

SAFETY DATA SHEET

Halocarbon R-416A



Section 1. Identification

GHS product identifier	: Halocarbon R-416A
Other means of identification	: FR-12; FRIGC®; ASPEN R416A
Product use	: Synthetic/Analytical chemistry.
Synonym	: FR-12; FRIGC®; ASPEN R416A
SDS #	: 00416A
Supplier's details	: ASPEN Refrigerants, Inc. 38-18 33rd Street Long Island City, NY 11101 1-800-473-3766

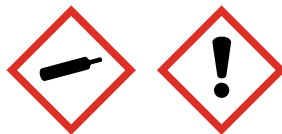
Emergency 24-hour telephone :1-800-424-9300

Section 2. Hazards identification

OSHA/HCS status	: This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).
Classification of the substance or mixture	: GASES UNDER PRESSURE - Compressed gas HAZARDOUS TO THE OZONE LAYER - Category 1

GHS label elements

Hazard pictograms :



Signal word : Warning

Hazard statements : Contains gas under pressure; may explode if heated.
May displace oxygen and cause rapid suffocation.
Harms public health and the environment by destroying ozone in the upper atmosphere.

Precautionary statements

General

: Read and follow all Safety Data Sheets (SDS'S) before use. Read label before use. Keep out of reach of children. If medical advice is needed, have product container or label at hand. Close valve after each use and when empty. Use equipment rated for cylinder pressure. Do not open valve until connected to equipment prepared for use. Use a back flow preventative device in the piping. Use only equipment of compatible materials of construction.

Prevention

: Not applicable.

Response

: Not applicable.

Storage

: Protect from sunlight when ambient temperature exceeds 52°C/125°F. Store in a well-ventilated place.

Disposal

: Refer to manufacturer/supplier for information on recovery/recycling.

Hazards not otherwise classified

: In addition to any other important health or physical hazards, this product may displace oxygen and cause rapid suffocation.

Section 3. Composition/information on ingredients

Substance/mixture : Mixture
Other means of identification : FR-12; FRIGC®; ASPEN R416A

CAS number/other identifiers

CAS number : Not applicable.
Product code : 00416A

Ingredient name	%	CAS number
1,1,1,2 - tetrafluoroethane	59	811-97-2
1-Chloro-1,2,2,2-Tetrafluoroethane	39.5	2837-89-0
N-Butane	1.5	106-97-8

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

Description of necessary first aid measures

Eye contact : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention if irritation occurs.

Inhalation : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention if adverse health effects persist or are severe. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Skin contact : Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Get medical attention if symptoms occur. Wash clothing before reuse. Clean shoes thoroughly before reuse.

Ingestion : As this product is a gas, refer to the inhalation section.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact : Contact with rapidly expanding gas may cause burns or frostbite.
Inhalation : No known significant effects or critical hazards.
Skin contact : Contact with rapidly expanding gas may cause burns or frostbite.
Frostbite : Try to warm up the frozen tissues and seek medical attention.
Ingestion : As this product is a gas, refer to the inhalation section.

Over-exposure signs/symptoms

Eye contact : No specific data.
Inhalation : No specific data.
Skin contact : No specific data.
Ingestion : No specific data.

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

Notes to physician : Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.
Specific treatments : No specific treatment.

Section 4. First aid measures

- Protection of first-aiders** : No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

- Suitable extinguishing media** : Use an extinguishing agent suitable for the surrounding fire.
- Unsuitable extinguishing media** : None known.

- Specific hazards arising from the chemical** : Contains gas under pressure. In a fire or if heated, a pressure increase will occur and the container may burst or explode.

- Hazardous thermal decomposition products** : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide
halogenated compounds

- Special protective actions for fire-fighters** : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Contact supplier immediately for specialist advice. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.

- Special protective equipment for fire-fighters** : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

- For non-emergency personnel** : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Avoid breathing gas. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.
- For emergency responders** : If specialised clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

- Environmental precautions** : Ensure emergency procedures to deal with accidental gas releases are in place to avoid contamination of the environment. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air). May be harmful to the environment if released in large quantities.

Methods and materials for containment and cleaning up

- Small spill** : Immediately contact emergency personnel. Stop leak if without risk.
- Large spill** : Immediately contact emergency personnel. Stop leak if without risk. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and storage

Precautions for safe handling

Section 7. Handling and storage

- Protective measures** : Put on appropriate personal protective equipment (see Section 8). Contains gas under pressure. Avoid contact with eyes, skin and clothing. Avoid breathing gas. Avoid release to the environment. Refer to special instructions/safety data sheet. Empty containers retain product residue and can be hazardous. Do not puncture or incinerate container. Use equipment rated for cylinder pressure. Close valve after each use and when empty. Protect cylinders from physical damage; do not drag, roll, slide, or drop. Use a suitable hand truck for cylinder movement.
- Advice on general occupational hygiene** : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.
- Conditions for safe storage, including any incompatibilities** : Store in accordance with local regulations. Store in a segregated and approved area. Store away from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10). Keep container tightly closed and sealed until ready for use. Cylinders should be stored upright, with valve protection cap in place, and firmly secured to prevent falling or being knocked over. Cylinder temperatures should not exceed 52 °C (125 °F).

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
1,1,1,2 - tetrafluoroethane	AIHA WEEL (United States, 10/2011). TWA: 1000 ppm 8 hours.
1-Chloro-1,2,2,2-Tetrafluoroethane	AIHA WEEL (United States, 10/2011). TWA: 1000 ppm 8 hours.
N-Butane	NIOSH REL (United States, 10/2013). TWA: 1900 mg/m ³ 10 hours. TWA: 800 ppm 10 hours. OSHA PEL 1989 (United States, 3/1989). TWA: 1900 mg/m ³ 8 hours. TWA: 800 ppm 8 hours. ACGIH TLV (United States, 3/2015). STEL: 1000 ppm 15 minutes.

- Appropriate engineering controls** : Good general ventilation should be sufficient to control worker exposure to airborne contaminants.
- Environmental exposure controls** : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

- Hygiene measures** : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.
- Eye/face protection** : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: safety glasses with side-shields.

Skin protection

Section 8. Exposure controls/personal protection

- Hand protection** : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.
- Body protection** : 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.
- Other skin protection** : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
- Respiratory protection** : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Section 9. Physical and chemical properties

Appearance

- Physical state** : Gas.
- Color** : Not available.
- Melting/freezing point** : -108°C (-162.4°F) This is based on data for the following ingredient: 1,1,1,2-Tetrafluoroethane. Weighted average: -144.4°C (-227.9°F)
- Critical temperature** : Lowest known value: 100.9°C (213.6°F) (1,1,1,2-Tetrafluoroethane).
- Odor** : Not available.
- Odor threshold** : Not available.
- pH** : Not available.
- Flash point** : Not available.
- Burning time** : Not applicable.
- Burning rate** : Not applicable.
- Evaporation rate** : Not available.
- Flammability (solid, gas)** : Not available.
- Lower and upper explosive (flammable) limits** : Not available.
- Vapor pressure** : Not available.
- Vapor density** : Highest known value: 3.5 (Air = 1) (1,1,1,2-Tetrafluoroethane). Weighted average: 3.47 (Air = 1)
- Gas Density (lb/ft³)** : Weighted average: 0.1
- Relative density** : Not applicable.
- Solubility** : Not available.
- Solubility in water** : Not available.
- Partition coefficient: n-octanol/water** : Not available.
- Auto-ignition temperature** : Not available.
- Decomposition temperature** : Not available.
- SADT** : Not available.
- Viscosity** : Not applicable.

Section 10. Stability and reactivity

- Reactivity** : No specific test data related to reactivity available for this product or its ingredients.
- Chemical stability** : The product is stable.
- Possibility of hazardous reactions** : Under normal conditions of storage and use, hazardous reactions will not occur.
- Conditions to avoid** : No specific data.
- Incompatible materials** : No specific data.
- Hazardous decomposition products** : Under normal conditions of storage and use, hazardous decomposition products should not be produced.
- Hazardous polymerization** : Under normal conditions of storage and use, hazardous polymerization will not occur.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
1,1,1,2 - tetrafluoroethane	LC50 Inhalation Vapor	Rat	1500 g/m ³	4 hours
1-Chloro-1,2,2,	LC50 Inhalation Gas.	Rat	600000 ppm	1 hours
2-Tetrafluoroethane				
N-Butane	LC50 Inhalation Vapor	Rat	658000 mg/m ³	4 hours

Irritation/Corrosion

Not available.

Sensitization

Not available.

Mutagenicity

Not available.

Carcinogenicity

Not available.

Reproductive toxicity

Not available.

Teratogenicity

Not available.

Specific target organ toxicity (single exposure)

Not available.

Specific target organ toxicity (repeated exposure)

Not available.

Aspiration hazard

Not available.

Information on the likely routes of exposure : Not available.

Potential acute health effects

Section 11. Toxicological information

Eye contact	: Contact with rapidly expanding gas may cause burns or frostbite.
Inhalation	: No known significant effects or critical hazards.
Skin contact	: Contact with rapidly expanding gas may cause burns or frostbite.
Ingestion	: As this product is a gas, refer to the inhalation section.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact	: No specific data.
Inhalation	: No specific data.
Skin contact	: No specific data.
Ingestion	: No specific data.

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects	: Not available.
Potential delayed effects	: Not available.

Long term exposure

Potential immediate effects	: Not available.
Potential delayed effects	: Not available.

Potential chronic health effects

Not available.

General	: No known significant effects or critical hazards.
Carcinogenicity	: No known significant effects or critical hazards.
Mutagenicity	: No known significant effects or critical hazards.
Teratogenicity	: No known significant effects or critical hazards.
Developmental effects	: No known significant effects or critical hazards.
Fertility effects	: No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates

Not available.

Section 12. Ecological information

Toxicity

Not available.

Persistence and degradability

Not available.

Bioaccumulative potential

Product/ingredient name	LogP _{ow}	BCF	Potential
1,1,1,2 - tetrafluoroethane	1.06	-	low
N-Butane	2.89	-	low

Mobility in soil

Section 12. Ecological information






Soil/water partition coefficient (K_{oc}) : Not available.

Other adverse effects : No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Empty ASPEN-owned pressure vessels should be returned to ASPEN. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Empty containers or liners may retain some product residues. Do not puncture or incinerate container.

Section 14. Transport information

	DOT	TDG	Mexico	IMDG	IATA
UN number	UN1078	UN1078	UN1078	UN1078	UN1078
UN proper shipping name	Refrigerant gas, n.o.s (1-Chloro-1,2,2,2-Tetrafluoroethane ,1,1, 1,2-Tetrafluoroethane)	Refrigerant gas, n.o.s (1-Chloro-1,2,2,2-Tetrafluoroethane ,1,1, 1,2-Tetrafluoroethane)	Refrigerant gas, n.o.s (1-Chloro-1,2,2,2-Tetrafluoroethane ,1,1, 1,2-Tetrafluoroethane)	Refrigerant gas, n.o.s (1-Chloro-1,2,2,2-Tetrafluoroethane ,1,1, 1,2-Tetrafluoroethane)	Refrigerant gas, n.o.s (1-Chloro-1,2,2,2-Tetrafluoroethane ,1,1, 1,2-Tetrafluoroethane)
Transport hazard class(es)	2.2 	2.2 	2.2 	2.2 	2.2 
Packing group	-	-	-	-	-
Environment	No.	No.	No.	No.	No.
Additional information	-	Product classified as per the following sections of the Transportation of Dangerous Goods Regulations: 2.13-2.17 (Class 2). <u>Explosive Limit and Limited Quantity Index</u> 0.125 <u>Passenger Carrying Road or Rail Index</u> 75	-	-	-

“Refer to CFR 49 (or authority having jurisdiction) to determine the information required for shipment of the product.”

Special precautions for user : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code : Not available.

Section 15. Regulatory information

U.S. Federal regulations : TSCA 8(a) CDR Exempt/Partial exemption: Not determined
 TSCA 12(b) one-time export: 1-Chloro-1,2,2,2-Tetrafluoroethane
 United States inventory (TSCA 8b): All components are listed or exempted.
 Clean Air Act (CAA) 112 regulated flammable substances: N-Butane

Clean Air Act Section 112 : Not listed

(b) Hazardous Air Pollutants (HAPs)

Clean Air Act Section 602 Class I Substances : Not listed

Clean Air Act Section 602 Class II Substances : Listed

DEA List I Chemicals (Precursor Chemicals) : Not listed

DEA List II Chemicals (Essential Chemicals) : Not listed

SARA 302/304

Composition/information on ingredients

No products were found.

SARA 304 RQ : Not applicable.

SARA 311/312

Classification : Sudden release of pressure

Composition/information on ingredients

Name	%	Fire hazard	Sudden release of pressure	Reactive	Immediate (acute) health hazard	Delayed (chronic) health hazard
1,1,1,2 - tetrafluoroethane	59	No.	Yes.	No.	No.	No.
1-Chloro-1,2,2,2-Tetrafluoroethane	39.5	No.	Yes.	No.	No.	No.
N-Butane	1.5	Yes.	Yes.	No.	No.	No.

SARA 313

	Product name	CAS number	%
Form R - Reporting requirements	1-Chloro-1,2,2,2-Tetrafluoroethane	2837-89-0	39.5
Supplier notification	1-Chloro-1,2,2,2-Tetrafluoroethane	2837-89-0	39.5

SARA 313 notifications must not be detached from the SDS and any copying and redistribution of the SDS shall include copying and redistribution of the notice attached to copies of the SDS subsequently redistributed.

State regulations

Massachusetts : The following components are listed: BUTANE

New York : None of the components are listed.

New Jersey : The following components are listed: 2-CHLORO-1,1,1,2-TETRAFLUOROETHANE; ETHANE, 2-CHLORO-1,1,1,2-TETRAFLUORO-; BUTANE

Pennsylvania : The following components are listed: BUTANE

International regulations

Montreal Protocol (Annexes A, B, C, E)

Ingredient name	List name	Status
HCFC 124	INTL - Montreal protocol (Annexes A, B, C, E)	Annex C, Group I

International lists

Section 15. Regulatory information

National inventory

Australia	: All components are listed or exempted.
Canada	: Not determined.
China	: All components are listed or exempted.
Europe	: All components are listed or exempted.
Japan	: All components are listed or exempted.
Malaysia	: Not determined.
New Zealand	: All components are listed or exempted.
Philippines	: All components are listed or exempted.
Republic of Korea	: All components are listed or exempted.
Taiwan	: All components are listed or exempted.

Canada

WHMIS (Canada)	: Class A: Compressed gas.
CEPA Toxic substances: The following components are listed: Volatile organic compounds; Hydrochlorofluorocarbons	
Canadian ARET: None of the components are listed.	
Canadian NPRI: The following components are listed: Volatile organic compounds; HCFC-124 (all isomers); Butane (all isomers)	
Alberta Designated Substances: None of the components are listed.	
Ontario Designated Substances: None of the components are listed.	
Quebec Designated Substances: None of the components are listed.	

Section 16. Other information

Canada Label requirements : Class A: Compressed gas.

Hazardous Material Information System (U.S.A.)

Health	2
Flammability	0
Physical hazards	3

Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks. Although HMIS® ratings are not required on SDSs under 29 CFR 1910.1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered mark of the National Paint & Coatings Association (NPCA). HMIS® materials may be purchased exclusively from J. J. Keller (800) 327-6868.

The customer is responsible for determining the PPE code for this material.

National Fire Protection Association (U.S.A.)



Reprinted with permission from NFPA 704-2001, Identification of the Hazards of Materials for Emergency Response Copyright ©1997, National Fire Protection Association, Quincy, MA 02269. This reprinted material is not the complete and official position of the National Fire Protection Association, on the referenced subject which is represented only by the standard in its entirety.

Copyright ©2001, National Fire Protection Association, Quincy, MA 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in NFPA 49 and NFPA 325, which would be used as a guideline only. Whether the chemicals are classified by NFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.

Procedure used to derive the classification

Section 16. Other information

Classification	Justification
Press. Gas Comp. Gas, H280 Ozone 1, H420	On basis of test data Calculation method

History

Date of printing : 12/5/2017

Date of issue/Date of revision : 12/5/2017

Date of previous issue : No previous validation

Version : 0.01

Key to abbreviations :

- ATE = Acute Toxicity Estimate
- BCF = Bioconcentration Factor
- GHS = Globally Harmonized System of Classification and Labelling of Chemicals
- IATA = International Air Transport Association
- IBC = Intermediate Bulk Container
- IMDG = International Maritime Dangerous Goods
- LogPow = logarithm of the octanol/water partition coefficient
- MARPOL 73/78 = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
- UN = United Nations

References : Not available.

Indicates information that has changed from previously issued version.

Other special considerations : WARNING: Contains (Chlorotetrafluoroethane (Freon 124), a substance which harms the public health and environment by destroying ozone in the upper atmosphere.

Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.

Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

SAFETY DATA SHEET



Halocarbon R-416A

Section 1. Identification

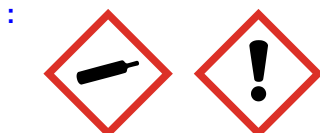
GHS product identifier	: Halocarbon R-416A
Other means of identification	: FR-12; FRIGCC®; ASPEN R416A
Product use	: Synthetic/Analytical chemistry.
Synonym	: FR-12; FRIGCC®; ASPEN R416A
SDS #	: 006058
Supplier's details	: Airgas USA, LLC and its affiliates 259 North Radnor-Chester Road Suite 100 Radnor, PA 19087-5283 1-610-687-5253
Emergency telephone number (with hours of operation)	: 1-866-734-3438

Section 2. Hazards identification

OSHA/HCS status	: This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).
Classification of the substance or mixture	: GASES UNDER PRESSURE - Compressed gas HAZARDOUS TO THE OZONE LAYER - Category 1

GHS label elements

Hazard pictograms



Signal word

: Warning

Hazard statements

: Contains gas under pressure; may explode if heated.
May displace oxygen and cause rapid suffocation.
Harms public health and the environment by destroying ozone in the upper atmosphere.

Precautionary statements

General

: Read and follow all Safety Data Sheets (SDS'S) before use. Read label before use. Keep out of reach of children. If medical advice is needed, have product container or label at hand. Close valve after each use and when empty. Use equipment rated for cylinder pressure. Do not open valve until connected to equipment prepared for use. Use a back flow preventative device in the piping. Use only equipment of compatible materials of construction.

Prevention

: Use and store only outdoors or in a well ventilated place.

Response

: Not applicable.

Storage

: Protect from sunlight. Protect from sunlight when ambient temperature exceeds 52°C/125°F. Store in a well-ventilated place.

Disposal

: Refer to manufacturer/supplier for information on recovery/recycling.

Hazards not otherwise classified

: In addition to any other important health or physical hazards, this product may displace oxygen and cause rapid suffocation.

Date of issue/Date of revision

: 4/16/2015.

Date of previous issue

: 4/13/2015.

Version : 0.03

1/12

Section 3. Composition/information on ingredients

Substance/mixture : Mixture
Other means of identification : FR-12; FRIGC®; ASPEN R416A

CAS number/other identifiers

CAS number : Not applicable.
Product code : 006058

Ingredient name	%	CAS number
1,1,1,2 - tetrafluoroethane	59	811-97-2
2-Chloro-1,1,1,2-tetrafluoroethane	39.5	2837-89-0
Butane	1.5	106-97-8

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

Description of necessary first aid measures

Eye contact : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention if irritation occurs.

Inhalation : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention if adverse health effects persist or are severe. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Skin contact : Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Get medical attention if symptoms occur. Wash clothing before reuse. Clean shoes thoroughly before reuse.

Ingestion : As this product is a gas, refer to the inhalation section.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact : Contact with rapidly expanding gas may cause burns or frostbite.
Inhalation : No known significant effects or critical hazards.
Skin contact : Contact with rapidly expanding gas may cause burns or frostbite.
Frostbite : Try to warm up the frozen tissues and seek medical attention.
Ingestion : As this product is a gas, refer to the inhalation section.

Over-exposure signs/symptoms

Eye contact : No specific data.
Inhalation : No specific data.
Skin contact : No specific data.
Ingestion : No specific data.

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

Section 4. First aid measures

- Notes to physician** : Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.
- Specific treatments** : No specific treatment.
- Protection of first-aiders** : No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

- Suitable extinguishing media** : Use an extinguishing agent suitable for the surrounding fire.

- Unsuitable extinguishing media** : None known.

- Specific hazards arising from the chemical** : Contains gas under pressure. In a fire or if heated, a pressure increase will occur and the container may burst or explode.

- Hazardous thermal decomposition products** : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide
halogenated compounds

- Special protective actions for fire-fighters** : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Contact supplier immediately for specialist advice. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.

- Special protective equipment for fire-fighters** : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

- For non-emergency personnel** : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Avoid breathing gas. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.
- For emergency responders** : If specialised clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".
- Environmental precautions** : Ensure emergency procedures to deal with accidental gas releases are in place to avoid contamination of the environment. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air). May be harmful to the environment if released in large quantities.

Methods and materials for containment and cleaning up

- Small spill** : Immediately contact emergency personnel. Stop leak if without risk.
- Large spill** : Immediately contact emergency personnel. Stop leak if without risk. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and storage

Precautions for safe handling

Protective measures : Put on appropriate personal protective equipment (see Section 8). Contains gas under pressure. Avoid contact with eyes, skin and clothing. Avoid breathing gas. Avoid release to the environment. Refer to special instructions/safety data sheet. Empty containers retain product residue and can be hazardous. Do not puncture or incinerate container. Use equipment rated for cylinder pressure. Close valve after each use and when empty. Protect cylinders from physical damage; do not drag, roll, slide, or drop. Use a suitable hand truck for cylinder movement.

Advice on general occupational hygiene : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

Conditions for safe storage, including any incompatibilities : Store in accordance with local regulations. Store in a segregated and approved area. Store away from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10). Keep container tightly closed and sealed until ready for use. Cylinders should be stored upright, with valve protection cap in place, and firmly secured to prevent falling or being knocked over. Cylinder temperatures should not exceed 52 °C (125 °F).

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
2-Chloro-1,1,1,2-tetrafluoroethane	AIHA WEEL (United States, 10/2011). TWA: 1000 ppm 8 hours.

Appropriate engineering controls : Good general ventilation should be sufficient to control worker exposure to airborne contaminants.

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: safety glasses with side-shields.

Skin protection

Section 8. Exposure controls/personal protection

- Hand protection** : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.
- Body protection** : 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.
- Other skin protection** : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
- Respiratory protection** : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Section 9. Physical and chemical properties

Appearance

- Physical state** : Gas.
- Color** : Not available.
- Melting/freezing point** : -108°C (-162.4°F) This is based on data for the following ingredient: norflurane.
Weighted average: -144.4°C (-227.9°F)
- Critical temperature** : Lowest known value: 100.9°C (213.6°F) (norflurane).
- Odor** : Not available.
- Odor threshold** : Not available.
- pH** : Not available.
- Flash point** : Not available.
- Burning time** : Not applicable.
- Burning rate** : Not applicable.
- Evaporation rate** : Not available.
- Flammability (solid, gas)** : Not available.
- Lower and upper explosive (flammable) limits** : Not available.
- Vapor pressure** : Not available.
- Vapor density** : Highest known value: 3.5 (Air = 1) (norflurane). Weighted average: 3.47 (Air = 1)
- Gas Density (lb/ft³)** : Weighted average: 0.1
- Relative density** : Not applicable.
- Solubility** : Not available.
- Solubility in water** : Not available.
- Partition coefficient: n-octanol/water** : Not available.
- Auto-ignition temperature** : Not available.
- Decomposition temperature** : Not available.
- SADT** : Not available.
- Viscosity** : Not applicable.

Section 10. Stability and reactivity

- Reactivity** : No specific test data related to reactivity available for this product or its ingredients.
- Chemical stability** : The product is stable.
- Possibility of hazardous reactions** : Under normal conditions of storage and use, hazardous reactions will not occur.
- Conditions to avoid** : No specific data.
- Incompatibility with various substances** : Highly reactive with, organic materials, alkalis.
- Hazardous decomposition products** : Under normal conditions of storage and use, hazardous decomposition products should not be produced.
- Hazardous polymerization** : Under normal conditions of storage and use, hazardous polymerization will not occur.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
2-Chloro-1,1,1,2-tetrafluoroethane	LC50 Inhalation Gas.	Rat	600000 ppm	1 hours

Irritation/Corrosion

Not available.

Sensitization

Not available.

Mutagenicity

Not available.

Carcinogenicity

Not available.

Reproductive toxicity

Not available.

Teratogenicity

Not available.

Specific target organ toxicity (single exposure)

Not available.

Specific target organ toxicity (repeated exposure)

Not available.

Aspiration hazard

Not available.

Section 11. Toxicological information

Information on the likely routes of exposure : Not available.

Potential acute health effects

Eye contact : Contact with rapidly expanding gas may cause burns or frostbite.
Inhalation : No known significant effects or critical hazards.
Skin contact : Contact with rapidly expanding gas may cause burns or frostbite.
Ingestion : As this product is a gas, refer to the inhalation section.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact : No specific data.
Inhalation : No specific data.
Skin contact : No specific data.
Ingestion : No specific data.

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects : Not available.
Potential delayed effects : Not available.

Long term exposure

Potential immediate effects : Not available.
Potential delayed effects : Not available.

Potential chronic health effects

Not available.

General : No known significant effects or critical hazards.
Carcinogenicity : No known significant effects or critical hazards.
Mutagenicity : No known significant effects or critical hazards.
Teratogenicity : No known significant effects or critical hazards.
Developmental effects : No known significant effects or critical hazards.
Fertility effects : No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates

Not available.

Section 12. Ecological information

Toxicity

Not available.

Persistence and degradability

Not available.

Section 12. Ecological information

Bioaccumulative potential

Not available.

Mobility in soil






Soil/water partition coefficient (K_{oc}) : Not available.

Other adverse effects : No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Empty Airgas-owned pressure vessels should be returned to Airgas. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Empty containers or liners may retain some product residues. Do not puncture or incinerate container.

Section 14. Transport information

	DOT	TDG	Mexico	IMDG	IATA
UN number	UN1078	UN1078	UN1078	UN1078	UN1078
UN proper shipping name	Refrigerant gas, n.o.s (1-Chloro-1,2,2, 2-Tetrafluoroethane ,1, 1,1, 2-Tetrafluoroethane)	Refrigerant gas, n.o.s (1-Chloro-1,2,2, 2-Tetrafluoroethane ,1, 1,1, 2-Tetrafluoroethane)	Refrigerant gas, n.o.s (1-Chloro-1,2,2, 2-Tetrafluoroethane ,1, 1,1, 2-Tetrafluoroethane)	Refrigerant gas, n.o.s (1-Chloro-1,2,2, 2-Tetrafluoroethane ,1, 1,1, 2-Tetrafluoroethane)	Refrigerant gas, n.o.s (1-Chloro-1,2,2, 2-Tetrafluoroethane ,1, 1,1, 2-Tetrafluoroethane)
Transport hazard class(es)	2.2 	2.2 	2.2 	2.2 	2.2 
Packing group	-	-	-	-	-
Environment	No.	No.	No.	No.	No.
Additional information	-	<u>Explosive Limit and Limited Quantity Index</u> 0.125 <u>Passenger Carrying Road or Rail Index</u> 75	-	-	-

“Refer to CFR 49 (or authority having jurisdiction) to determine the information required for shipment of the product.”

Special precautions for user : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Section 14. Transport information

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code : Not available.

Section 15. Regulatory information

U.S. Federal regulations : TSCA 8(a) CDR Exempt/Partial exemption: Not determined
United States inventory (TSCA 8b): All components are listed or exempted.
Clean Air Act (CAA) 112 regulated flammable substances: Butane

Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs) : Not listed

Clean Air Act Section 602 Class I Substances : Not listed

Clean Air Act Section 602 Class II Substances : Listed

DEA List I Chemicals (Precursor Chemicals) : Not listed

DEA List II Chemicals (Essential Chemicals) : Not listed

SARA 302/304

Composition/information on ingredients

No products were found.

SARA 304 RQ : Not applicable.

SARA 311/312

Classification : Sudden release of pressure

Composition/information on ingredients

Name	%	Fire hazard	Sudden release of pressure	Reactive	Immediate (acute) health hazard	Delayed (chronic) health hazard
2-Chloro-1,1,1,2-tetrafluoroethane	39.5	No.	Yes.	No.	No.	No.

SARA 313

	Product name	CAS number	%
Form R - Reporting requirements	1-chloro-1,2,2,2-tetrafluoroethane	2837-89-0	39.5
Supplier notification	1-chloro-1,2,2,2-tetrafluoroethane	2837-89-0	39.5

SARA 313 notifications must not be detached from the SDS and any copying and redistribution of the SDS shall include copying and redistribution of the notice attached to copies of the SDS subsequently redistributed.

State regulations

Massachusetts : The following components are listed: BUTANE
New York : None of the components are listed.
New Jersey : The following components are listed: 2-CHLORO-1,1,1,2-TETRAFLUOROETHANE; ETHANE, 2-CHLORO-1,1,1,2-TETRAFLUORO-; BUTANE
Pennsylvania : The following components are listed: BUTANE
Canada inventory : Not determined.

International regulations

Date of issue/Date of revision : 4/16/2015. **Date of previous issue** : 4/13/2015. **Version** : 0.03 9/12

Section 15. Regulatory information

International lists :

- Australia inventory (AICS)**: All components are listed or exempted.
- China inventory (IECSC)**: All components are listed or exempted.
- Japan inventory**: All components are listed or exempted.
- Korea inventory**: All components are listed or exempted.
- Malaysia Inventory (EHS Register)**: Not determined.
- New Zealand Inventory of Chemicals (NZIoC)**: All components are listed or exempted.
- Philippines inventory (PICCS)**: All components are listed or exempted.
- Taiwan inventory (CSNN)**: Not determined.

Chemical Weapons Convention List Schedule I Chemicals : Not listed

Chemical Weapons Convention List Schedule II Chemicals : Not listed

Chemical Weapons Convention List Schedule III Chemicals : Not listed

Canada

WHMIS (Canada) :

- Class A: Compressed gas.
- CEPA Toxic substances**: The following components are listed: Volatile organic compounds; Hydrochlorofluorocarbons
- Canadian ARET**: None of the components are listed.
- Canadian NPRI**: The following components are listed: Volatile organic compounds; HCFC-124 (all isomers); Butane (all isomers)
- Alberta Designated Substances**: None of the components are listed.
- Ontario Designated Substances**: None of the components are listed.
- Quebec Designated Substances**: None of the components are listed.

Section 16. Other information

Canada Label requirements : Class A: Compressed gas.

Hazardous Material Information System (U.S.A.)

Health	2
Flammability	0
Physical hazards	3

Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks. Although HMIS® ratings are not required on SDSs under 29 CFR 1910.1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered mark of the National Paint & Coatings Association (NPCA). HMIS® materials may be purchased exclusively from J. J. Keller (800) 327-6868.

The customer is responsible for determining the PPE code for this material.

National Fire Protection Association (U.S.A.)



Section 16. Other information

Reprinted with permission from NFPA 704-2001, Identification of the Hazards of Materials for Emergency Response Copyright ©1997, National Fire Protection Association, Quincy, MA 02269. This reprinted material is not the complete and official position of the National Fire Protection Association, on the referenced subject which is represented only by the standard in its entirety.

Copyright ©2001, National Fire Protection Association, Quincy, MA 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in NFPA 49 and NFPA 325, which would be used as a guideline only. Whether the chemicals are classified by NFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.

History

Date of printing : 4/16/2015.

Date of issue/Date of revision : 4/16/2015.

Date of previous issue : 4/13/2015.

Version : 0.03

Key to abbreviations :

- ATE = Acute Toxicity Estimate
- BCF = Bioconcentration Factor
- GHS = Globally Harmonized System of Classification and Labelling of Chemicals
- IATA = International Air Transport Association
- IBC = Intermediate Bulk Container
- IMDG = International Maritime Dangerous Goods
- LogPow = logarithm of the octanol/water partition coefficient
- MARPOL 73/78 = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
- UN = United Nations
- ACGIH – American Conference of Governmental Industrial Hygienists
- AIHA – American Industrial Hygiene Association
- CAS – Chemical Abstract Services
- CEPA – Canadian Environmental Protection Act
- CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act (EPA)
- CFR – United States Code of Federal Regulations
- CPR – Controlled Products Regulations
- DSL – Domestic Substances List
- GWP – Global Warming Potential
- IARC – International Agency for Research on Cancer
- ICAO – International Civil Aviation Organisation
- Inh – Inhalation
- LC – Lethal concentration
- LD – Lethal dosage
- NDSL – Non-Domestic Substances List
- NIOSH – National Institute for Occupational Safety and Health
- TDG – Canadian Transportation of Dangerous Goods Act and Regulations
- TLV – Threshold Limit Value
- TSCA – Toxic Substances Control Act
- WEEL – Workplace Environmental Exposure Level
- WHMIS – Canadian Workplace Hazardous Material Information System

References : Not available.

 Indicates information that has changed from previously issued version.

Other special considerations : WARNING: Contains (Chlorotetrafluoroethane (Freon 124), a substance which harms the public health and environment by destroying ozone in the upper atmosphere.

Notice to reader

Date of issue/Date of revision : 4/16/2015.	Date of previous issue : 4/13/2015.	Version : 0.03
--	--	-----------------------

11/12

Section 16. Other information

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.

Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.



ARI CERTIFIED RECLAIMER

"ASPEN" R-416A/FR-12

Revised 05-28-2002DDG

Chemical Product/Company Identification

Material Identification:	CAS Number:	811-97-2
	Formula:	1-Chloro-1,2,2,2-Tetrafluoroethane, 1,1,1,2-Tetrafluoroethane, Butane (Near Azeotrope)
	MSDS Code:	012006
	Chemical Family:	Refrigerant gas for mobile air conditioning systems, stationary air conditioning and stationary refrigeration systems.
Tradenames and Synonyms:	R-416A, FRIGC® FR-12™ Refrigerant (U.S. Patent # 5425890)	
Company Identification:	CFC Refimax, LLC 1935G Delk Ind. Blvd. SE Marietta, GA. 30067	
Phone Numbers: CHEMTREC	Product Information:	U.S. International
	Transport Emergency:	1-800-424-9300 703-527-3887 (Collect)
	Medical Emergency:	1-800-424-9300 703-527-3887 (Collect)

Composition/Information On Ingredients

Chemical Name	Cas. No.	Wt.-%	Exposure Limit
1,1,1,2-Tetrafluoroethane (R-134a)	811-97-2	59.0	1000 ppm AIHA WEEL
1-Chloro-1,2,2,2-Tetrafluoroethane (R-124)	2837-89-0	39.5	1000 ppm AIHA WEEL
Butane (R-600)	106-97-8	1.5	800 ppm ACGIH TLV

Disclosure as a toxic chemical is required under Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR part 372.

Potential Health Effects

NFPA HAZARD IDENTIFICATION

Degree of Hazard:	Health: 2	Fire: 0	Reactivity: 0
-------------------	-----------	---------	---------------

Hazard Ratings: 0: Least, 1: Slight, 2: Moderate, 3: High, 4: Extreme

INHALATION: Avoid inhalation of high concentrations of gas. Acute overexposure may result in irritation of the throat and lungs. High concentrations in confined areas can displace oxygen and can cause dizziness, unconsciousness, and even death with longer exposure. Long-term exposure to this product may cause symptoms of drowsiness, dullness, numbness, headache, dizziness, nausea and increase heart rate.

SKIN CONTACT: Avoid direct skin contact. Direct contact with liquefied/pressurized gas or frost particles may cause severe burns or frostbite ("cold" burns).

EYE CONTACT: Avoid eye contact. Direct contact with liquefied/pressurized gas or frost particles may cause severe and possibly permanent eye damage.

ADDITIONAL INFORMATION: Individuals with preexisting diseases of the central nervous system, cardiovascular system, lungs or kidneys may have increased susceptibility to the toxicity of excessive exposures.



OTHER INFORMATION: The following statement complies with 40cfr III.721.3180 as such applies to R-124 only: Inhalation of high concentrations of vapor is harmful and may cause heart irregularities, unconsciousness, or death. Intentional misuse can be fatal. Vapor reduces oxygen available for breathing and is heavier than air. Liquid contact causes frostbite. The effects in animals from single exposure by inhalation include central nervous system effects, anesthesia, and decreased blood pressure. Cardiac sensitization occurred in dogs exposed to a concentration of 2.5 percent in air and given an intravenous epinephrine challenge. Repeated exposures produced increased liver weights, anesthetic effects, irregular respiration, poor coordination, and nonspecific effects such as decreased body weight gain. However, no irreversible effects were seen as evidenced by histopathologic evaluation. As part of an extensive toxicology program, halogenated chlorofluorocarbon-124 will be tested in subchronic, developmental, and chronic/cancer studies. Avoid breathing high concentration of vapor. Use with sufficient ventilation to keep employee exposure below recommended limits. Avoid contact of liquid with skin and eyes. Wear chemical splash goggles and lined butyl gloves. DO NOT allow product to contact open flame or electrical heating elements because dangerous decomposition products may form. R-416A/FR-12 is not carcinogenic, mutagenic, a skin sensitizer, or a reproductive toxin according to the OSHA Hazard Communication Standard (HCS) [29 CFR 1910.1200].

First Aid Measures

INHALATION: Conscious person should be assisted to an uncontaminated area and inhale fresh air. Unconscious person should be moved to an uncontaminated area, given mouth to mouth resuscitation and supplemental oxygen. Do not give epinephrine (adrenaline). Seek immediate medical attention.

SKIN CONTACT: If skin is exposed to liquefied/pressurized gas or frost particles, soak with warm water. If frostbite occurs, do not immerse frozen area into hot water or place in front of a heat source.

EYE CONTACT: If eye is exposed to liquefied/pressurized gas or frost particles, immediately flush eyes with large amounts of water and continue flushing for 15 minutes until irritation subsides.

INGESTION: Not applicable by this route of exposure. Do not attempt to give anything by mouth to an unconscious person. Do not induce vomiting unless instructed to do so by a physician.

NOTES TO PHYSICIANS: Because of possible disturbances of cardiac rhythm, catecholamine drugs, such as epinephrine, should be used with special caution only in situations of emergency life support.

Fire Fighting Measures

FLAMMABLE PROPERTIES:	Flash Point:	Non-flammable , Will not burn
	Flammable limits in Air, % by Volume	
	LEL:	Not applicable
	UEL:	Not applicable
	Autoignition:	Unknown

FIRE AND EXPLOSION HAZARDS: Cylinders are equipped with temperature and pressure relief devices but still may rupture under fire conditions. Decomposition may occur. Gas vapors can collect and remain in low spots even after the source of gas has been eliminated. Contact with certain reactive metals may result in explosive or exothermic reactions under specific conditions (e.g. – very high temperatures and/or appropriate pressures). Caution! Contents are under pressure and can explode when exposed to heat or flames.

EXTINGUISHING MEDIA: Extinguishing media is generally not necessary for this material. This material is non-flammable. Use the extinguishing media appropriate for combustibles in area.

FIRE FIGHTING INSTRUCTIONS: Keep containers cool with water spray. Self-contained breathing apparatus (SCBA) is required if cylinders rupture or release under fire conditions. Use water to keep fire exposed containers cool and to protect personnel during shutoff. If possible, stop the flow of gas or vapor, then fight fire according to types of burning material. If flow cannot be safely shut off, allow fire to burn itself out. Cool cylinders with water spray until well after fire is out. Upon exposure to intense heat or flame container may vent rapidly or explode.



Accidental Release Measures

Evacuate all personnel from affected area. Use appropriate protective equipment. If leak is in user's equipment, be certain to purge piping with an inert gas prior to attempting repairs. Comply with Federal, State, and local regulations for reporting releases.

Handling And Storage

HANDLING (PERSONNEL): Do not drag, roll, or slide cylinders. Secure cylinders at all times. Use separate control valves or pressure reducing regulators to safely discharge gas from cylinder. Use a check valve to prevent reverse flow into cylinder, or an increase in pressure, or an increased discharge rate. Compressed gas cylinders must not be refilled except by a qualified producer of gas. Shipment of the compressed gas cylinder which has not been filled by the owner or with the owner's consent, is a violation of federal law. Do not mix with air for leak testing or use with air for any purpose above atmospheric pressure.

STORAGE: Never expose cylinders to excessive heat. Cylinders should be stored in a well-ventilated area. Storage should not exceed 50°C (122°F) and should be free of oxidizers or corrosive materials.

Exposure Controls/Personal Protection

Respiratory Protection: Positive pressure air line with mask or self-contained breathing apparatus should be available for emergency use.

Ventilation: Use hood with forced ventilation and/or local exhaust codes.
Protective Gloves: Plastic or rubber

Eye Protection: Safety glasses or goggles

Other Protective Equip: Safety shoes

Physical And Chemical Properties

PHYSICAL DATA:

Boiling Point:	-24.2°C
Freezing Point:	-101°C.
Vapor Pressure:	4620 torr @ 25°C
Solubility in Water:	1.4 g/l
Odor:	Faint hydrocarbon
Form:	Liquified gas
Color:	Clear, colorless
Density:	1.33 g/cm ³ - Liquid

Stability And Reactivity

CHEMICAL STABILITY: Material is stable. However, avoid open flames and high temperatures.

CONDITIONS TO AVOID: Do not expose cylinders to temperatures exceeding 50°C, Extreme heat or pressure

POLYMERIZATION: Polymerization will not occur.

DECOMPOSITION: Decomposition products are hazardous

INCOMPATIBILITY: (Materials to avoid) None known.

Disposal Considerations

WASTE DISPOSAL: Comply with Federal, State, and local regulations. Remove to a permitted waste disposal facility or reclaim by distillation.



Transportation Information

SHIPPING INFORMATION:

Proper Shipping Name: 1-Chloro-1,2,2,2-Tetrafluoroethane,
1,1,1,2-Tetrafluoroethane, Butane
Hazard Class: 2.2
UN No: 1078
DOT/IMO Label: Non-Flammable Gas
Shipping Containers: Cylinders, Ton Tanks.

DISCLAIMER

The information recommendations and suggestions herein were compiled from reference material and sources believed to be reliable. However, the MSDS accuracy or completeness is not guaranteed by CFC Refimax, LLC, or its affiliates nor is any responsibility assumed or implied for any loss or damage resulting from inaccuracies or omissions. Since conditions of use are beyond our control no warranties of merchantability or fitness for a particular purpose are expressed or implied. 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.