



## A-GAS R407C

A-Gas (Singapore) PTE LTD

Chemwatch: 7078-87

Version No: 4.1.1.1

Material Safety Data Sheet according to NOHSC and ADG requirements

Chemwatch Hazard Alert Code: 2

Issue Date: 09/09/2013

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Initial Date: Not Available

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### SECTION 1 IDENTIFICATION OF THE SUBSTANCE / MIXTURE AND OF THE COMPANY / UNDERTAKING

#### Product Identifier

Product name	A-GAS R407C
Chemical Name	A-Gas R407C
Synonyms	Not Available
Proper shipping name	REFRIGERANT GAS R 407C
Chemical formula	Not Available
Other means of identification	Not Available
CAS number	158675-78-6

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

Relevant identified uses	Use according to manufacturer's directions.
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#### Details of the supplier of the safety data sheet

Registered company name	A-Gas (Singapore) PTE LTD
Address	360 Orchard Road, #10-05, Int'l Building 238869 Singapore
Telephone	65 6836 0065
Fax	65 6836 6521
Website	www.agas.com
Email	Not Available

#### Emergency telephone number

Association / Organisation	Not Available
Emergency telephone numbers	65 6836 0065
Other emergency telephone numbers	65 6836 0065

#### CHEMWATCH EMERGENCY RESPONSE

Primary Number	Alternative Number 1	Alternative Number 2
1800 039 008	+612 9186 1132	Not Available

Once connected and if the message is not in your preferred language then please dial 01

### SECTION 2 HAZARDS IDENTIFICATION

#### Classification of the substance or mixture

DANGEROUS GOODS. NON-HAZARDOUS SUBSTANCE. According to NOHSC Criteria, and ADG Code.

#### CHEMWATCH HAZARD RATINGS

	Min	Max
Flammability	0	
Toxicity	2	
Body Contact	2	
Reactivity	1	
Chronic	2	

0 = Minimum  
1 = Low  
2 = Moderate  
3 = High  
4 = Extreme

Poisons Schedule	None
Risk Phrases <sup>[1]</sup>	<b>R44</b> Risk of explosion if heated under confinement. <b>R04</b> Forms very sensitive explosive metallic compounds.
Legend:	1. Classified by Chemwatch; 2. Classification drawn from HSIS; 3. Classification drawn from EC Directive 1272/2008 - Annex VI
GHS Classification	Not Applicable

Continued...

## A-Gas R407C

**Legend:** 1. Classified by Chemwatch; 2. Classification drawn from HSIS ; 3. Classification drawn from EC Directive 1272/2008 - Annex VI

## Label elements

## GHS label elements

## SIGNAL WORD

NOT APPLICABLE

## Hazard statement(s)

## AUH044

Risk of explosion if heated under confinement

## Precautionary statement(s): Prevention

Not Applicable

## Precautionary statement(s): Response

Not Applicable

## Precautionary statement(s): Storage

Not Applicable

## Precautionary statement(s): Disposal

Not Applicable

## Label elements

Relevant risk statements are found in section 2

## Indication(s) of danger

Not Applicable

## SAFETY ADVICE

## S03

Keep in a cool place.

## S15

Keep away from heat.

## S56

Dispose of this material and its container at hazardous or special waste collection point.

## Other hazards

May produce discomfort of the respiratory system and skin\*.

Inhalation may produce health damage\*.

Cumulative effects may result following exposure\*.

Vapours potentially cause drowsiness and dizziness\*.

## SECTION 3 COMPOSITION / INFORMATION ON INGREDIENTS

## Substances

CAS No	%[weight]	Name
354-33-6	25	<a href="#">pentafluoroethane</a>
811-97-2	52	<a href="#">tetrafluoroethane</a>
75-10-5	23	<a href="#">difluoromethane</a>

## Mixtures

See section above for composition of Substances

## SECTION 4 FIRST AID MEASURES

## Description of first aid measures

## Eye Contact

- ▶ If product comes in contact with eyes remove the patient from gas source or contaminated area.
  - ▶ Take the patient to the nearest eye wash, shower or other source of clean water.
  - ▶ Open the eyelid(s) wide to allow the material to evaporate.
  - ▶ 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.
  - ▶ 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.
  - ▶ 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)
  - ▶ Transport to hospital or doctor.
  - ▶ Even when no pain persists and vision is good, a doctor should examine the eye as delayed damage may occur.
  - ▶ If the patient cannot tolerate light, protect the eyes with a clean, loosely tied bandage.
  - ▶ Ensure verbal communication and physical contact with the patient.
- DO NOT** allow the patient to rub the eyes  
**DO NOT** allow the patient to tightly shut the eyes  
**DO NOT** introduce oil or ointment into the eye(s) without medical advice  
**DO NOT** use hot or tepid water.

## Skin Contact

- If skin contact occurs:
- ▶ Immediately remove all contaminated clothing, including footwear.
  - ▶ Flush skin and hair with running water (and soap if available).

## A-Gas R407C

	<ul style="list-style-type: none"> <li>▶ Seek medical attention in event of irritation.</li> </ul>
Inhalation	<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>
Ingestion	<ul style="list-style-type: none"> <li>▶ Not considered a normal route of entry.</li> <li>▶ For advice, contact a Poisons Information Centre or a doctor.</li> <li>▶ <b>If swallowed do NOT induce vomiting.</b></li> <li>▶ If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration.</li> <li>▶ Observe the patient carefully.</li> <li>▶ Never give liquid to a person showing signs of being sleepy or with reduced awareness; i.e. becoming unconscious.</li> <li>▶ Give water to rinse out mouth, then provide liquid slowly and as much as casualty can comfortably drink.</li> <li>▶ Seek medical advice.</li> </ul>

## Indication of any immediate medical attention and special treatment needed

	<p>for intoxication due to Freons/ Halons;</p> <p>A: Emergency and Supportive Measures</p> <ul style="list-style-type: none"> <li>▶ Maintain an open airway and assist ventilation if necessary</li> <li>▶ Treat coma and arrhythmias if they occur. Avoid (adrenaline) epinephrine or other sympathomimetic amines that may precipitate ventricular arrhythmias. Tachyarrhythmias caused by increased myocardial sensitisation may be treated with propranolol, 1-2 mg IV or esmolol 25-100 microgm/kg/min IV.</li> <li>▶ Monitor the ECG for 4-6 hours</li> </ul> <p>B: Specific drugs and antidotes:</p> <ul style="list-style-type: none"> <li>▶ There is no specific antidote</li> </ul> <p>C: Decontamination</p> <ul style="list-style-type: none"> <li>▶ Inhalation; remove victim from exposure, and give supplemental oxygen if available.</li> <li>▶ Ingestion; (a) Prehospital: Administer activated charcoal, if available. <b>DO NOT</b> induce vomiting because of rapid absorption and the risk of abrupt onset CNS depression. (b) Hospital: Administer activated charcoal, although the efficacy of charcoal is unknown. Perform gastric lavage only if the ingestion was very large and recent (less than 30 minutes)</li> </ul> <p>D: Enhanced elimination:</p> <ul style="list-style-type: none"> <li>▶ There is no documented efficacy for diuresis, haemodialysis, haemoperfusion, or repeat-dose charcoal.</li> </ul> <p><i>POISONING and DRUG OVERDOSE, Californian Poison Control System Ed. Kent R Olson; 3rd Edition</i></p> <ul style="list-style-type: none"> <li>▶ Do not administer sympathomimetic drugs unless absolutely necessary as material may increase myocardial irritability.</li> <li>▶ No specific antidote.</li> <li>▶ Because rapid absorption may occur through lungs if aspirated and cause systematic effects, the decision of whether to induce vomiting or not should be made by an attending physician.</li> <li>▶ If lavage is performed, suggest endotracheal and/or esophageal control.</li> <li>▶ Danger from lung aspiration must be weighed against toxicity when considering emptying the stomach.</li> <li>▶ Treatment based on judgment of the physician in response to reactions of the patient</li> </ul> <p>for gas exposures:</p> <p>-----</p> <p>BASIC TREATMENT</p> <p>-----</p> <ul style="list-style-type: none"> <li>▶ Establish a patent airway with suction where necessary.</li> <li>▶ Watch for signs of respiratory insufficiency and assist ventilation as necessary.</li> <li>▶ Administer oxygen by non-rebreather mask at 10 to 15 l/min.</li> <li>▶ Monitor and treat, where necessary, for pulmonary oedema .</li> <li>▶ Monitor and treat, where necessary, for shock.</li> <li>▶ Anticipate seizures.</li> </ul> <p>-----</p> <p>ADVANCED TREATMENT</p> <p>-----</p> <ul style="list-style-type: none"> <li>▶ Consider orotracheal or nasotracheal intubation for airway control in unconscious patient or where respiratory arrest has occurred.</li> <li>▶ Positive-pressure ventilation using a bag-valve mask might be of use.</li> <li>▶ Monitor and treat, where necessary, for arrhythmias.</li> <li>▶ Start an IV D5W TKO. If signs of hypovolaemia are present use lactated Ringers solution. Fluid overload might create complications.</li> <li>▶ Drug therapy should be considered for pulmonary oedema.</li> <li>▶ Hypotension with signs of hypovolaemia requires the cautious administration of fluids. Fluid overload might create complications.</li> <li>▶ Treat seizures with diazepam.</li> <li>▶ Proparacaine hydrochloride should be used to assist eye irrigation.</li> </ul> <p><i>BRONSTEIN, A.C. and CURRANCE, P.L.</i>  <i>EMERGENCY CARE FOR HAZARDOUS MATERIALS EXPOSURE: 2nd Ed. 1994</i></p>
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## SECTION 5 FIREFIGHTING MEASURES

## Extinguishing media

	<p><b>SMALL FIRE:</b> Use extinguishing agent suitable for type of surrounding fire.</p> <p><b>LARGE FIRE:</b> Cool cylinder.</p>
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## Special hazards arising from the substrate or mixture

Fire Incompatibility	<ul style="list-style-type: none"> <li>▶ Avoid contamination with oxidising agents i.e. nitrates, oxidising acids, chlorine bleaches, pool chlorine etc. as ignition may result</li> </ul>
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#### Advice for firefighters

Fire Fighting	<p>GENERAL</p> <ul style="list-style-type: none"><li>Alert Fire Brigade and tell them location and nature of hazard.</li></ul>
Fire/Explosion Hazard	<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></ul>

### SECTION 6 ACCIDENTAL RELEASE MEASURES

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

Minor Spills	<ul style="list-style-type: none"><li>Vented gas is more dense than air and may collect in pits, basements.</li></ul>
Major Spills	<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></ul>
	Personal Protective Equipment advice is contained in Section 8 of the MSDS.

### SECTION 7 HANDLING AND STORAGE

#### Precautions for safe handling

Safe handling	<p><b>Contains low boiling substance:</b></p> <p>Storage in sealed containers may result in pressure buildup causing violent rupture of containers not rated appropriately.</p> <ul style="list-style-type: none"><li>Check for bulging containers.</li><li>Vent periodically</li></ul>
Other information	<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></ul>

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

Suitable container	<ul style="list-style-type: none"><li><b>DO NOT use aluminium or galvanised containers</b></li></ul> <p>[Cylinder: Steel packaging] Ensure the use of equipment rated for cylinder pressure. Ensure the use of compatible materials of construction. Valve protection cap to be in place until cylinder is secured, connected. Cylinder must be properly secured either in use or in storage. Cylinder valve must be closed when not in use or when empty. Segregate full from empty cylinders. WARNING: Suckback into cylinder may result in rupture. Use back-flow preventive device in piping.</p>
Storage incompatibility	<ul style="list-style-type: none"><li>Avoid reaction with oxidising agents</li></ul> <p>Haloalkanes:</p> <ul style="list-style-type: none"><li>are highly reactive:some of the more lightly substituted lower members are highly flammable; the more highly substituted may be used as fire suppressants, not always with the anticipated results.</li><li>may react with the lighter divalent metals to produce more reactive compounds analogous to Grignard reagents.</li></ul>

#### PACKAGE MATERIAL INCOMPATIBILITIES

### SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION

#### Control parameters

##### OCCUPATIONAL EXPOSURE LIMITS (OEL)

##### INGREDIENT DATA

Source	Ingredient	Material name	TWA	STEL	Peak	Notes
Australia Exposure Standards	tetrafluoroethane	1,1,1,2-Tetrafluoroethane	4240 (mg/m3) / 1000 (ppm)	Not Available	Not Available	Not Available

##### EMERGENCY LIMITS






Ingredient	TEEL-0	TEEL-1	TEEL-2	TEEL-3
tetrafluoroethane	1000(ppm)	8000(ppm)	13000(ppm)	27000(ppm)
difluoromethane	1000(ppm)	3000(ppm)	200000(ppm)	350000(ppm)

Ingredient	Original IDLH	Revised IDLH
A-GAS R407C	Not Available	Not Available

#### Exposure controls

Appropriate engineering controls	<p>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:</p> <p>Process controls which involve changing the way a job activity or process is done to reduce the risk.</p>
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## A-Gas R407C

<b>Personal protection</b>	    
<b>Eye and face protection</b>	<ul style="list-style-type: none"> <li>▶ Chemical goggles.</li> <li>▶ Full face shield may be required for supplementary but never for primary protection of eyes</li> <li>▶ 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.</li> </ul>
<b>Skin protection</b>	See Hand protection below
<b>Hand protection</b>	<ul style="list-style-type: none"> <li>▶ When handling sealed and suitably insulated cylinders wear cloth or leather gloves.</li> <li>▶ Insulated gloves:</li> </ul> <p>NOTE: Insulated gloves should be loose fitting so that may be removed quickly if liquid is spilled upon them. Insulated gloves are not made to permit hands to be placed in the liquid; they provide only short-term protection from accidental contact with the liquid.</p>
<b>Body protection</b>	See Other protection below
<b>Other protection</b>	<ul style="list-style-type: none"> <li>▶ 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)</li> <li>▶ Air-supplied breathing apparatus is required where release of gas from primary containment is either suspected or demonstrated.</li> <li>▶ Protective overalls, closely fitted at neck and wrist.</li> <li>▶ Eye-wash unit.</li> </ul>
<b>Thermal hazards</b>	

## Recommended material(s)

## GLOVE SELECTION INDEX

Glove selection is based on a modified presentation of the:

"Forsberg Clothing Performance Index".

The effect(s) of the following substance(s) are taken into account in the A-GAS R407C Not Available

Material	CPI
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\* CPI - Chemwatch Performance Index

A: Best Selection

B: Satisfactory; may degrade after 4 hours continuous immersion

C: Poor to Dangerous Choice for other than short term immersion

## Respiratory protection

Type AX Filter of sufficient capacity

Where the concentration of gas/particulates in the breathing zone, approaches or exceeds the "Exposure Standard" (or ES), respiratory protection is required.

Degree of protection varies with both face-piece and Class of filter; the nature of protection varies with Type of filter.

Required Minimum Protection Factor	Half-Face Respirator	Full-Face Respirator	Powered Air Respirator
up to 10 x ES	AX-AUS P3	-	AX-PAPR-AUS / Class 1 P3
up to 50 x ES	-	AX-AUS / Class 1 P3	-
up to 100 x ES	-	AX-2 P3	AX-PAPR-2 P3 ^

^ - Full-face

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(SO2), G = Agricultural chemicals, K = Ammonia(NH3), Hg = Mercury, NO = Oxides of nitrogen, MB = Methyl bromide, AX = Low boiling point organic compounds(below 65 degC)

## SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

## Information on basic physical and chemical properties

<b>Appearance</b>	Colourless pressurised liquefied gas with an ethereal odour; does not mix with water		
<b>Physical state</b>	Liquefied Gas	<b>Relative density (Water = 1)</b>	1.17 @ 20 deg.C
<b>Odour</b>	Not Available	<b>Partition coefficient n-octanol / water</b>	Not Available
<b>Odour threshold</b>	Not Available	<b>Auto-ignition temperature (°C)</b>	Not Available
<b>pH (as supplied)</b>	7	<b>Decomposition temperature</b>	Not Available
<b>Melting point / freezing point (°C)</b>	-100 (freezing point)	<b>Viscosity (cSt)</b>	141.2 mPa.s @ 25 deg.C
<b>Initial boiling point and boiling range (°C)</b>	-44 to -37	<b>Molecular weight (g/mol)</b>	Not Applicable
<b>Flash point (°C)</b>	Not Applicable	<b>Taste</b>	Not Available
<b>Evaporation rate</b>	Not Applicable	<b>Explosive properties</b>	Not Available
<b>Flammability</b>	Not Available	<b>Oxidising properties</b>	Not Available
<b>Upper Explosive Limit (%)</b>	Not Applicable	<b>Surface Tension (dyn/cm or mN/m)</b>	Not Available
<b>Lower Explosive Limit (%)</b>	Not Applicable	<b>Volatile Component (%vol)</b>	Not Available

## A-Gas R407C

Vapour pressure (kPa)	1035 @ 20 deg.C	Gas group	Not Available
Solubility in water (g/L)	Immiscible	pH as a solution(1%)	Not Applicable
Vapour density (Air = 1)	3.59 @ 20 deg.C	VOC g/L	

## SECTION 10 STABILITY AND REACTIVITY

Reactivity	See section 7
Chemical stability	<ul style="list-style-type: none"> <li>▶ Presence of incompatible materials.</li> <li>▶ Product is considered stable.</li> <li>▶ Hazardous polymerisation will not occur.</li> </ul>
Possibility of hazardous reactions	See section 7
Conditions to avoid	See section 7
Incompatible materials	See section 7
Hazardous decomposition products	See section 5

## SECTION 11 TOXICOLOGICAL INFORMATION

## Information on toxicological effects

Inhaled	Inhalation of vapours or aerosols (mists, fumes), generated by the material during the course of normal handling, may be damaging to the health of the individual. Symptoms of asphyxia (suffocation) may include headache, dizziness, shortness of breath, muscular weakness, drowsiness and ringing in the ears. If the asphyxia is allowed to progress, there may be nausea and vomiting, further physical weakness and unconsciousness and, finally, convulsions, coma and death. Significant concentrations of the non-toxic gas reduce the oxygen level in the air.
Ingestion	Overexposure is unlikely in this form. Not normally a hazard due to physical form of product. Considered an unlikely route of entry in commercial/industrial environments
Skin Contact	Limited evidence exists, or practical experience predicts, that the material either produces inflammation of the skin in a substantial number of individuals following direct contact, and/or produces significant inflammation when applied to the healthy intact skin of animals, for up to four hours, such inflammation being present twenty-four hours or more after the end of the exposure period. Skin irritation may also be present after prolonged or repeated exposure; this may result in a form of contact dermatitis (nonallergic). The dermatitis is often characterised by skin redness (erythema) and swelling (oedema) which may progress to blistering (vesiculation), scaling and thickening of the epidermis. At the microscopic level there may be intercellular oedema of the spongy layer of the skin (spongiosis) and intracellular oedema of the epidermis.
Eye	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).
Chronic	Principal route of occupational exposure to the gas is by inhalation. It is generally accepted that the fluorocarbons are less toxic than the corresponding halogenated aliphatic based on chlorine. Repeated inhalation exposure to the fluorocarbon FC-11 does not produce pathologic lesions of the liver and other visceral organs in experimental animals. There has been conjecture in non-scientific publications that fluorocarbons may cause leukemia, cancer, sterility and birth defects; these have not been verified by current research.

A-GAS R407C	TOXICITY Not Available	IRRITATION Not Available
pentafluoroethane	TOXICITY Inhalation (rat) LC50: >709000 ppm/4h * Inhalation (Rat) LC50: 800000 ppm/4h* Not Available	IRRITATION Nil reported * [ Not Available
tetrafluoroethane	TOXICITY Inhalation (Mouse) LC50: 1700000 mg/m3/2h Inhalation (Rat) LC50: >60% vol 4 h * Inhalation (Rat) LC50: >80% vol 15 mins * Inhalation (Rat) LC50: 1500000 mg/m3/4h Not Available	IRRITATION Not Available
difluoromethane	TOXICITY Inhalation (rat) LC50: >760000 ppm/4h * Not Available	IRRITATION (DuPont) Not Available

\* Value obtained from manufacturer's msds

unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances

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A-GAS R407C	Acute toxicity - Oral route, LD 50, not applicable - Dermal route, LD 50, not applicable - Inhalation, LC 50, 4 h, Rat, > 50 % v/v air (R 134a/R125/R32) Irritation - Rabbit, slightly irritant (skin) (R134a) - Rabbit, slightly irritant (eyes) (R134a) - No irritation signs noted during toxicity testing. (R125/R32) Chronic toxicity - Inhalation, after a single exposure, dog, >= 7.5% v/v air, cardiac sensitization following adrenergic stimulation (R134a/R125/R32) - Inhalation, after prolonged exposure, rat, Target organ: testes, >= 5% v/v air, (R134a), Remark: Leydig cells/benign tumours - Inhalation, after repeated exposure, rat, 5% v/v air, no observed effect (Data relative to R125) - Inhalation, after repeated exposure, rat, Target organ: central nervous system, >= 5% v/v air, observed effect (R32) - No effect on mutagenesis, carcinogenesis and reproduction (SOLKANE ® 134a) - No mutagenic, teratogenic effects (R125/R32)
PENTAFLUOROETHANE	Cardiac sensitisation threshold limit >245400 mg/m3 Anaesthetic effects threshold limit 490800 mg/m3 * DuPont SDS
TETRAFLUOROETHANE	* with added oxygen - ZhongHao New Chemical Materials MSDS Excessive concentration can have a narcotic effect; inhalation of high concentrations of decomposition products can cause lung oedema.

Acute Toxicity	☐	Carcinogenicity	☐
Skin Irritation/Corrosion	☐	Reproductivity	☐
Serious Eye Damage/Irritation	☐	STOT - Single Exposure	☐
Respiratory or Skin sensitisation	☐	STOT - Repeated Exposure	☐
Mutagenicity	☐	Aspiration Hazard	☐

CMR STATUS

SECTION 12 ECOLOGICAL INFORMATION

Toxicity

**DO NOT discharge into sewer or waterways.**  
[Ecotoxicity|Acute ecotoxicity]- Result: no specific data - (R134a)- Fishes, Salmo gairdneri, LC 50, 96 h, 450 mg/l|Conditions: semi-static test|- Fishes, Salmo gairdneri, NOEC, mortality, 96 h, 300 mg/l|Conditions: semi-static test|- Crustaceans, Daphnia magna, EC 50, 48 h, 980 mg/l|Conditions: static test|- Bacteria, Pseudomonas putida, EC 10, growth, 6 h, > 730 mg/l|Mobility|- Air, Henry's law constant (H) 19.7 - 150kPa.m3/mol|Result: considerable volatility|Conditions: 20 °C / calculated value (R134a/R125/R32)- Soil/sediments, adsorption, log KOC from 1.05 - 1.7|Conditions: calculated value|(R134a/R125/R32)|Persistence and degradability|Abiotic degradation|- Air, indirect photo-oxidation, t 1/2 4.1628.2 year(s)|Conditions: sensitizer: OH radicals|Degradation's products: carbon dioxide / fluorhydric acid / trifluoroacetic acid|(R134a/R125/R32)- Air, photolysis, ODP = 0 Result: no effect on stratospheric ozone|Reference value for CFC 11: ODP = 1.- Air, greenhouse effect, GWP = 0.37|Reference value for CFC 11: GWP = 1. (R134a/R125/R32)|Biotic degradation|- Aerobic, test ready biodegradability/closed bottle, degradation from 2 - 5 %, 28 day(s)|Result: non-readily biodegradable|(R134a/R125/R32)- Aerobic, test biodegradation by methane oxidation|Result: non-biodegradable|Conditions: inoculum: Methylosinus trichosporium OB3b|(R134a)|Comments|- Product is persistent in air (atmospheric lifetime: 6 - 40 years).|- Product is not significantly hazardous for the aquatic environment as:- very low toxicity for aquatic organisms.- . considerable volatility.- . no bioaccumulation.

Persistence and degradability

Ingredient	Persistence: Water/Soil	Persistence: Air
Not Available	Not Available	Not Available

Bioaccumulative potential

Ingredient	Bioaccumulation
Not Available	Not Available

Mobility in soil

Ingredient	Mobility
Not Available	Not Available

SECTION 13 DISPOSAL CONSIDERATIONS

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>
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SECTION 14 TRANSPORT INFORMATION

Labels Required

	
Marine Pollutant	NO
HAZCHEM	2TE

Land transport (ADG)

## A-Gas R407C

UN number	3340
Packing group	Not Available
UN proper shipping name	REFRIGERANT GAS R 407C
Environmental hazard	No relevant data
Transport hazard class(es)	Class : 2.2 Subrisk :
Special precautions for user	Special provisions : limited quantity : 120 ml

## Air transport (ICAO-IATA / DGR)

UN number	3340
Packing group	Not Available
UN proper shipping name	Refrigerant gas R 407C
Environmental hazard	No relevant data
Transport hazard class(es)	ICAO/IATA Class : 2.2 ICAO / IATA Subrisk : ERG Code : 2L
Special precautions for user	Special provisions : 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 Maximum Qty / Pack : Forbidden

## Sea transport (IMDG-Code / GGVSee)

UN number	3340
Packing group	Not Available
UN proper shipping name	REFRIGERANT GAS R 407C
Environmental hazard	No relevant data
Transport hazard class(es)	IMDG Class : 2.2 IMDG Subrisk :
Special precautions for user	EMS Number : F-C,S-V Special provisions : Limited Quantities : 120 ml

## SECTION 15 REGULATORY INFORMATION

## Safety, health and environmental regulations / legislation specific for the substance or mixture

<p>perfluorooethane(354-33-6) is found on the following regulatory lists</p>	<p>"International Council of Chemical Associations (ICCA) - High Production Volume List", "International Maritime Dangerous Goods Requirements (IMDG Code)", "International Maritime Dangerous Goods Requirements (IMDG Code) - Substance Index", "Australia Dangerous Goods Code (ADG Code) - List of Emergency Action Codes", "United Nations Recommendations on the Transport of Dangerous Goods Model Regulations (English)", "OECD List of High Production Volume (HPV) Chemicals", "Australia - Australian Capital Territory - Environment Protection Regulation: Pollutants entering waterways taken to cause environmental harm (Aquatic habitat)", "Australia Customs (Prohibited Exports) Regulations 1958 - Schedule 15 Ozone depleting substances - Part 9 HFCs", "Australia Dangerous Goods Code (ADG Code) - Packing Instruction - Liquefied and Dissolved Gases", "United Nations Recommendations on the Transport of Dangerous Goods Model Regulations (Spanish)", "International Air Transport Association (IATA) Dangerous Goods Regulations", "Regulations concerning the International Carriage of Dangerous Goods by Rail - Table A: Dangerous Goods List - RID 2013 (English)", "Australia Dangerous Goods Code (ADG Code) - Dangerous Goods List", "Australia - Australian Capital Territory - Environment Protection Regulation: Ambient environmental standards (AQUA/1 to 6 - non-pesticide anthropogenic organics)"</p>
<p>tetrafluoroethane(811-97-2) is found on the following regulatory lists</p>	<p>"International Maritime Dangerous Goods Requirements (IMDG Code)", "International Maritime Dangerous Goods Requirements (IMDG Code) - Substance Index", "Australia Exposure Standards", "Australia Dangerous Goods Code (ADG Code) - List of Emergency Action Codes", "United Nations Recommendations on the Transport of Dangerous Goods Model Regulations (English)", "OECD List of High Production Volume (HPV) Chemicals", "Australia - Australian Capital Territory - Environment Protection Regulation: Pollutants entering waterways taken to cause environmental harm (Aquatic habitat)", "Australia Customs (Prohibited Exports) Regulations 1958 - Schedule 15 Ozone depleting substances - Part 9 HFCs", "Sigma-Aldrich Transport Information", "Australia Dangerous Goods Code (ADG Code) - Packing Instruction - Liquefied and Dissolved Gases", "United Nations Recommendations on the Transport of Dangerous Goods Model Regulations (Spanish)", "Australia High Volume Industrial Chemical List (HVICL)", "International Air Transport Association (IATA) Dangerous Goods Regulations", "Australia Hazardous Substances Information System - Consolidated Lists", "Regulations concerning the International Carriage of Dangerous Goods by Rail - Table A: Dangerous Goods List - RID 2013 (English)", "Australia Dangerous Goods Code (ADG Code) -</p>

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## A-Gas R407C

	Dangerous Goods List", "Australia - Australian Capital Territory - Environment Protection Regulation: Ambient environmental standards (AQUA/1 to 6 - non-pesticide anthropogenic organics)"
<b>difluoromethane(75-10-5) is found on the following regulatory lists</b>	"International Council of Chemical Associations (ICCA) - High Production Volume List", "International Maritime Dangerous Goods Requirements (IMDG Code)", "Australia - Victoria Occupational Health and Safety Regulations - Schedule 9: Materials at Major Hazard Facilities (And Their Threshold Quantity) Table 2", "International Maritime Dangerous Goods Requirements (IMDG Code) - Substance Index", "Australia Dangerous Goods Code (ADG Code) - List of Emergency Action Codes", "United Nations Recommendations on the Transport of Dangerous Goods Model Regulations (English)", "OECD List of High Production Volume (HPV) Chemicals", "International Air Transport Association (IATA) Dangerous Goods Regulations - Prohibited List Passenger and Cargo Aircraft", "Australia - Australian Capital Territory - Environment Protection Regulation: Pollutants entering waterways taken to cause environmental harm (Aquatic habitat)", "Australia Customs (Prohibited Exports) Regulations 1958 - Schedule 15 Ozone depleting substances - Part 9 HFCs", "Sigma-AldrichTransport Information", "United Nations Recommendations on the Transport of Dangerous Goods Model Regulations (Spanish)", "Australia Dangerous Goods Code (ADG Code) - Packing Instruction - Liquefied and Dissolved Gases", "International Air Transport Association (IATA) Dangerous Goods Regulations", "Regulations concerning the International Carriage of Dangerous Goods by Rail - Table A: Dangerous Goods List - RID 2013 (English)", "Australia - Australian Capital Territory - Environment Protection Regulation: Ambient environmental standards (AQUA/1 to 6 - non-pesticide anthropogenic organics)", "Australia Dangerous Goods Code (ADG Code) - Dangerous Goods List"

## SECTION 16 OTHER INFORMATION

## 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.

A list of reference resources used to assist the committee may be found at:

[www.chemwatch.net/references](http://www.chemwatch.net/references)

The (M)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.

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