Worker	PNECs Compartment
Not Available	Not Available	Not Available

\* Values for General Population

### Occupational Exposure Limits (OEL)

#### INGREDIENT DATA

Source	Ingredient	Material name	TWA	STEL	Peak	Notes
Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available

Not Applicable

### Emergency Limits

Ingredient	TEEL-1	TEEL-2	TEEL-3
(Z)-1,2,3,3,3-Pentafluoropropene	Not Available	Not Available	Not Available

Ingredient	Original IDLH	Revised IDLH
(Z)-1,2,3,3,3-Pentafluoropropene	Not Available	Not Available

### 8.2. Exposure controls

<b>8.2.1. Appropriate engineering controls</b>	Engineering controls are used to remove a hazard or place a barrier between the worker and the hazard. Well-designed engineering controls can be highly effective in protecting workers and will typically be independent of worker interactions to provide this high level of protection. The basic types of engineering controls are:
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Process controls which involve changing the way a job activity or process is done to reduce the risk. Enclosure and/or isolation of emission source which keeps a selected hazard "physically" away from the worker and ventilation that strategically "adds" and "removes" air in the work environment. Ventilation can remove or dilute an air contaminant if designed properly. The design of a ventilation system must match the particular process and chemical or contaminant in use. Employers may need to use multiple types of controls to prevent employee overexposure.

- ▶ Areas where cylinders are stored require good ventilation and, if enclosed, need discrete/controlled exhaust ventilation.
- ▶ Secondary containment and exhaust gas treatment may be required by certain jurisdictions.
- ▶ Local exhaust ventilation may be required in work areas.
- ▶ Consideration should be given to the use of diaphragm or bellows-sealed, soft-seat valves; backflow prevention devices and flow-monitoring or limiting devices.
- ▶ Automated alerting systems with automatic shutdown of gas-flow may be appropriate and may in fact be mandatory in certain jurisdictions.
- ▶ Respiratory protection in the form of air-supplied or self-contained breathing equipment must be worn if the oxygen concentration in the workplace air is less than 19%.
- ▶ Cartridge respirators do NOT give protection and may result in rapid suffocation.

Air contaminants generated in the workplace possess varying "escape" velocities which, in turn, determine the "capture velocities" of fresh circulating air required to effectively remove the contaminant.

Type of Contaminant:	Air Speed:
gas discharge (active generation into zone of rapid air motion)	1-2.5 m/s (200-500 f/min.)

Within each range the appropriate value depends on:

Lower end of the range	Upper end of the range
1: Room air currents minimal or favourable to capture	1: Disturbing room air currents
2: Contaminants of low toxicity or of nuisance value only.	2: Contaminants of high toxicity
3: Intermittent, low production.	3: High production, heavy use
4: Large hood or large air mass in motion	4: Small hood-local control only

Simple theory shows that air velocity falls rapidly with distance away from the opening of a simple extraction pipe. Velocity generally decreases with the square of distance from the extraction point (in simple cases). Therefore the air speed at the extraction point should be adjusted, accordingly, after reference to distance from the contaminating source. The air velocity at the extraction fan, for example, should be a minimum of 1-2.5 m/s (200-500 f/min.) for extraction of gases discharged 2 meters distant from the extraction point. Other mechanical considerations, producing performance deficits within the extraction apparatus, make it essential that theoretical air velocities are multiplied by factors of 10 or more when extraction systems are installed or used.

### 8.2.2. Individual protection measures, such as personal protective equipment



#### Eye and face protection

- ▶ Chemical goggles.
- ▶ Full face shield may be required for supplementary but never for primary protection of eyes.
- ▶ Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lenses or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience. Medical and first-aid personnel should be trained in their removal and suitable equipment should be readily available. In the event of chemical exposure, begin eye irrigation immediately and remove contact lens as soon as practicable. Lens should be removed at the first signs of eye redness or irritation - lens should be removed in a clean environment only after workers have washed hands thoroughly. [CDC NIOSH Current Intelligence Bulletin 59], [AS/NZS 1336 or national equivalent]

#### Skin protection

See Hand protection below

#### Hands/feet protection

- ▶ When handling sealed and suitably insulated cylinders wear cloth or leather gloves.

#### Body protection

See Other protection below

#### Other protection

- ▶ Protective overalls, closely fitted at neck and wrist.
- ▶ Eye-wash unit.
- ▶ Ensure availability of lifeline in confined spaces.
- ▶ Staff should be trained in all aspects of rescue work.
- ▶ Rescue gear: Two sets of SCBA breathing apparatus Rescue Harness, lines etc.

### Respiratory protection

Type -P Filter of sufficient capacity. (AS/NZS 1716 & 1715, EN 143:2000 & 149:2001, ANSI Z88 or national equivalent)

Required Minimum Protection Factor	Half-Face Respirator	Full-Face Respirator	Powered Air Respirator
up to 10 x ES	P1 Air-line*	- -	PAPR-P1 -
up to 50 x ES	Air-line**	P2	PAPR-P2
up to 100 x ES	-	P3 Air-line*	-
100+ x ES	-	Air-line**	PAPR-P3

\* - Negative pressure demand \*\* - Continuous flow

A(All classes) = Organic vapours, B AUS or B1 = Acid gasses, B2 = Acid gas or hydrogen cyanide(HCN), B3 = Acid gas or hydrogen cyanide(HCN), E = Sulfur dioxide(SO<sub>2</sub>), G = Agricultural chemicals, K = Ammonia(NH<sub>3</sub>), Hg = Mercury, NO = Oxides of nitrogen, MB = Methyl bromide, AX = Low boiling point organic compounds(below 65 degC)

- ▶ Positive pressure, full face, air-supplied breathing apparatus should be used for work in enclosed spaces if a leak is suspected or the primary containment is to be opened (e.g. for a cylinder change)
- ▶ Air-supplied breathing apparatus is required where release of gas from primary containment is either suspected or demonstrated.

### 8.2.3. Environmental exposure controls

See section 12

## SECTION 9 Physical and chemical properties

### 9.1. Information on basic physical and chemical properties

Appearance	Not Available		
Physical state	Divided Solid	Relative density (Water = 1)	Not Available
Odour	Not Available	Partition coefficient n-octanol / water	Not Available
Odour threshold	Not Available	Auto-ignition temperature (°C)	Not Available
pH (as supplied)	Not Available	Decomposition temperature (°C)	Not Available
Melting point / freezing point (°C)	Not Available	Viscosity (cSt)	Not Available
Initial boiling point and boiling range (°C)	-18	Molecular weight (g/mol)	Not Available
Flash point (°C)	Not Available	Taste	Not Available
Evaporation rate	Not Available	Explosive properties	Not Available
Flammability	Not Available	Oxidising properties	Not Available
Upper Explosive Limit (%)	Not Available	Surface Tension (dyn/cm or mN/m)	Not Applicable
Lower Explosive Limit (%)	Not Available	Volatile Component (%vol)	Not Available
Vapour pressure (kPa)	Not Available	Gas group	Not Available
Solubility in water	Not Available	pH as a solution (1%)	Not Available
Vapour density (Air = 1)	Not Available	VOC g/L	Not Available
Nanoform Solubility	Not Available	Nanoform Particle Characteristics	Not Available
Particle Size	Not Available		

### 9.2. Other information

Not Available

## SECTION 10 Stability and reactivity

10.1. Reactivity	See section 7.2
10.2. Chemical stability	<ul style="list-style-type: none"> <li>▶ Unstable in the presence of incompatible materials.</li> <li>▶ Product is considered stable.</li> <li>▶ Hazardous polymerisation will not occur.</li> </ul>
10.3. Possibility of hazardous reactions	See section 7.2
10.4. Conditions to avoid	See section 7.2
10.5. Incompatible materials	See section 7.2
10.6. Hazardous decomposition products	See section 5.3

## SECTION 11 Toxicological information

### 11.1. Information on toxicological effects

Inhaled	<p>The material is not thought to produce adverse health effects or irritation of the respiratory tract (as classified by EC Directives using animal models). Nevertheless, good hygiene practice requires that exposure be kept to a minimum and that suitable control measures be used in an occupational setting.</p> <p>Inhalation of non-toxic gases may cause:</p> <ul style="list-style-type: none"> <li>▶ CNS effects: headache, confusion, dizziness, stupor, seizures and coma;</li> <li>▶ respiratory: shortness of breath and rapid breathing;</li> </ul>
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	<ul style="list-style-type: none"> <li>▸ cardiovascular: collapse and irregular heart beats;</li> <li>▸ gastrointestinal: mucous membrane irritation, nausea and vomiting.</li> </ul> <p>Material is highly volatile and may quickly form a concentrated atmosphere in confined or unventilated areas. The vapour may displace and replace air in breathing zone, acting as a simple asphyxiant. This may happen with little warning of overexposure. The use of a quantity of material in an unventilated or confined space may result in increased exposure and an irritating atmosphere developing. Before starting consider control of exposure by mechanical ventilation.</p>
<b>Ingestion</b>	Not normally a hazard due to physical form of product. Considered an unlikely route of entry in commercial/industrial environments
<b>Skin Contact</b>	The material is not thought to produce adverse health effects or skin irritation following contact (as classified by EC Directives using animal models). Nevertheless, good hygiene practice requires that exposure be kept to a minimum and that suitable gloves be used in an occupational setting. Vapourising liquid causes rapid cooling and contact may cause cold burns, frostbite, even through normal gloves. Frozen skin tissues are painless and appear waxy and yellow. Signs and symptoms of frost-bite may include "pins and needles", paleness followed by numbness, a hardening and stiffening of the skin, a progression of colour changes in the affected area, (first white, then mottled and blue and eventually black; on recovery, red, hot, painful and blistered).
<b>Eye</b>	This material can cause eye irritation and damage in some persons. Not considered to be a risk because of the extreme volatility of the gas.
<b>Chronic</b>	Long-term exposure to the product is not thought to produce chronic effects adverse to the health (as classified by EC Directives using animal models); nevertheless exposure by all routes should be minimised as a matter of course. Main route of exposure to the gas in the workplace is by inhalation.

<b>(Z)-1,2,3,3,3-Pentafluoropropene</b>	<b>TOXICITY</b>	<b>IRRITATION</b>
	Not Available	Not Available
<b>Legend:</b>	1. Value obtained from Europe ECHA Registered Substances - Acute toxicity 2. Value obtained from manufacturer's SDS. Unless otherwise specified data extracted from RTECS - Register of Toxic Effect of chemical Substances	

<b>Acute Toxicity</b>	✗	<b>Carcinogenicity</b>	✗
<b>Skin Irritation/Corrosion</b>	✗	<b>Reproductivity</b>	✗
<b>Serious Eye Damage/Irritation</b>	✓	<b>STOT - Single Exposure</b>	✓
<b>Respiratory or Skin sensitisation</b>	✗	<b>STOT - Repeated Exposure</b>	✗
<b>Mutagenicity</b>	✗	<b>Aspiration Hazard</b>	✗

**Legend:** ✗ – Data either not available or does not fill the criteria for classification  
 ✓ – Data available to make classification

## 11.2 Information on other hazards

### 11.2.1. Endocrine disrupting properties

No evidence of endocrine disrupting properties were found in the current literature.

### 11.2.2. Other information

See Section 11.1

## SECTION 12 Ecological information

### 12.1. Toxicity

<b>(Z)-1,2,3,3,3-Pentafluoropropene</b>	<b>Endpoint</b>	<b>Test Duration (hr)</b>	<b>Species</b>	<b>Value</b>	<b>Source</b>
	Not Available	Not Available	Not Available	Not Available	Not Available
<b>Legend:</b>	Extracted from 1. IUCLID Toxicity Data 2. Europe ECHA Registered Substances - Ecotoxicological Information - Aquatic Toxicity 4. US EPA, Ecotox database - Aquatic Toxicity Data 5. ECETOC Aquatic Hazard Assessment Data 6. NITE (Japan) - Bioconcentration Data 7. METI (Japan) - Bioconcentration Data 8. Vendor Data				

### 12.2. Persistence and degradability

<b>Ingredient</b>	<b>Persistence: Water/Soil</b>	<b>Persistence: Air</b>
	No Data available for all ingredients	No Data available for all ingredients

### 12.3. Bioaccumulative potential

<b>Ingredient</b>	<b>Bioaccumulation</b>
	No Data available for all ingredients

### 12.4. Mobility in soil

<b>Ingredient</b>	<b>Mobility</b>
	No Data available for all ingredients

### 12.5. Results of PBT and vPvB assessment



	P	B	T
Relevant available data	Not Available	Not Available	Not Available
PBT	✗	✗	✗
vPvB	✗	✗	✗
PBT Criteria fulfilled?			No
vPvB			No

## 12.6. Endocrine disrupting properties

No evidence of endocrine disrupting properties were found in the current literature.

## 12.7. Other adverse effects

No evidence of ozone depleting properties were found in the current literature.

## SECTION 13 Disposal considerations

### 13.1. Waste treatment methods

Product / Packaging disposal	<ul style="list-style-type: none"> <li>▶ Evaporate residue at an approved site.</li> <li>▶ Return empty containers to supplier. If containers are marked non-returnable establish means of disposal with manufacturer prior to purchase.</li> <li>▶ Ensure damaged or non-returnable cylinders are gas-free before disposal.</li> </ul>
Waste treatment options	Not Available
Sewage disposal options	Not Available

## SECTION 14 Transport information

### Labels Required

	
Marine Pollutant	NO
HAZCHEM	2TE

### Land transport (ADR-RID)

14.1. UN number or ID number	3163												
14.2. UN proper shipping name	LIQUEFIED GAS, N.O.S.												
14.3. Transport hazard class(es)	<table border="1"> <tr> <td>Class</td> <td>2.2</td> </tr> <tr> <td>Subsidiary risk</td> <td>Not Applicable</td> </tr> </table>	Class	2.2	Subsidiary risk	Not Applicable								
Class	2.2												
Subsidiary risk	Not Applicable												
14.4. Packing group	Not Applicable												
14.5. Environmental hazard	Not Applicable												
14.6. Special precautions for user	<table border="1"> <tr> <td>Hazard identification (Kemler)</td> <td>20</td> </tr> <tr> <td>Classification code</td> <td>2A</td> </tr> <tr> <td>Hazard Label</td> <td>2.2</td> </tr> <tr> <td>Special provisions</td> <td>274 392 662</td> </tr> <tr> <td>Limited quantity</td> <td>120 ml</td> </tr> <tr> <td>Tunnel Restriction Code</td> <td>3 (C/E)</td> </tr> </table>	Hazard identification (Kemler)	20	Classification code	2A	Hazard Label	2.2	Special provisions	274 392 662	Limited quantity	120 ml	Tunnel Restriction Code	3 (C/E)
Hazard identification (Kemler)	20												
Classification code	2A												
Hazard Label	2.2												
Special provisions	274 392 662												
Limited quantity	120 ml												
Tunnel Restriction Code	3 (C/E)												

### Air transport (ICAO-IATA / DGR)

14.1. UN number	3163						
14.2. UN proper shipping name	Liquefied gas, n.o.s. *						
14.3. Transport hazard class(es)	<table border="1"> <tr> <td>ICAO/IATA Class</td> <td>2.2</td> </tr> <tr> <td>ICAO / IATA Subrisk</td> <td>Not Applicable</td> </tr> <tr> <td>ERG Code</td> <td>2L</td> </tr> </table>	ICAO/IATA Class	2.2	ICAO / IATA Subrisk	Not Applicable	ERG Code	2L
ICAO/IATA Class	2.2						
ICAO / IATA Subrisk	Not Applicable						
ERG Code	2L						
14.4. Packing group	Not Applicable						
14.5. Environmental hazard	Not Applicable						

14.6. Special precautions for user	Special provisions	Not Applicable
	Cargo Only Packing Instructions	200
	Cargo Only Maximum Qty / Pack	150 kg
	Passenger and Cargo Packing Instructions	200
	Passenger and Cargo Maximum Qty / Pack	75 kg
	Passenger and Cargo Limited Quantity Packing Instructions	Forbidden
	Passenger and Cargo Limited Maximum Qty / Pack	Forbidden

**Sea transport (IMDG-Code / GGVSee)**

14.1. UN number	3163	
14.2. UN proper shipping name	LIQUEFIED GAS, N.O.S.	
14.3. Transport hazard class(es)	IMDG Class	2.2
	IMDG Subrisk	Not Applicable
14.4. Packing group	Not Applicable	
14.5. Environmental hazard	Not Applicable	
14.6. Special precautions for user	EMS Number	F-C, S-V
	Special provisions	274 392
	Limited Quantities	120 mL

**Inland waterways transport (ADN)**

14.1. UN number	3163	
14.2. UN proper shipping name	LIQUEFIED GAS, N.O.S.	
14.3. Transport hazard class(es)	2.2	Not Applicable
14.4. Packing group	Not Applicable	
14.5. Environmental hazard	Not Applicable	
14.6. Special precautions for user	Classification code	2A
	Special provisions	274; 392; 662
	Limited quantity	120 ml
	Equipment required	PP
	Fire cones number	0

**14.7. Maritime transport in bulk according to IMO instruments****14.7.1. Transport in bulk according to Annex II of MARPOL and the IBC code**

Not Applicable

**14.7.2. Transport in bulk in accordance with MARPOL Annex V and the IMSBC Code**

Product name	Group
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**14.7.3. Transport in bulk in accordance with the IGC Code**

Product name	Ship Type
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**SECTION 15 Regulatory information****15.1. Safety, health and environmental regulations / legislation specific for the substance or mixture**

This safety data sheet is in compliance with the following EU legislation and its adaptations - as far as applicable - : Directives 98/24/EC, - 92/85/EEC, - 94/33/EC, - 2008/98/EC, - 2010/75/EU; Commission Regulation (EU) 2020/878; Regulation (EC) No 1272/2008 as updated through ATPs.

**Information according to 2012/18/EU (Seveso III):**

Seveso Category	Status
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Not Available

**15.2. Chemical safety assessment**

No Chemical Safety Assessment has been carried out for this substance/mixture by the supplier.

**ECHA SUMMARY**

Not Applicable

**National Inventory Status**

National Inventory	Status
Australia - AIC / Australia	Not Available

National Inventory	Status
Non-Industrial Use	
Canada - DSL	Not Available
Canada - NDSL	Not Available
China - IECSC	Not Available
Europe - EINEC / ELINCS / NLP	Not Available
Japan - ENCS	Not Available
Korea - KECI	Not Available
New Zealand - NZIoC	Not Available
Philippines - PICCS	Not Available
USA - TSCA	Not Available
Taiwan - TCSI	Not Available
Mexico - INSQ	Not Available
Vietnam - NCI	Not Available
Russia - FBEPH	Not Available
<b>Legend:</b>	<i>Yes = All CAS declared ingredients are on the inventory No = One or more of the CAS listed ingredients are not on the inventory. These ingredients may be exempt or will require registration.</i>

**SECTION 16 Other information**

<b>Revision Date</b>	26/05/2023
<b>Initial Date</b>	23/05/2022

**Full text Risk and Hazard codes****Other information**

Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references.

The SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

For detailed advice on Personal Protective Equipment, refer to the following EU CEN Standards:

EN 166 Personal eye-protection

EN 340 Protective clothing

EN 374 Protective gloves against chemicals and micro-organisms

EN 13832 Footwear protecting against chemicals

EN 133 Respiratory protective devices

**Definitions and abbreviations**

PC—TWA: Permissible Concentration-Time Weighted Average

PC—STEL: Permissible Concentration-Short Term Exposure Limit

IARC: International Agency for Research on Cancer

ACGIH: American Conference of Governmental Industrial Hygienists

STEL: Short Term Exposure Limit

TEEL: Temporary Emergency Exposure Limit.

IDLH: Immediately Dangerous to Life or Health Concentrations

ES: Exposure Standard

OSF: Odour Safety Factor

NOAEL :No Observed Adverse Effect Level

LOAEL: Lowest Observed Adverse Effect Level

TLV: Threshold Limit Value

LOD: Limit Of Detection

OTV: Odour Threshold Value

BCF: BioConcentration Factors

BEI: Biological Exposure Index

AiIC: Australian Inventory of Industrial Chemicals

DSL: Domestic Substances List

NDSL: Non-Domestic Substances List

IECSC: Inventory of Existing Chemical Substance in China

EINECS: European Inventory of Existing Commercial chemical Substances

ELINCS: European List of Notified Chemical Substances

NLP: No-Longer Polymers

ENCS: Existing and New Chemical Substances Inventory

KECI: Korea Existing Chemicals Inventory

NZIoC: New Zealand Inventory of Chemicals

PICCS: Philippine Inventory of Chemicals and Chemical Substances

TSCA: Toxic Substances Control Act

TCSI: Taiwan Chemical Substance Inventory

INSQ: Inventario Nacional de Sustancias Químicas

NCI: National Chemical Inventory

FBEPH: Russian Register of Potentially Hazardous Chemical and Biological Substances

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