



R-1234yf REFRIGERANT 10 POUND CYLINDER

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

Revision date:

Version: 1.1

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

Product form : Substance
Trade name : R-1234yf REFRIGERANT 10 POUND CYLINDER
CAS No : 754-12-1
Product code : 6123
Formula : C3H2F4
Synonyms : 2,3,3,3-tetrafluoropropene / 2,3,3,3-tetrafluoropropene-1 / HFO-1234yf / Liquefied gas, flammable, n.o.s.

1.2. Relevant identified uses of the substance or mixture and uses advised against

Use of the substance/mixture : Refrigerant gas

1.3. Details of the supplier of the safety data sheet

Technical Chemical Company
P.O. BOX 139
Cleburne, Texas 76033
T 817-645-6088

1.4. Emergency telephone number

Emergency number : CHEMTREC 24 Hour 1-800-424-9300, 1-703-527-3887 (International)

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

GHS-US classification

Flam. Aerosol 1 H222
Liquefied gas H280

Full text of H statements : see section 16

2.2. Label elements

GHS-US labeling

Hazard pictograms (GHS-US) :



GHS02

GHS04

Signal word (GHS-US) :

Danger

Hazard statements (GHS-US) :

H222 - Extremely flammable aerosol
H280 - Contains gas under pressure; may explode if heated

Precautionary statements (GHS-US) :

P210 - Keep away from heat, sparks, open flames, hot surfaces. - No smoking
P211 - Do not spray on an open flame or other ignition source
P251 - Pressurized container: Do not pierce or burn, even after use
P410+P403 - Protect from sunlight. Store in a well-ventilated place
P410+P412 - Protect from sunlight. Do not expose to temperatures exceeding 50 °C/122 °F

2.3. Other hazards

Other hazards not contributing to the classification :

Asphyxiant in high concentrations. . Contains gas under pressure; may explode if heated. Intentional misuse and inhalation abuse may cause cardiac or central nervous systems effects. Warning. May Cause frostbite in contact with skin. May Cause frostbite in contact with skin. (Liquid form can be ejected if the aerosol can is not held upright during use.) Warning. This product dispenses liquid. Liquid may drip onto skin causing frostbite, blistering, red skin. WARNING. . None under normal conditions.

2.4. Unknown acute toxicity (GHS US)

No data available

SECTION 3: Composition/Information on ingredients

3.1. Substance

Name	Product identifier	%	GHS-US classification
2,3,3,3-Tetrafluoroprop-1-ene (Main constituent)	(CAS No) 754-12-1	100	Flam. Aerosol 1, H222 Liquefied gas, H280

Full text of H-phrases: see section 16

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3.2. Mixture

Not applicable

The exact percentage is a trade secret.

SECTION 4: First aid measures

4.1. Description of first aid measures

First-aid measures general	: Check the vital functions. Unconscious: maintain adequate airway and respiration. Respiratory arrest: artificial respiration or oxygen. Cardiac arrest: perform resuscitation. Victim conscious with laboured breathing: half-seated. Victim in shock: on his back with legs slightly raised. Vomiting: prevent asphyxia/aspiration pneumonia. Prevent cooling by covering the victim (no warming up). Keep watching the victim. Give psychological aid. Keep the victim calm, avoid physical strain. Depending on the victim's condition: doctor/hospital. Never give alcohol to drink.
First-aid measures after inhalation	: Remove the victim into fresh air. Respiratory problems: consult a doctor/medical service.
First-aid measures after skin contact	: Rinse with water. In case of frostbites: Wash immediately with lots of water (15 minutes)/shower. Remove clothing while washing. Do not remove clothing if it sticks to the skin. Cover wounds with sterile bandage. Consult a doctor/medical service. If burned surface > 10%: take victim to hospital.
First-aid measures after eye contact	: Rinse with water. Do not apply neutralizing agents. Take victim to an ophthalmologist if irritation persists.
First-aid measures after ingestion	: Not applicable.

4.2. Most important symptoms and effects, both acute and delayed

Symptoms/injuries after inhalation	: EXPOSURE TO HIGH CONCENTRATIONS: Dizziness. Slight irritation. Headache. Respiratory difficulties. Nausea. Vomiting. Coordination disorders. Disturbances of consciousness.
Symptoms/injuries after skin contact	: Frostbites.
Symptoms/injuries after eye contact	: No data available.
Symptoms/injuries after ingestion	: Not applicable.
Chronic symptoms	: No effects known.

4.3. Indication of any immediate medical attention and special treatment needed

No additional information available

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media	: Water spray. Alcohol-resistant foam. BC powder. Carbon dioxide.
Unsuitable extinguishing media	: No unsuitable extinguishing media known.

5.2. Special hazards arising from the substance or mixture

Fire hazard	: DIRECT FIRE HAZARD. Extremely flammable. Gas/vapour flammable with air within explosion limits. INDIRECT FIRE HAZARD. May build up electrostatic charges: risk of ignition. May be ignited by sparks. Gas/vapour spreads at floor level: ignition hazard.
Explosion hazard	: DIRECT EXPLOSION HAZARD. Gas/vapour explosive with air within explosion limits. INDIRECT EXPLOSION HAZARD. Heat may cause pressure rise in tanks/drums: explosion risk. may be ignited by sparks.
Reactivity	: On burning: release of toxic and corrosive gases/vapours (hydrofluoric acid, carbon monoxide - carbon dioxide).

5.3. Advice for firefighters

Firefighting instructions	: If no hazard for/from the surroundings: controlled burning. If hazardous substances are nearby: consider extinguishment. Extinguish only if gas supply/leak can be shut afterwards. Cool tanks/drums with water spray/remove them into safety. Physical explosion risk: extinguish/cool from behind cover. Do not move the load if exposed to heat. After cooling: persistent risk of physical explosion. Dilute toxic gases with water spray.
Protection during firefighting	: Heat/fire exposure: compressed air/oxygen apparatus.
Other information	: Aerosol level 3.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

General measures	: Evacuate area. No open flames. No smoking. No flames, no sparks. Eliminate all sources of ignition. Isolate from fire, if possible, without unnecessary risk. Remove ignition sources. Use special care to avoid static electric charges.
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6.1.1. For non-emergency personnel

Protective equipment	: Insulating gloves. Protective goggles. Protective clothing. Large spills/in enclosed spaces: compressed air apparatus.
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Emergency procedures : Keep upwind. Mark the danger area. Consider evacuation. Seal off low-lying areas. Close doors and windows of adjacent premises. Stop engines and no smoking. No naked flames or sparks. Spark- and explosionproof appliances and lighting equipment. Avoid ingress of water in the containers. Wash contaminated clothes.

6.1.2. For emergency responders

Protective equipment : Safety glasses. Protective gloves. Equip cleanup crew with proper protection.
Emergency procedures : Stop release. Ventilate area. Stop leak if safe to do so.

6.2. Environmental precautions

Prevent spreading in sewers.

6.3. Methods and material for containment and cleaning up

For containment : Contain released substance, pump into suitable containers. Plug the leak, cut off the supply. Dam up the liquid spill. Tip the container on one side to stop the leakage. Try to reduce evaporation. Measure the concentration of the explosive gas-air mixture. Dilute/disperse combustible gas/vapour with water curtain. Provide equipment/receptacles with earthing. Do not spray water on unheated tank walls. Do not use compressed air for pumping over spills.
Methods for cleaning up : Damaged/cooled tanks must be emptied. Do not use compressed air for pumping over spills. Take collected spill to manufacturer/competent authority. Wash clothing and equipment after handling.

6.4. Reference to other sections

See Heading 8. Exposure controls and personal protection.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Additional hazards when processed : Hazardous waste due to potential risk of explosion. Pressurized container: Do not pierce or burn, even after use.
Precautions for safe handling : Comply with the legal requirements. Clean contaminated clothing. Handle uncleaned empty containers as full ones. Thoroughly clean/dry the installation before use. Do not use compressed air for pumping over. Use spark-/explosionproof appliances and lighting system. Take precautions against electrostatic charges. Keep away from naked flames/heat. Keep away from ignition sources/sparks. Observe normal hygiene standards. Measure the concentration in the air regularly. Measure the oxygen concentration in the air. Work under local exhaust/ventilation.
Hygiene measures : Always wash hands after handling the product. Wash hands and other exposed areas with mild soap and water before eating, drinking or smoking and when leaving work. Do not eat, drink or smoke when using this product. Wash contaminated clothing before reuse. Wash affected areas thoroughly after handling. Remove contaminated clothes. Separate working clothes from town clothes. Launder separately.

7.2. Conditions for safe storage, including any incompatibilities

Technical measures : Proper grounding procedures to avoid static electricity should be followed.
Storage conditions : Keep only in the original container in a cool, well ventilated place away from : Keep container closed when not in use. Do not expose to temperatures exceeding 50 °C/ 122 °F. Keep in fireproof place.
Incompatible products : Strong bases. Strong acids.
Incompatible materials : Sources of ignition. Direct sunlight. Heat sources.
Storage temperature : < 50 °C
Heat-ignition : KEEP SUBSTANCE AWAY FROM: heat sources. ignition sources.
Prohibitions on mixed storage : KEEP SUBSTANCE AWAY FROM: oxidizing agents. reducing agents. (strong) acids. (strong) bases. metals. metal powders.
Storage area : Store in a cool area. Store in a dry area. Ventilation at floor level. Fireproof storeroom. Provide for an automatic sprinkler system. Provide for a tub to collect spills. Provide the tank with earthing. Keep out of direct sunlight. Meet the legal requirements.
Special rules on packaging : SPECIAL REQUIREMENTS: with pressure relief valve. clean. correctly labelled. meet the legal requirements.

7.3. Specific end use(s)

Follow Label Directions.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

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USA ACGIH	ACGIH TWA (mg/m ³)	2.5 mg/m ³ (Fluorides, as F; USA; Time-weighted average exposure limit 8 h; TLV - Adopted Value)

8.2. Exposure controls

Appropriate engineering controls : Ensure good ventilation of the work station. Local exhaust ventilation, vent hoods.

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Personal protective equipment : Avoid all unnecessary exposure. Safety glasses. Gloves.



Materials for protective clothing : GIVE EXCELLENT RESISTANCE:
Hand protection : Insulated gloves.
Eye protection : Safety glasses.
Skin and body protection : Protective clothing.
Respiratory protection : High vapour/gas concentration: self-contained respirator.
Consumer exposure controls : Avoid contact during pregnancy/while nursing.
Other information : Do not eat, drink or smoke during use.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state : Gas
Appearance : Gas.
Molecular mass : 114.04 g/mol
Color : Colourless.
Odor : Mild odour.
Odor threshold : No data available
pH : No data available
Relative evaporation rate (butyl acetate=1) : No data available
Melting point : -152 °C
Freezing point : No data available
Boiling point : -29.4 °C
Flash point : No data available
Auto-ignition temperature : 405 °C
Decomposition temperature : No data available
Flammability (solid, gas) : No data available
Vapor pressure : 6.1 hPa (21 °C)
Vapor pressure at 50 °C : 14 hPa (54 °C)
Relative vapor density at 20 °C : 3.9
Relative density : 1.1 (25 °C)
Specific gravity / density : 1100 kg/m³ (25 °C)
Solubility : Insoluble in water.
Water: 0.020 g/100ml (24 °C)
Log Pow : 2.15 (Experimental value)
Log Kow : No data available
Viscosity, kinematic : No data available
Viscosity, dynamic : No data available
Explosive properties : No data available
Oxidizing properties : No data available
Explosion limits : 4 - 19 vol %
112 - 518 g/m³

9.2. Other information

VOC content : 100 %
Gas group : Liquefied gas
Other properties : Gas/vapour heavier than air at 20°C. May generate electrostatic charges.

SECTION 10: Stability and reactivity

10.1. Reactivity

On burning: release of toxic and corrosive gases/vapours (hydrofluoric acid, carbon monoxide - carbon dioxide).

10.2. Chemical stability

Stable under normal conditions.

10.3. Possibility of hazardous reactions

Not established.

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10.4. Conditions to avoid

Direct sunlight. Extremely high or low temperatures. Heat. Sparks. Open flame. Overheating.

10.5. Incompatible materials

Strong acids. Strong bases.

10.6. Hazardous decomposition products

Toxic fume. . Carbon monoxide. Carbon dioxide.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute toxicity : Not classified

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LC50 inhalation rat (mg/l)	1865 mg/l/4h (Rat)
LC50 inhalation rat (ppm)	400000 ppm/4h (Rat)

Skin corrosion/irritation	: Not classified
Serious eye damage/irritation	: Not classified
Respiratory or skin sensitization	: Not classified
Germ cell mutagenicity	: Not classified Based on available data, the classification criteria are not met
Carcinogenicity	: Not classified
Reproductive toxicity	: Not classified
Specific target organ toxicity (single exposure)	: Not classified
Specific target organ toxicity (repeated exposure)	: Not classified
Aspiration hazard	: Not classified
Potential Adverse human health effects and symptoms	: Based on available data, the classification criteria are not met.
Symptoms/injuries after inhalation	: EXPOSURE TO HIGH CONCENTRATIONS: Dizziness. Slight irritation. Headache. Respiratory difficulties. Nausea. Vomiting. Coordination disorders. Disturbances of consciousness.
Symptoms/injuries after skin contact	: Frostbites.
Symptoms/injuries after eye contact	: No data available.
Symptoms/injuries after ingestion	: Not applicable.
Chronic symptoms	: No effects known.

SECTION 12: Ecological information

12.1. Toxicity

Ecology - air	: Not classified as dangerous for the ozone layer (Regulation (EC) No 1005/2009). Not included in the list of fluorinated greenhouse gases (Regulation (EC) No 842/2006).
Ecology - water	: Slightly harmful to fishes (LC50(96h) >100 mg/l). Practically non-toxic to algae (EC50 >100 mg/l).

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LC50 fish 1	> 197 mg/l (LC50; OECD 203: Fish, Acute Toxicity Test; 96 h; Cyprinus carpio)
EC50 Daphnia 1	> 83 mg/l (EC50; OECD 202: Daphnia sp. Acute Immobilisation Test; 48 h; Daphnia magna)
Threshold limit algae 1	> 75 mg/l (NOEC)
Threshold limit algae 2	> 100 mg/l (EC50)

12.2. Persistence and degradability

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Persistence and degradability	Not readily biodegradable in water.
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12.3. Bioaccumulative potential

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Log Pow	2.15 (Experimental value)
Bioaccumulative potential	Low potential for bioaccumulation (Log Kow < 4).

12.4. Mobility in soil

No additional information available

12.5. Other adverse effects

Other information : Avoid release to the environment.

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SECTION 13: Disposal considerations

13.1. Waste treatment methods

- Waste disposal recommendations : Remove waste in accordance with local and/or national regulations. Hazardous waste shall not be mixed together with other waste. Different types of hazardous waste shall not be mixed together if this may entail a risk of pollution or create problems for the further management of the waste. Hazardous waste shall be managed responsibly. All entities that store, transport or handle hazardous waste shall take the necessary measures to prevent risks of pollution or damage to people or animals. Refer to manufacturer/supplier for information on recovery/recycling.
- Additional information : LWCA (the Netherlands): KGA category 06. Hazardous waste according to Directive 2008/98/EC.
- Ecology - waste materials : Avoid release to the environment.

SECTION 14: Transport information

In accordance with ADR / RID / IMDG / IATA / ADN

- US DOT (ground): UN3161, Liquefied gas, flammable, n.o.s. (R-1234yf), 2.1
- ICAO/IATA (air): UN3161, Liquefied gas, flammable, n.o.s. (R-1234yf), 2.1
- IMO/IMDG (water): UN3161, Liquefied gas, flammable, n.o.s. (R-1234yf), 2.1
- Special Provisions: T50 - When portable tank instruction T50 is referenced in Column (7) of the 172.101 Table, the applicable liquefied compressed gases are authorized to be transported in portable tanks in accordance with the requirements of 173.313 of this subchapter

14.2. UN proper shipping name

- Proper Shipping Name (DOT) : Liquefied gas, flammable, n.o.s. (R-1234yf)
R-1234yf
- Class (DOT) : 2.1 - Class 2.1 - Flammable gas 49 CFR 173.115
- Hazard labels (DOT) : 2.1 - Flammable gas



- DOT Symbols : G - Identifies PSN requiring a technical name
- DOT Special Provisions (49 CFR 172.102) : T50 - When portable tank instruction T50 is referenced in Column (7) of the 172.101 Table, the applicable liquefied compressed gases are authorized to be transported in portable tanks in accordance with the requirements of 173.313 of this subchapter
- 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

14.3. Additional information

- Emergency Response Guide (ERG) Number : 115
- Other information : No supplementary information available.

Overland transport

- Class (ADR) : 2 - Gases
- Hazard identification number (Kemler No.) : 23
- Classification code (ADR) : 2F
- Hazard labels (ADR) : 2.1 - Flammable gases



- Orange plates : An orange rectangular plate with a black border. The top half contains the number '23' and the bottom half contains the number '3161'.

- Tunnel restriction code (ADR) : B/D

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Transport by sea

DOT Vessel Stowage Location	: D - The material must be stowed "on deck only" on a cargo vessel and on a passenger vessel carrying a number of passengers limited to not more than the larger of 25 passengers or one passenger per each 3 m of overall vessel length, but the material is prohibited on passenger vessels in which the limiting number of passengers is exceeded
DOT Vessel Stowage Other	: 40 - Stow "clear of living quarters"
EmS-No. (1)	: F-D
EmS-No. (2)	: S-U

Air transport

DOT Quantity Limitations Passenger aircraft/rail (49 CFR 173.27)	: Forbidden
DOT Quantity Limitations Cargo aircraft only (49 CFR 175.75)	: 150 kg

SECTION 15: Regulatory information

15.1. US Federal regulations

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Listed on the United States TSCA (Toxic Substances Control Act) inventory

SARA Section 311/312 Hazard Classes	Fire hazard Immediate (acute) health hazard Sudden release of pressure hazard
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15.2. International regulations

CANADA

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Listed on the Canadian DSL (Domestic Substances List)

WHMIS Classification	Class B Division 1 - Flammable Gas Class A - Compressed Gas
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EU-Regulations

No additional information available

Classification according to Regulation (EC) No. 1272/2008 [CLP]

Flam. Gas 1 H220
Press. Gas

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

Classification according to Directive 67/548/EEC [DSD] or 1999/45/EC [DPD]

Not classified

15.2.2. National regulations

R-1234yf REFRIGERANT 10 POUND CYLINDER (754-12-1)

Listed on the AICS (Australian Inventory of Chemical Substances)
Listed on KECI (Korean Existing Chemicals Inventory)
Listed on the Japanese ENCS (Existing & New Chemical Substances) inventory

15.3. US State regulations

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U.S. - California - Proposition 65 - Carcinogens List	No
U.S. - California - Proposition 65 - Developmental Toxicity	No
U.S. - California - Proposition 65 - Reproductive Toxicity - Female	No
U.S. - California - Proposition 65 - Reproductive Toxicity - Male	No

SECTION 16: Other information

Indication of changes : Revision - See : *.
Other information : None.

Full text of H-phrases:

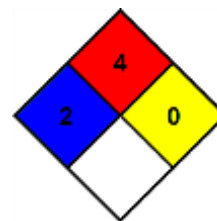
H222	Extremely flammable aerosol
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NFPA health hazard	: 2 - Intense or continued exposure could cause temporary incapacitation or possible residual injury unless prompt medical attention is given.
NFPA fire hazard	: 4 - Will rapidly or completely vaporize at normal pressure and temperature, or is readily dispersed in air and will burn readily.
NFPA reactivity	: 0 - Normally stable, even under fire exposure conditions, and are not reactive with water.



HMIS III Rating

Health	: 0 Minimal Hazard - No significant risk to health
Flammability	: 4 Severe Hazard
Physical	: 2 Moderate Hazard
Personal Protection	: B

SDS US (GHS HazCom 2012) - TCC

The Supplier identified in Section 1 of this MSDS has evaluated this product and certifies it to be labeled and packaged in compliance with the applicable provisions of the Federal Hazardous Substance Act as stated in 16 CFR 1500 and enforced by the Consumer Product Safety Commission, and where applicable the products that require Child Resistant Closures are packaged in accordance with the Poison Prevention Packaging Act as stated in 16 CFR 1700 and enforced by the Consumer Product Safety Commission. All closures have been tested in accordance with the latest protocols. No other testing is required to certify compliance with the above. The date of manufacture is stamped on the product

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