



SDS

In compliance with HCS/HazCom 2012

SAFETY DATA SHEET


Product: R-407C

Revision: 00

Date: 9/02/2021

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1 - IDENTIFICATION	
Product identifier	R-407C
Recommended use of the chemical and restrictions on use	Refrigerant gas
Company and Address	Supplier: Hangzhou ECOOL Refrigerant Co.,ltd 402B,C,Zijin high-tech business incubator, Xihu district, Zhejiang, China Distributor: Dust Free 1112 Industrial Dr Royse City, TX 75189
Telephone number	Distributor: 877-422-2482
Emergency telephone number	CHEMTREC for Emergency Response: 1-800-424-9300 / +1 703-527-3887
E-mail	dcrawford@dustfree.com

2 - HAZARDS IDENTIFICATION	
Classification of the chemical	Gas under pressure – Liquefied gas
Signal word	WARNING
Hazard statement(s)	H280 Contains gas under pressure; may explode if heated.
Symbol(s)	



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Precautionary statement(s)	H410 + P403 Protect from sunlight. Store in a well-ventilated place.
Classification system adopted	Hazard Communication Standard (HCS) 29 CFR: 1910.1200 - Appendix A (OSHA). Adoption of the Globally Harmonized System of Classification and Labeling of Chemicals (GHS), United Nations, 8 ed.
Other hazards which do not result in classification	The high elevation product is an asphyxiating gas, meaning it displaces oxygen from the ambient atmosphere so that less oxygen is inhaled into the lungs.

3 – COMPOSITION / INFORMATION ON INGREDIENTS

Impurities and stabilizing additives contributing to the hazard (%m):

Components	Concentration %	Number CAS	GHS classification*
1,1,1,2-Tetrafluoroethane (HFC-134a)	52%	811-97-2	H280
Pentafluoroethane (HFC-125)	25%	354-33-6	H280
Difluoromethane (HFC- 32)	23%	75-10-5	H221; H280

* Hazard statements are described in section 16.

4 - FIRST-AID MEASURES

Inhalation	Remove victim to fresh air and keep at rest. Monitor respiratory function. If victim is breathing hard, provide oxygen. If necessary, give artificial respiration. Get medical attention. Take this SDS.
Skin contact	Remove clothing, shoes, and jewelry to avoid hampering blood circulation. Clothes frozen on the skin must be thawed before being removed. Wash exposed skin with large amounts of water



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	for at least 15 minutes. Get medical attention. Take this SDS.
Eye contact	Carefully rinse with water for several minutes. If you wear contact lenses, remove them if easy. If eye irritation persists: Get medical attention. Take this SDS.
Ingestion	It is not ingested as it is a gas.
Most important symptoms and effects, acute and delayed	Direct contact with the liquid can cause low temperature frostbite-type burns to the skin with skin hardening, waxy and painful appearance, and to the eyes with pain, redness and blindness. May cause suffocation if inhaled. In high concentrations it can decrease oxygen concentration and cause increased heart rate, increased respiratory rate, shortness of breath, cough, abnormal fatigue, vomiting, unconsciousness, seizures, and respiratory collapse. The product is an asphyxiant and displaces oxygen from the ambient atmosphere so that less oxygen is inhaled into the lungs. This causes less oxygen to cross the alveolar-capillary membrane to oxygenate the blood. This decreases oxygen delivery to vital organs and results in anaerobic metabolism. Organ systems with higher aerobic metabolic rates, such as the cardiovascular system and the central nervous system, are among the first to manifest key signs of dysfunction.
Indication of any immediate medical attention and special treatment needed	Avoid contact with the product when helping the victim. Keep victim at rest and warm. Exposure treatment should be directed towards controlling the patient's symptoms and clinical status and providing oxygen.

5 - FIRE-FIGHTING MEASURES

Extinguishing media	Suitable: Compatible with water fog. Not recommended: Direct water jets. Do not pour water directly
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	at the leak point as freezing may occur.
Specific hazards arising from the chemical product	Combustion of the chemical or its packaging can form carbon monoxide (CO) and carbon dioxide (CO ₂). May explode under heat. Broken cylinders can protrude violently. Static electricity buildup can ignite any explosive mixture. Gas is heavier than air and can accumulate in confined spaces causing oxygen deficiency. R-407C is not flammable at ambient temperatures and atmospheric pressure. However, this material will become combustible when mixed with air under pressure and exposed to strong ignition sources.
Specific extinguishing methods	The service team must wear self-contained respiratory protective equipment (SCBA) with positive pressure and complete protective clothing. Containers and tanks involved in the fire must be cooled with water fog.

6- ACCIDENTAL RELEASE MEASURES

Personal precautions	Preventive isolation from sources of ignition. Do not smoke. Evacuate the area within a radius of at least 100 meters. Do not touch damaged containers or spilled material without wearing suitable clothing. Avoid inhalation, eye, and skin contact. Use personal protective equipment as described in section 8.
Protective equipment	Use protective equipment as described in Section 8.
Emergency procedures	Wear complete PPE, with safety glasses, safety gloves, suitable protective clothing, and closed shoes. In case of large leaks, where exposure is large, the use of a respiratory protective mask with a gas filter is recommended.
Environmental precautions	Prevent the product from reaching the soil and water courses. Notify the relevant authorities if the product has caused environmental.



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Methods and materials for containment	Containment techniques may include bunding, covering of drains and capping procedures. Stop the gas from escaping if it is possible to do so without risk. Slowly flush the contents into the atmosphere.
Methods and materials for cleaning up	Extinguishing the fire without blocking the leak can generate an explosion. Ventilate spill area or remove container to well-ventilated area. Use water fog to reduce or deflect the vapor cloud. All equipment used to contain the product must be grounded. For final disposal, proceed according to section 13 of this SDS.

7- HANDLING AND STORAGE

Precautions for safe handling	Schedule a first aid action before starting the activity with the product. Product use is restricted to professionals. Attention - Avoid exposure - obtain special instructions before use. Handle in a ventilated area or with a general ventilation/local exhaust system. Avoid the release of gases. Protect cylinders from physical damage; do not drag, roll, slide or fall. Damaged valves must be immediately reported to the supplier. Keep container valve outlets clean and free from contaminants, particularly oil and water. Close the container valve after each use and when empty, even if it is still connected to the equipment. Never attempt to transfer gases from one cylinder/container to another. Never use a direct flame or electrical heating devices to increase pressure in a container. Do not remove or deface the labels provided by the supplier to identify the contents of the cylinder. Use personal protective equipment as described in section 8.
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<p>Conditions for safe storage, including any incompatibilities</p>	<p>Wash hands and face thoroughly after handling and before eating, drinking, smoking, or using the bathroom. Contaminated clothing must be changed and washed before reuse. Remove contaminated clothing and protective equipment before entering eating areas. Store in a well-ventilated place, away from sunlight. Keep container closed and away from combustible materials. Inspect cylinders to ensure they are properly labeled (identified) and undamaged. Keep cylinders in an upright position, fixed to a wall or other solid structure. Ground all cylinders and containers. Incompatible materials: oxidizing agents and strong bases and acids, freshly abraded aluminum surfaces at specific temperatures and pressures may cause a strong exothermic reaction. Chemically reactive metals: potassium, calcium, powdered aluminum, magnesium, and zinc.</p>
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8 - EXPOSURE CONTROLS AND PERSONAL PROTECTION	
Permissible concentration	
Occupational exposure limit	Not established.
Biological limit	Not established.
Appropriate engineering controls	Provide mechanical ventilation and direct exhaust system to the outside environment. These measures help to reduce exposure to the product. Pressure systems must be checked regularly for leaks. Oxygen detectors should be used when asphyxiating gases can be released. Ensure exposure is below occupational exposure limits (where available). Consider work authorization system, for example, for maintenance activities.
Individual protection measures, such as personal protective equipment	
Respiratory protection	The use of a self-contained respirator (SCBA) or positive



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	pressure air line with mask is recommended to be used in oxygen-depleted atmospheres. Based on the inhalation hazard of the product, a risk assessment must be carried out to adequately define respiratory protection in view of the conditions of use of the product.
Hand protection	Skin contact with refrigerant may cause frostbite. General work clothing and gloves (leather) should provide adequate protection. If prolonged contact with the liquid or gas is anticipated, insulated gloves constructed of PVA, neoprene or butyl rubber should be used. Any contaminated clothing should be promptly removed and washed before reuse.
Eye protection	For normal conditions, wear safety glasses. Where there is reasonable probability of liquid contact, wear chemical safety goggles.
Skin and body protection	Proper protective clothing and closed shoes are recommended.
Special precautions	Not established.

9 - PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Appearance (physical state, color, etc.)	Clear, colorless liquid and vapor. Gas at ambient temperatures.
Odour	Faint ethereal odor.
Odour threshold	Not available.
pH	Neutral.
Melting point/freezing point	Not available.
Boiling point, initial boiling, and boiling range	-43°C (-45.4°F).



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Flashpoint	Not available.
Upper/lower flammability or explosive limits	Not applicable.
Vapour pressure	156.2 psia at 70°F. 356.7 psia at 130°F
Vapour density	3.0 (air = 1.0).
Relative density	1.16 at 21.1°C (70°F).
Solubility(ies)	Not available.
n-octanol/water partition coefficient	Not available.
Auto-ignition temperature	Not available.
Decomposition temperature	Not available.
Odour threshold	Not available.
Evaporation rate	> 1.
Flammability	Not available.
Viscosity	Not available.
Other information	Gas/vapour heavier than air. It can accumulate in confined spaces, particularly at ground level or below.

10 - STABILITY AND REACTIVITY

Reactivity and Chemical stability	Stable product under normal conditions of temperature and pressure. Do not mix with oxygen or air above atmospheric pressure. Any source of high temperature, such as lighted cigarettes, flames, hot spots, or welding may yield toxic and/or corrosive decomposition products.
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Possibility of hazardous reactions	Freshly abraded aluminum surfaces (may cause strong exothermic reaction). Chemically active metals: potassium, calcium, powdered aluminum, magnesium, and zinc.
Conditions to avoid	High temperatures. Sources of ignition, contact with incompatible materials.
Incompatible materials	Oxidizing agents and strong bases and acids, potassium, calcium, powdered aluminum, magnesium, and zinc.
Hazardous decomposition products	Decomposition of product may generate toxic gases such as CO, CO ₂ , halogens, halogen acids and possibly carbonyl halides.

11 - TOXICOLOGICAL INFORMATION

Acute toxicity	The product is not expected to present toxicity for the oral, dermal and inhalation routes. <u>1,1,1,2-Tetrafluoroethane (HFC-134a):</u> LC ₅₀ (inhalation, rats, 4h): 2,080,000 mg/m ³ . <u>Difluoromethane (HFC- 32):</u> LC ₅₀ (inhalation, rats, 4h): 520000 ppm (1107000 mg/m ³). <u>Pentafluoroethane (HFC-125):</u> LC ₅₀ (inhalation, rats, 4h): > 800,000 ppm.
Skin irritation/corrosion	Direct contact with the liquid can cause low temperature frostbite-type burns to the skin with skin hardening, waxy appearance and pain.
Eye damage/irritation	Direct contact with the liquid can cause low temperature frostbite-type burns to the eyes with pain, redness, and blindness.
Respiratory or skin sensitization	The product is not expected to cause respiratory or skin irritation. <u>1,1,1,2-Tetrafluoroethane (HFC-134a):</u> Studies conducted with guinea pigs did not show any sensitizing



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	potential.
Reproductive cell mutagenicity	<p>The product is not expected to cause mutagenicity in germ cells.</p> <p><u>1,1,1,2-Tetrafluoroethane (HFC-134a):</u> Assays performed with HFC 134a did not show mutagenic potential <i>in vitro</i> or <i>in vivo</i>.</p> <p><u>Difluoromethane (HFC- 32):</u> One gene mutation assay in bacteria, two <i>in vitro</i> cytogenicity studies are available, all with negative results.</p> <p><u>Pentafluoroethane (HFC-125):</u> <i>In vitro</i> and <i>in vivo</i> genotoxicity tests – negative results.</p>
Carcinogenicity	<p>The product is not expected to have carcinogenic potential.</p> <p><u>Difluoromethane (HFC- 32):</u> Difluoromethane is not classified for mutagenicity and there is no evidence from the 13-week repeated dose toxicity study that difluoromethane is able to induce hyperplasia and/or pre-neoplastic lesions. There is no indication of a carcinogenic potential for HFC-32.</p>
Reproductive toxicity	<p>The product is not expected to cause reproductive toxicity.</p> <p><u>Pentafluoroethane (HFC-125):</u> No developmental toxicity was observed in pregnant rats and rabbits exposed up to 50000 ppm HFC 125.</p> <p><u>1,1,1,2-Tetrafluoroethane (HFC-134a):</u> HFC 134a did not show teratogenic potential in rats and rabbits. Only non-specific effects on fetal maturation (delayed fetal ossification) in the rat were observed after exposure to 50,000 ppm HFC-134a.</p>
Specific target organ toxicity – single exposure	<p>The product is asphyxiating. In high concentrations it can decrease oxygen concentration and cause increased heart rate, increased respiratory rate, shortness of breath, cough, abnormal fatigue, vomiting, unconsciousness, seizures and respiratory</p>



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	collapse. It can cause drowsiness or dizziness, headache, mental confusion, tremors, and yellowish vision. As an asphyxiant, it displaces oxygen from the ambient atmosphere so that less oxygen is inhaled into the lungs. This causes less oxygen to cross the alveolar-capillary membrane to oxygenate the blood. This decreases oxygen delivery to vital organs and results in anaerobic metabolism. Organ systems with higher aerobic metabolic rates, such as the cardiovascular system and the central nervous system, are among the first to manifest key signs of dysfunction.
Specific target organ toxicity – repeated exposure	The product is not expected to cause specific target organ toxicity through repeated exposure.
Aspiration hazard	It is not expected that the product presents aspiration hazard.

12 - ECOLOGICAL INFORMATION

Environmental effects, behavior, and fate of the product	
Ecotoxicity	The product is not expected to be harmful to aquatic organisms. <u>1,1,1,2-Tetrafluoroethane (HFC-134a):</u> LC ₅₀ (<i>Rainbow trout</i> , 96h): 450 mg/L. EC ₅₀ (<i>Daphnia magna</i> , 48h): 980 mg/L. EC ₅₀ (Algae, 72h): > 100 mg/L. <u>Difluoromethane (HFC- 32):</u> LC ₅₀ (Fish, 96h): 1507.037 mg/L. LC ₅₀ (<i>Daphnia</i> , 48h): 652.238 mg/L. EC ₅₀ (Algae, 96h): 142.302 mg/L.
Persistence and degradability	It is expected that the product will not have persistence.
Bioaccumulative potential	The product is expected to have low bioaccumulative potential in aquatic organisms.



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	<u>1,1,1,2-Tetrafluoroethane (HFC-134a):</u> Log kow: 1.06. BCF: 5.63. <u>Difluoromethane (HFC- 32):</u> Log kow: 0.21. <u>Pentafluoroethane (HFC-125):</u> Log kow: 1.48.
Mobility in soil	Not evaluated.
Other adverse effects	There are not known adverse environmental effects of the product.

13 - DISPOSAL CONSIDERATIONS

Description of waste residues and information on their safe handling and methods of disposal, including the disposal of any contaminated packaging	Must be disposed of as hazardous waste in compliance with local regulations. The treatment and disposal should be evaluated for each specific product. Keep product residues in their original containers and properly closed. Disposal should be in accordance with the regulations for the product. Do not reuse empty containers. These may contain product residues and should be kept closed and sent for appropriate disposal as established for the product.
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14 - TRANSPORT INFORMATION

International regulations	
Land	UN – “United Nations” Recommendations on the TRANSPORT OF DANGEROUS GOODS. Model Regulations
UN number	3340



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UN proper shipping name	REFRIGERANT GAS R 407C
Transport hazard class(es)	2.2
Subsidiary risk	N.A.
Packing group	N.A.
Sea	IMO – International Maritime Organization International Maritime Dangerous Goods Code (IMDG Code)
UN number	3340
UN proper shipping name	REFRIGERANT GAS R 407C
Transport hazard class(es)	2.2
Subsidiary risk	N.A.
Packing group	N.A.
Environmental hazards	Product is not considered a marine pollutant..
EmS	F-C, S-V
Air	IATA – International Air Transport Association Dangerous Goods Regulation (DGR)
UN number	3340
UN proper shipping name	REFRIGERANT GAS R 407C
Transport hazard class(es)	2.2
Subsidiary risk	N.A.
Packing group	N.A.
Transport in bulk according to MARPOL 73/78, Annex II, and the IBC Code	Consult regulations: - International Maritime Organization. MARPOL: Articles, protocols, annexes, unified interpretations of the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto, consolidated edition. IMO, London, 2006. - International Maritime Organization. IBC code: International



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	code for the construction and equipment of shipping carrying dangerous chemicals in bulk: With Standards and guidelines relevant to the code. IMO, London, 2007.
Special precautions	There is no need of special precautions.

15 - REGULATORY INFORMATION

Safety, health, and environmental regulations/legislation specific for the substance or mixture	International Labor Organization C170 Chemicals Convention, from June 25th, 1990: Occupational Safety and Health – Toxic Substances and Agents. Hazard Communication Standard (HCS) 29 CFR: 1910.1200 - Appendix A, B, C, D, E, F. GLOBALLY HARMONIZED SYSTEM OF CLASSIFICATION AND LABELLING OF CHEMICALS (GHS). 8. rev. ed. Listed on the United States TSCA (Toxic Substances Control Act) inventory: Difluoromethane (HFC- 32) is listed. Pentafluoroethane (HFC-125) is listed. 1,1,1,2-Tetrafluoroethane is listed. CA PROP 65: Not listed.
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16 - OTHER INFORMATION

This SDS was prepared based on current knowledge about the proper product handling and under normal conditions of use, in accordance with the application specified on the packaging. Any other use of the product involving their combination with other materials, and use various forms of those indicated, are the responsibility of the user. Warns that the handling of any chemical substance requires the prior knowledge of its hazards for the user. In the workplace it is for the user company's product promotes training of its collaborators about the possible risks arising from exposure to the chemical.

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Hazard phrases described in section 3:

H221 Flammable gas.

H280 Contains gas under pressure; may explode if heated.

Abbreviations:

ACGIH – American Conference of Governmental Industrial Hygienists

BCF – Bioconcentration factor

CAS – Chemical Abstracts Service

LC₅₀ – Lethal Concentration 50%

LD₅₀ – Lethal Dose 50%

LE₅₀ – Lethal effective 50%

ERPG - Emergency Response Planning Guidelines

NIOSH – National Institute of Occupational Safety and Health

OSHA – Occupational Safety & Health Administration

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