R-448A

Safety Data Sheet

According to 29 CFR § 1910.1200, Hazard Communication Standard (HCS)
Issue date: 8/21/2026 Version: 1.0

SECTION 1 Identification

1.1. Product identifier

Product form : Mixture
Trade name : R-448A

1.2. Other means of identification

Other means of identification : HFC/HFO blend (R-32 / R-125 / R-1234yf / R-134a / R-1234ze(E))

1.3. Recommended use of the chemical and restrictions on use

Recommended use : Refrigerant
Restrictions on use : Reserved for industrial and professional use,Not for consumer sale or use,For use by trained, certified refrigeration technicians. (EPA Section 608)

1.4. Supplier's details

RGAS Refrigerants
2777 Allen Parkway
Suite 1185
Houston, Texas 77019
T 281-953-5550
info@rgasref.com

1.5. Emergency phone number

Emergency number : For Hazardous Materials or Dangerous Goods Incident Spill, Leak, Fire, Exposure, or Accident
Call CHEMTREC Day or Night: 1-800-424-9300 (Toll Free, USA) / 703-527-3887 (Virginia, USA)
CCN 1024991
Back-up Emergency Number: +1 703-741-5970 (Washington, DC)

SECTION 2 Hazard identification

2.1. Classification of the substance or mixture

GHS US classification

Gas under pressure : Liquefied gas
Simple asphyxiant, Category 1
Full text of H-statements: see section 16

H280 Contains gas under pressure; may explode if heated.
SIAS May displace oxygen and cause rapid suffocation.

2.2. Label elements

GHS US labelling

Hazard pictograms (GHS US) :



Signal word (GHS US) : Warning
Hazard statements (GHS US) : H280 - Contains gas under pressure; may explode if heated
May displace oxygen and cause rapid suffocation
Precautionary statements (GHS US) : Protect from sunlight. Store in a well-ventilated place.

2.3. Hazards associated with known or reasonably anticipated uses

No additional information available

2.4. Hazards not otherwise classified

No additional information available

2.5. Unknown acute toxicity

No additional information available

SECTION 3 Composition/information on ingredients

3.1. Substances

Not applicable

3.2. Mixtures

Name	Product identifier	%	GHS US classification
Pentafluoroethane	CAS-No.: 354-33-6	26	Press. Gas (Comp.), H280 Simple Asphy. 1, SIAS
Difluoromethane	CAS-No.: 75-10-5	26	Flam. Gas 1B, H221 Press. Gas (Liq.), H280 Simple Asphy. 1, SIAS
1,1,1,2-Tetrafluoroethane	CAS-No.: 811-97-2	21	Press. Gas (Liq.), H280 Simple Asphy. 1, SIAS
2,3,3,3-Tetrafluoropropene	CAS-No.: 754-12-1	20	Flam. Gas 1B, H221 Press. Gas (Liq.), H280 Simple Asphy. 1, SIAS
Trans-1,3,3,3- Tetrafluoroprop-1-ene	CAS-No.: 29118-24-9	7	Press. Gas (Liq.), H280 Simple Asphy. 1, SIAS

Full text of hazard classes and H-statements : see section 16

SECTION 4 First-aid measures

4.1. Description of necessary first-aid measures

First-aid measures general : Call a physician immediately. First aider: Pay attention to self-protection. Never give anything by mouth to an unconscious person. Give artificial respiration if necessary. Induce artificial respiration with mask fitted with one-way valve or other suitable device but, not mouth-to-mouth.

First-aid measures after inhalation : Remove person to fresh air and keep comfortable for breathing. If the victim is unconscious: Lay in a stable manner on victim's side. Induce artificial respiration with mask fitted with one-way valve or other suitable device; not mouth-to-mouth. Call a physician immediately.

First-aid measures after skin contact : If frostbite has occurred, seek medical attention immediately; do NOT rub the affected areas or flush them with water. In order to prevent further tissue damage, do NOT attempt to remove frozen clothing from frostbitten areas. If frostbite has NOT occurred, immediately and thoroughly wash contaminated skin with soap and water.

First-aid measures after eye contact : If eye tissue is frozen, seek medical attention immediately; if tissue is not frozen, immediately and thoroughly flush the eyes with large amounts of water for at least 15 minutes, occasionally lifting the lower and upper eyelids. If irritation, pain, swelling, lacrimation, or photophobia persist, get medical attention as soon as possible.

First-aid measures after ingestion : Rinse mouth. Do NOT induce vomiting. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. If you feel unwell, seek medical advice.

4.2. Most important symptoms/effects, acute and delayed

Symptoms/effects after inhalation : In high concentrations may cause asphyxiation.

Symptoms/effects after skin contact	:	Contact with the liquefied gas may cause frostbite.
Symptoms/effects after eye contact	:	Contact with the liquefied gas may cause severe ocular lesions.
Symptoms/effects after ingestion	:	Ingestion is not a likely route of exposure.

4.3. Indication of immediate medical attention and special treatment needed, if necessary

Other medical advice or treatment	:	In the event of contact with the liquid: treat resulting frostbite as a burn. Call a physician immediately.

SECTION 5: Fire-fighting measures

5.1. Suitable (and unsuitable) extinguishing media

Suitable extinguishing media	:	Use extinguishing media appropriate for surrounding fire. Dry chemical, CO2, alcohol-resistant foam or waterspray.
Unsuitable extinguishing media	:	Do not use a heavy water stream.

5.2. Specific hazards arising from the chemical

Fire hazard	:	Contains gas under pressure; may explode if heated.
Explosion hazard	:	Heat may build pressure, rupturing closed containers, spreading fire and increasing risk of burns and injuries.
Hazardous decomposition products in case of fire	:	Toxic fumes may be released. Carbon dioxide. Carbon monoxide. Hydrogen fluoride. Halogenated compounds. Carbonyl halides.

5.3. Special protective equipment and precautions for fire-fighters

Firefighting instructions	:	No action shall be taken without appropriate training or involving any personal risk. Do not enter fire area without proper protective equipment, including respiratory protection. Use extinguishing media appropriate for surrounding fire. Move containers from fire area if it can be done without personal risk. Damaged cylinders should be handled by specialists only. Large fires: Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Cool affected containers with flooding quantities of water. Do not throw water directly on point of leakage or security devices; freezing may occur. Withdraw immediately in case of rising sound from venting devices or discolouration from tank. ALWAYS stay away from tanks engulfed in fire. Prevent fire fighting water from entering the environment.
Protection during firefighting	:	Do not attempt to take action without suitable protective equipment. Self-contained breathing apparatus. Complete protective clothing.

SECTION 6 Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

General measures	:	Do not take actions involving personal risks. Avoid all personal contact including breathing in the gas. Before entering an area, especially a confined area, check the atmosphere with an appropriate device. In a fire or if heated, a pressure increase will occur, and the container may burst, with the risk of a subsequent explosion. Remove ignition sources. Isolate from fire, if possible, without unnecessary risk. Stop leak if safe to do so. Proper grounding procedures to avoid static electricity should be followed. Prevent from entering sewers, basements and workpits, or any place where its accumulation can be dangerous for inhalation.

For non-emergency personnel

Protective equipment	:	Wear self-contained breathing apparatus and protective suit (see section 8).
Emergency procedures	:	Evacuate the danger area. If outdoors, move to an area upwind of the danger area. If possible without taking personal risks, Remove ignition sources, ventilate area. Do not breathe gas. Do not get in eyes, on skin, or on clothing. No open flames, no sparks, and no smoking. Prevent other non-emergency personnel from entering the danger area.

For emergency responders

Protective equipment	:	Do not attempt to take action without suitable protective equipment. Total impervious protective suits, gloves, and boots must be worn to prevent any contact with the product. Use self-contained breathing apparatus. For further information refer to section 8: "Exposure controls/personal protection".
Emergency procedures	:	Evacuate personnel to a safe area. Monitor concentration of released product. Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe. Stop leak if safe to do so. Ventilate spillage area. Use water spray to disperse the vapours. Do not direct water at source of leak or at safety devices as freezing could occur. Prevent from entering sewers, basements and workpits, or any place where its accumulation can be dangerous.
Environmental precautions	:	Avoid release to the environment.

6.2. Methods and materials for containment and cleaning up

For containment	:	Stop leak without risks if possible. If the leak cannot be stopped, allow the gas to release in place or remove to a safe, well-ventilated area and allow the release. Leave the product to evaporate.
Methods for cleaning up	:	Take up liquid spill into absorbent material. Do not touch or walk on the spilled product. Clean contaminated surfaces with an excess of water. Avoid the spillage or runoff entering drains, sewers or watercourses.

For further information refer to section 8: "Exposure controls/personal protection",For further information refer to section 13

SECTION 7 Handling and storage

7.1. Precautions for safe handling

Precautions for safe handling	:	Do not handle until all safety precautions have been read and understood. Use only outdoors or in a well-ventilated area. Wear personal protective equipment. Do not breathe gas. Do not get in eyes, on skin, or on clothing. Use only properly specified equipment which is suitable for this product, its supply pressure and temperature. Take precautionary measures against static discharge. Pressurized container. Only experienced and properly instructed persons should handle gases under pressure.
Technical measures	:	Oxygen detectors should be used when asphyxiating gases may be released.
Hygiene measures	:	Do not eat, drink or smoke when using this product. Always wash hands after handling the product. Contaminated work clothing should not be allowed out of the workplace.
Additional hazards when processed	:	The gas is heavier than air.

7.2. Conditions for safe storage, including incompatibilities

Storage conditions	:	Keep container tightly closed. Always keep container in upright position. Container valve guards or caps should be in place. Store in a well-ventilated place. Protect cylinders from physical damage; do not drag, roll, slide or drop. Protect from sunlight. Protect from moisture. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
Incompatible materials	:	Strong oxidizers.
Storage temperature	:	≤ 51.67 °C / 125 °F
Heat and ignition sources	:	No flames, no sparks. Eliminate all sources of ignition.
Packaging materials	:	Always store product in container of same material as original container.

SECTION 8 Exposure controls/personal protection

8.1. Control parameters

No additional information available

8.2. Appropriate engineering controls

Appropriate engineering controls	:	Ensure good ventilation of the work station. Alarm detectors should be used when toxic gases may be released. Handle in accordance with good industrial hygiene and safety procedures. Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure.
Environmental exposure controls	:	Avoid release to the environment. Take measures to reduce or limit air emissions and releases to soil and the aquatic environment.

8.3. Individual protection measures, such as personal protective equipment

Personal protective equipment:
Personal protective equipment should be chosen according to national standards and in discussion with the supplier of the protective equipment. Wear recommended personal protective equipment.

Materials for protective clothing:
Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. Select per OSHA 29 CFR 1910.132, 1910.136, and 1910.138

Hand protection:
Chemically impervious gloves as described by OSHA's hand protection regulations in 29 CFR 1910.138. Wear cold insulating gloves.

Eye protection:
Chemical goggles or safety glasses. Do not wear contact lenses

Skin and body protection:
Tyvek® Gown/Coveralls. Wear suitable protective clothing. Lab coat

Respiratory protection:
A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed and a NIOSH/MSHA or European Standard EN 149 approved respirator must be used if any of the following situations occur: workplace conditions warrant respirator use, or exposure limits are exceeded or if irritation or other symptoms are experienced. Use breathing equipment (SCBA)

Personal protective equipment symbol(s):



SECTION 9 Physical and chemical properties

9.1. Basic physical and chemical properties

Physical state	:	Gas
Appearance	:	Liquefied compressed gas.
Colour	:	Colorless
Odour	:	No data available
Odour threshold	:	No data available
pH	:	No data available
Melting point	:	No data available
Freezing point	:	No data available
Boiling point	:	No data available
Flash point	:	No data available
Flammability (solid, gas)	:	Non flammable.
Vapour pressure	:	No data available
Relative vapour density at 20°C	:	No data available
Relative density	:	No data available

Solubility	:	No data available
Partition coefficient n-octanol/water (Log Pow)	:	No data available
Auto-ignition temperature	:	No data available
Decomposition temperature	:	No data available
Viscosity, kinematic	:	No data available
Explosive limits	:	No data available
Particle characteristics	:	No data available

9.2. Data relevant with regard to physical hazard classes (supplemental)

No additional information available

SECTION 10 Stability and reactivity

10.1. Reactivity

Decomposes on heating.

10.2. Chemical stability

Stable under normal conditions of use.

10.3. Possibility of hazardous reactions

No dangerous reactions known under normal conditions of use.

10.4. Conditions to avoid

Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Incompatible materials. Do not puncture or incinerate, even when empty.

10.5. Incompatible materials

Strong oxidizers.

10.6. Hazardous decomposition products

May liberate toxic gases. Thermal decomposition generates: Carbon dioxide. Carbon monoxide. Hydrogen fluoride. Halogenated compounds. Carbonyl halides.

SECTION 11 Toxicological information

11.1. Information on toxicological effects

Acute toxicity (oral)	:	Not classified
Acute toxicity (dermal)	:	Not classified
Acute toxicity (inhalation)	:	Not classified

Difluoromethane	
LC50 Inhalation - Rat [ppm]	100000 ppm/1h

2,3,3,3-Tetrafluoropropene	
LC50 Inhalation - Rat [ppm]	> 405800 ppm/4h

Skin corrosion/irritation	:	Not classified
Serious eye damage/irritation	:	Not classified
Respiratory or skin sensitisation	:	Not classified
Germ cell mutagenicity	:	Not classified

Carcinogenicity : Not classified

Reproductive toxicity : Not classified
STOT-single exposure : Not classified
STOT-repeated exposure : Not classified

1,1,1,2-Tetrafluoroethane	
NOAEC (inhalation, rat, gas, 90 days)	50000 ppm

Aspiration hazard : Not applicable
Symptoms/effects after inhalation : In high concentrations may cause asphyxiation.
Symptoms/effects after skin contact : Contact with the liquefied gas may cause frostbite.
Symptoms/effects after eye contact : Contact with the liquefied gas may cause severe ocular lesions.
Symptoms/effects after ingestion : Ingestion is not a likely route of exposure.

SECTION 12 Ecological information

12.1. Ecotoxicity

Hazardous to the aquatic environment, short–term (acute) : Not classified
Hazardous to the aquatic environment, long–term (chronic) : Not classified

Pentafluoroethane	
LC50 - Fish [1]	> 81.8 mg/l
EC50 - Crustacea [1]	> 97.9 mg/l
LC50 - Fish [2]	450 mg/l
EC50 72h - Algae [1]	> 114 mg/l
EC50 72h - Algae [2]	> 118 mg/l
NOEC chronic fish	32 mg/l

1,1,1,2-Tetrafluoroethane	
LC50 - Fish [1]	450 mg/l
EC50 72h - Algae [1]	> 118 mg/l
EC50 72h - Algae [2]	> 114 mg/l

Difluoromethane	
LC50 - Fish [1]	> 81.8 mg/l
EC50 - Crustacea [1]	> 97.9 mg/l
EC50 72h - Algae [1]	> 118 mg/l
EC50 72h - Algae [2]	> 114 mg/l

2,3,3,3-Tetrafluoropropene	
LC50 - Fish [1]	> 197 mg/l
EC50 - Crustacea [1]	> 100 mg/l
LC50 - Fish [2]	33 mg/l
EC50 - Crustacea [2]	65 mg/l
EC50 72h - Algae [1]	> 100 mg/l

2,3,3,3-Tetrafluoropropene	
EC50 72h - Algae [2]	> 2.5 mg/l
LOEC (chronic)	> 15.2 mg/l
NOEC (chronic)	15.2 mg/l
NOEC chronic fish	2.7 mg/l

12.2. Persistence and degradability

R-448A	
Persistence and degradability	Not readily biodegradable.

Pentafluoroethane	
Persistence and degradability	Not rapidly degradable

1,1,1,2-Tetrafluoroethane	
Persistence and degradability	Not rapidly degradable

Difluoromethane	
Persistence and degradability	Not readily biodegradable, 5% % biodegradation 28 days.

2,3,3,3-Tetrafluoropropene	
Persistence and degradability	Not rapidly degradable

Trans-1,3,3,3- Tetrafluoroprop-1-ene	
Persistence and degradability	Not rapidly degradable

12.3. Bioaccumulative potential

Difluoromethane	
Partition coefficient n-octanol/water (Log Pow)	0.2177 25 °C / 77 °F
Bioaccumulative potential	Bioaccumulation unlikely.

12.4. Mobility in soil

No additional information available

12.5. Other adverse effects

Ozone : Not classified
Effect on global warming : Contains fluorinated greenhouse gases covered by the Kyoto protocol.
Calculated GWP of mixture : 2054.67
For quantities refer to cylinder label.
Fluorinated greenhouse gases : No
GWPmix (fluorinated gas) : 2054.67

SECTION 13 Disposal considerations

Regional waste regulation : Disposal must be done according to official regulations. Must be recovered and disposed of by an EPA-certified reclaimer; cannot be vented to atmosphere.
Waste treatment methods : Dispose of contents/container in accordance with licensed collector’s sorting instructions.
Sewage disposal recommendations : Disposal must be done according to official regulations.

Product/Packaging disposal recommendations	:	Disposal must be done according to official regulations. Dispose of this material and its container at hazardous or special waste collection point. Refer to all applicable national, international and local regulations or provisions.
Additional information	:	Empty containers to be re-used must only be prepared by qualified and trained personnel.
Ecological waste information	:	Avoid release to the environment.

SECTION 14 Transport information

In accordance with DOT / IMDG / IATA

DOT	IMDG	IATA
14.1. UN number		
UN3163	3163	3163
14.2. Proper Shipping Name		
Liquefied gas, n.o.s. (Pentafluoroethane ; Difluoromethane ; 1,1,1,2-Tetrafluoroethane (HFC-134a))	LIQUEFIED GAS, N.O.S. (Pentafluoroethane ; Difluoromethane ; 1,1,1,2-Tetrafluoroethane (HFC-134a))	Liquefied gas, n.o.s. (Pentafluoroethane ; Difluoromethane ; 1,1,1,2-Tetrafluoroethane (HFC-134a))
14.3. Transport hazard class(es)		
2.2	2.2	2.2
14.4. Packing group		
Not applicable	Not applicable	Not applicable
14.5. Environmental hazards		
	Dangerous for the environment: No Marine pollutant: No	
No supplementary information available		

14.6. Transport in bulk

Not applicable

14.7. Special precautions for user

DOT

UN-No. (DOT)	:	UN3163
DOT Packaging Exceptions (49 CFR 173.xxx)	:	306
DOT Packaging Non Bulk (49 CFR 173.xxx)	:	304
DOT Packaging Bulk (49 CFR 173.xxx)	:	314, 315
DOT Quantity Limitations Passenger aircraft/rail (49 CFR 173.27)	:	75 kg
DOT Quantity Limitations Cargo aircraft only (49 CFR 175.75)	:	150 kg
DOT Vessel Stowage Location	:	A - The material may be stowed ‘‘on deck’’ or ‘‘under deck’’ on a cargo vessel and on a passenger vessel.

IMDG

Special provisions (IMDG)	:	274, 392
Limited quantities (IMDG)	:	120 ml
Excepted quantities (IMDG)	:	E1
Packing instructions (IMDG)	:	P200
Tank instructions (IMDG)	:	T50
EmS-No. (Fire)	:	F-C - FIRE SCHEDULE Charlie - NON-FLAMMABLE GASES
EmS-No. (Spillage)	:	S-V - SPILLAGE SCHEDULE Victor - GASES (NON-FLAMMABLE, NON-TOXIC)
Stowage category (IMDG)	:	A

IATA

PCA Excepted quantities (IATA)	:	E1
PCA Limited quantities (IATA)	:	Forbidden
PCA limited quantity max net quantity (IATA)	:	Forbidden
PCA packing instructions (IATA)	:	200
PCA max net quantity (IATA)	:	75kg
CAO packing instructions (IATA)	:	200
CAO max net quantity (IATA)	:	150kg
ERG code (IATA)	:	2L

SECTION 15 Regulatory information

15.1. Federal regulations

All components of this product are present and listed as Active on the United States Environmental Protection Agency Toxic Substances Control Act (TSCA) inventory.

Contains chemical(s) subject to TSCA 12b export notification if product is shipped outside the U.S

2,3,3,3-Tetrafluoropropene	CAS-No. 754-12-1	20%

This product or mixture is not known to contain a toxic chemical or chemicals in excess of the applicable de minimis concentration as specified in 40 CFR §372.38(a) subject to the reporting requirements of section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372.

15.2. International regulations

CANADA

Pentafluoroethane (354-33-6)

Listed on the Canadian DSL (Domestic Substances List)

1,1,1,2-Tetrafluoroethane (811-97-2)

Listed on the Canadian DSL (Domestic Substances List)

Difluoromethane (75-10-5)

Listed on the Canadian DSL (Domestic Substances List)

2,3,3,3-Tetrafluoropropene (754-12-1)

Listed on the Canadian DSL (Domestic Substances List)

Trans-1,3,3,3- Tetrafluoroprop-1-ene (29118-24-9)

Listed on the Canadian DSL (Domestic Substances List)

EU-Regulations

No additional information available

National regulations

Pentafluoroethane (354-33-6)

Listed on INSQ (Mexican National Inventory of Chemical Substances)

1,1,1,2-Tetrafluoroethane (811-97-2)

Listed on INSQ (Mexican National Inventory of Chemical Substances)

Difluoromethane (75-10-5)

Listed on INSQ (Mexican National Inventory of Chemical Substances)

15.3. State regulations

California Proposition 65 - This product does not contain any substances known to the state of California to cause cancer, developmental and/or reproductive harm

SECTION 16 Other Information

According to 29 CFR § 1910.1200, Hazard Communication Standard (HCS)

Issue date : 8/21/2026

Full text of hazard classes and H-statements	
H221	Flammable gas
H280	Contains gas under pressure; may explode if heated
SIAS	May displace oxygen and cause rapid suffocation

This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product.