Safety Data Sheet R407C

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name	:	R407C
Supplier	:	Alpha Refrigerants UK Limited
Address	:	Shelton Street, Covent Garden, London, United Kingdom
Contact	:	info@alpharefrigerants.co.uk
Website	:	www.alpharefrigerants.co.uk

2. HAZARDS IDENTIFICATION

CLASSIFICATION	:	Gases under pressure, Liquefied Gas
HAZARD PICTOGRAM	:	
SIGNAL WORD	:	WARNING
HAZARD STATEMENT	:	Contains gas under pressure, may explode if heated
SYMBOL	:	Gas Cylinder
PRECAUTIONARY STATEMENT	:	For STORAGE; Protect from sunlight, store in a well ventilated place

EMERGENCY OVERVIEW: Colorless, volatile liquid with ethereal and faint sweetish odor. Non-flammable material. Overexposure may cause dizziness and loss of concentration. At higher levels, CNS depression and cardiac arrhythmia may result from exposure. Vapors displace air and can cause asphyxiation in confined spaces. At higher temperatures, (>250°C), decomposition products may include Hydrofluoric Acid (HF) and carbonyl halides.

POTENTIAL HEALTH HAZARDS

SKIN: Irritation would result from a defatting action on tissue. Liquid contact could cause frostbite.

EYES: Liquid contact can cause severe irritation and frostbite. Mist may irritate.

INHALATION: R-407C is low in acute toxicity in animals. When oxygen levels in air are reduced to 12-14% by displacement, symptoms of asphyxiation, loss of coordination, increased pulse rate and deeper respiration will occur. At high levels, cardiac arrhythmia may occur.

INGESTION: Ingestion is unlikely because of the low boiling point of the material. Should it occur, discomfort in the gastrointestinal tract from rapid evaporation of the material and consequent evolution of gas would result. Some effects of inhalation and skin exposure would be expected.

3. COMPOSITION / INFORMATION ON INGREDIENTS

Chemical Name	CAS No.	REACH Registration	EEC No.	% (w/w)	Classification according to 1272/2008 [CLP]
Difluoromethane (HFC 32)	75-10-5	01-2119471312-47	200-839-4	23%	Flam. Gas 1; H220 Press. Gas (Liq. gas); H280
Pentafluoroethane (HFC 125)	354-33-6	01-2119485636-25	206-557-8	25%	Press. Gas; H280
1,1,1,2-Tetrafluoroethane	811-97-2	01-2119459374-33	212-377-0	52%	Press. Gas; H280

4. FIRST AID MEASURES

EYES: Immediately flush with plenty of water. Get medical attention if irritation persists.

SKIN: Flush exposed skin with lukewarm water (not hot), or use other means to warm skin slowly. Get medical attention if frostbitten by liquid or if irritation occurs.

SWALLOWED: Not applicable - product is a gas at ambient temperatures.

INHALED: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention. Do not give adrenaline, epinephrine or similar drugs following exposure to this product.

5. FIRE FIGHTING MEASURES

5.1 Extinguishing Media:

This product is not flammable in air under ambient conditions of temperature and pressure. Use extinguishing media appropriate to the surrounding fire conditions.

5.2 Special hazards arising from the Substance or Mixture:

At high temperature, toxic and/or corrosive fumes may be produced by thermal decomposition (gaseous hydrogen fluoride (HF), carbon oxides).

5.3 Advice for Fire Fighters:

Wear self-contained breathing apparatus and protective clothing. Heat may cause the containers to explode. Keep fire exposed containers cool by spraying with water. Fire exposed containers may vent contents through pressure relief devices. In case of fire nearby, remove exposed containers.

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures :

Evacuate personnel to safe areas. Avoid skin contact with leaking liquid (danger of frostbite). Ventilate the area. Follow safe handling advice (see section 7) and personal protective equipment recommendations (see section 8).

6.2 Environmental precautions :

Avoid release to the environment. Prevent further leakage or spillage if safe to do so. Retain and dispose of contaminated wash water.

6.3 Methods and materials for containment and cleaning up :

Ventilate the area. Local or national regulations may apply to releases and disposal of this material, as well as those materials and items employed in the cleanup of releases. You will need to determine which regulations are applicable.

7. HANDLING STORAGE

7.1 Precautions for Safe Handling

Only experienced and properly instructed persons should handle gases under pressure. Protect containers from physical damage. Do not drag, roll, slide or drop. Do not remove or deface labels. Adopt best manual handling considerations when handling, carrying and dispensing. Secure cylinders in an upright position at all times. Close valves when not in use and when empty. Ensure adequate ventilation of the working area. Do not allow backfeed into the container. Avoid contact with skin and eyes. When using, do not eat, drink or smoke. Never use direct flame or electrical heating device to raise the pressure of the container.

7.2 Conditions for safe storage, including any incompatibilities

Keep containers tightly closed. Keep in a cool, dry, well-ventilated area. Store in correctly labelled containers. Keep away from sources of ignition – no smoking. Store out of direct sunlight.

- Recommended storage temperature : < 52 °C
- Storage period : > 10 yr
- Further information on storage stability : The product has an indefinite shelf life when stored properly

8. EXPOSURE CONTROLS/ PERSONAL PROTECTION

Engineering Controls : Ensure adequate ventilation of the working area. Oxygen detectors should be used when asphyxiating gases may be released. Systems under pressure should be regularly checked for leaks.

Personal Protective Equipment

Eye and Face Protection : Sufficient eye protection should be worn. When handling compressed gas, at least glasses with side protection should be worn. When handling liquid gas, chemical safety goggles must be used as well as a protective shield.

Skin protection : **Body protection:** Use protective boots while handling gas cylinders. **Hand protection:** Wear leather gloves to prevent frostbite injuries from rapidly expanding gas when handling pressurized gas bottles.

Respiratory Protection : In an emergency (e.g.: unintentional release of the substance, exceeding the occupational exposure limit value) respiratory protection must be worn. Consider the maximum period for wear. Wear self- contained breathing apparatus. Do not use filter respirator.

Environmental exposure controls : Do not allow material to be released to the environment without the proper governmental permits.

Industrial Hygiene : Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday. Avoid contact with skin and eyes. Avoid inhalation of vapour.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	:	Compressed liquefied gas.
Colour	:	Clear, colorless
Odour	:	Slight ethereal
pH	:	Not available.
Melting point	:	No data available.
Boiling point	:	-43.6 °C
Density	:	1.136 g/cm3 at 25 °C, (as liquid)
Vapour Density	:	3.03 (air = 1)
Vapour pressure	:	1,190.3 kPa (25 °C)
Partition coefficient (n -octanol/water)	:	Log pow = 1.274 (R134a); Log pow= 2.3(R125); Log pow = 0.2 (R32).
Solubility in water	:	Insoluble in water; Soluble in: chlorinated solvents, alcohols, esters.
Flash point	:	No data available.
Critical Temperature	:	87.3°C
Critical Pressure	:	4.63 Mpa
Flammability	:	Not flammable.
Decomposition temperature	:	No data available.
Explosive properties	:	No data available.
Oxidising properties	:	Non oxidizer.
Evaporation rate	:	No data available.
Viscosity	:	No data available.
GWP	:	1774
ODP	:	Non-Ozone Depleting
Molecular Weight	:	86.2 (g/mol)

10. STABILITY AND REACTIVITY

REACTIVITY: Stable under normal conditions

CHEMICAL STABILITY: Stable under normal conditions. The gaseous product in the presence of air can form, under certain conditions of temperature and pressure, a flammable mixture.

POSSIBILITY OF HAZARDOUS REACTIONS: No data is available on this product

CONDITIONS TO AVOID: Keep away from heat and sources of ignition. Avoid contact with flames and red hot metallic surfaces.

INCOMPATIBLE MATERIALS: Alkaline hydroxides, alkaline earth metals, strong oxidizing agents, finely divided metals.

HAZARDOUS DECOMPOSITION PRODUCT: Under normal conditions of storage and use, hazardous decomposition products should not be produced. At high temperature, thermal decomposition can give rise to toxic and corrosive products.

11. TOXICOLOGICAL INFORMATION

PENTAFLUOROETHANE - Inhalation, followed by intravenous injection of epinephrine to simulate stress reactions, resulted in cardiac sensitization in dogs. Following repeated inhalation exposure, no adverse effects were observed in rats. No birth defects were noted in the offspring of rats or rabbits exposed by inhalation during pregnancy. No genetic changes were observed in standard tests using bacteria, animal cells or whole animals. Single exposure (acute) studies indicate Inhalation - Practically Non-Toxic to Rats (4-hr LC50 > 800,000 ppm)

DIFLUOROMETHANE - Inhalation, followed by intravenous injection of epinephrine to simulate stress reactions, resulted in cardiac sensitization in dogs. Acute inhalation of high concentrations has produced an anesthetic effect in rats. Following repeated inhalation exposure, no adverse effects were observed in rats. No birth defects were noted in the offspring of rats or rabbits exposed by inhalation during pregnancy, even at dosages which produced significant adverse effects in the mother. No genetic changes were observed in standard tests using bacteria, animal cells or whole animals. Single exposure (acute) studies indicate: Inhalation - Practically Non-toxic to Rats (4-hr LC50 >520,000 ppm)

Avoid contact with strong alkali or alkaline earth metals, finely powdered metals such as aluminum, magnesium or zinc and strong oxidizers, since they may react or accelerate decomposition.

1,1,1,2 – TETRAFLUOROETHANE - Inhalation 4-hour LC50: 567,000 ppm in rats Single exposure caused: Cardiac sensitization, a potentially fatal disturbance of heart rhythm associated with a heightened sensitivity to the action of epinephrine.

Lowest-Observed-Adverse-Effect-Level for cardiac sensitization: 75,000 ppm. Single exposure caused: Lethargy. Narcosis. Increased respiratory rates. These effects were temporary. Single exposure to near lethal doses caused: Pulmonary edema. Repeated exposure caused: Increased adrenals, liver, spleen weight. Decreased uterine, prostate weight. Repeated dosing of higher concentrations caused: the following temporary effects - Tremors. Incoordination.

CARCINOGENIC, DEVELOPMENTAL, REPRODUCTIVE, MUTAGENIC EFFECTS: In a two-year

inhalation study, HFC-134a, at a concentration of 50,000 ppm, produced an increase in late- occurring benign testicular tumors, testicular hyperplasia and testicular weight. The no-effect- level for this study was 10,000 ppm. Animal data show slight fetotoxicity but only at exposure levels producing other toxic effects in the adult animal. Reproductive data on male mice show: No change in reproductive performance. Tests have shown that this material does not cause genetic damage in bacterial or mammalian cell cultures, or in animals. In animal testing, this material has not caused permanent genetic damage in reproductive cells of mammals (has not produced heritable genetic damage).

INCOMPATIBILITY:

Thermal decomposition products include hydrogen fluoride, hydrogen chloride, carbon monoxide, carbon dioxide and chlorine.

12. ECOLOGICAL INFORMATION

ECO TOXICOLOGICAL INFORMATION:

PENTAFLUOROETHANE - When released into the environment, this material may be expected to partition almost exclusively into the atmosphere. Based on its low n-octanol/water partition coefficient (log POW of 1.48), bioaccumulation is considered unlikely. In a 28-day ready biodegradability closed bottle test, it appeared to be stable (about 2% degraded). This material does not dissociate in water.

DIFLUOROMETHANE - The octanol/water partition coefficient (log POW) was 1.62 indicating a low bio concentration factor. In a 28-day ready biodegradability closed bottle test, it appeared to be stable.

1,1,1,2 – TETRAFLUOROETHANE : 48-HOUR EC50, DAPHNIA MAGNA (980 mg/L); 96-HOUR LC50, RAINBOW TROUT (450 mg/L)

13. DISPOSAL CONSIDERATIONS

WASTE DISPOSAL:

Recover, reclaim or recycle when practical. Dispose of in accordance with federal, state and local regulations.

NOTE: Chemical additions to, processing of, or otherwise altering this material may make this waste management information incomplete, inaccurate, or otherwise inappropriate. Furthermore, state and local waste disposal requirements may be more restrictive or otherwise different from federal laws and regulations.

14. TRANSPORTATION INFORMATION

Hazard pictograms	:	
UN number	:	UN 3340
UN proper shipping name	:	LIQUEFIED GAS, N.O.S. (REFRIGERANT GAS R407C) (Pentafluoroethane, Difluoromethane, Tetrafluoroethane)
ADR/RID		
Class	:	2
Labels	:	2.2
Hazard No. (ADR)	:	20
Tunnel category	:	(C/E)
Emergency action code	:	2TE
IMDG		
Class	:	2.2
EmS No.	:	F-C, S-V
IATA		
Class	:	2.2
Packing instruction	:	200 1
Packing group	:	N/A

15. REGULATORY INFORMATION

REGULATION (EC) No 1907/2006 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No 793/93 and Commission Regulation (EC) No 1488/94 as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC.

16. OTHER INFORMATION

Text of Hazard Statements in Section 3

H280: Contains gas under pressure; may explode if heated.

H220: Extremely flammable gas

Reference Materials - HSE publication EH40/2005 Workplace exposure limits (latest edition)

DISCLAIMER: The information recommendations and suggestions herein were compiled from reference material and sources believed to be reliable. This MSDS is not intended as a license to operate under or recommendation to infringe on any patents. Appropriate warnings and safe-handling procedures should be provided to handlers and users. Data contained is based on a worst case condition of one of the constituents used in the refrigerant.