

SECTION 1: Identification

1.1. Identification

Product form : Mixture
Product name : R-438A

1.2. Recommended use and restrictions on use

Use of the substance/mixture : Refrigerant

1.3. Supplier

FluoroFusion Specialty Chemicals, Inc.
3950 Powhatan Rd.
Clayton, NC 27520
Phone: 919-888-0894
www.fluorofusion.com
Email: info@fluorofusion.com

1.4. Emergency telephone number

Emergency number : Contact Chemtrec at 800-424-9300 (24 hours)

SECTION 2: Hazard(s) identification

2.1. Classification of the substance or mixture

GHS-US classification

Gases under pressure Liquefied gas H280 Contains gas under pressure; may explode if heated

Full text of H statements : see section 16

2.2. GHS Label elements, including precautionary statements

GHS-US labeling

Hazard pictograms (GHS-US) :



Signal word (GHS-US) : Warning

Hazard statements (GHS-US) : H280 - Contains gas under pressure; may explode if heated

Precautionary statements (GHS-US) : P410+P403 - Protect from sunlight. Store in a well-ventilated place

2.3. Other hazards which do not result in classification

Vapors are heavier than air and can cause suffocation by reducing oxygen available for breathing. Rapid evaporation of the liquid may cause frostbite.

2.4. Unknown acute toxicity (GHS US)

Not applicable.

SECTION 3: Composition/Information on ingredients

3.1. Substances

Not applicable.

3.2. Mixtures

Name	Product identifier	%	GHS-US classification
Ethane, pentafluoro-	(CAS No) 354-33-6	45	Liquefied gas, H280
1,1,1,2-Tetrafluoroethane	(CAS No) 811-97-2	44.2	Compressed gas, H280
Difluoromethane	(CAS No) 75-10-5	8.5	Flammable gas, H220
Butane	(CAS No) 106-97-8	1.7	Flammable gas, H220
Isopentane	(CAS No) 78-78-4	0.6	Flammable liquid, H224

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SECTION 4: First-aid measures

4.1. Description of first aid measures

- First-aid measures general : Never give anything by mouth to an unconscious person. If you feel unwell, seek medical advice (show the label where possible).
- First-aid measures after inhalation : Allow victim to breathe fresh air. Allow the victim to rest.
- First-aid measures after skin contact : Remove affected clothing and wash all exposed skin area with mild soap and water, followed by warm water rinse.
- First-aid measures after eye contact : Rinse immediately with plenty of water. Obtain medical attention if pain, blinking or redness persist.
- First-aid measures after ingestion : Rinse mouth. Do NOT induce vomiting. Obtain emergency medical attention.

4.2. Most important symptoms and effects (acute and delayed)

- Potential Adverse human health effects and symptoms : No additional information available.
- Symptoms/injuries : Not expected to present a significant hazard under anticipated conditions of normal use.

4.3. Immediate medical attention and special treatment, if necessary

No additional information available

SECTION 5: Fire-fighting measures

5.1. Suitable (and unsuitable) extinguishing media

- Suitable extinguishing media : Foam. Dry powder. Carbon dioxide. Water spray. Sand.
- Unsuitable extinguishing media : Do not use a heavy water stream.

5.2. Specific hazards arising from the chemical

No additional information available

5.3. Special protective equipment and precautions for fire-fighters

- Firefighting instructions : Use water spray or fog for cooling exposed containers. Exercise caution when fighting any chemical fire. Prevent fire-fighting water from entering environment.
- Protection during firefighting : Do not enter fire area without proper protective equipment, including respiratory protection.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

6.1.1. For non-emergency personnel

- Emergency procedures : Evacuate unnecessary personnel.

6.1.2. For emergency responders

- Protective equipment : Equip cleanup crew with proper protection.
- Emergency procedures : Ventilate area.

6.2. Environmental precautions

Prevent entry to sewers and public waters. Notify authorities if liquid enters sewers or public waters.

6.3. Methods and material for containment and cleaning up

- Methods for cleaning up : Store away from other materials.

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

- Precautions for safe handling : Wash hands and other exposed areas with mild soap and water before eating, drinking or smoking and when leaving work. Provide good ventilation in process area to prevent formation of vapor.

7.2. Conditions for safe storage, including any incompatibilities

- Storage conditions : Keep only in the original container in a cool, well ventilated place. Keep container closed when not in use.
- Incompatible products : Strong bases. Strong acids.
- Incompatible materials : Sources of ignition. Direct sunlight.

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Storage area : Store in a well-ventilated place. Protect cylinder and its fittings from physical damage. Cylinders should be stored upright and firmly secured to prevent falling or being knocked over.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Ethane, pentafluoro- (354-33-6)		
AIHA	WEEL TWA (ppm)	1000 ppm
1,1,1,2-Tetrafluoroethane (811-97-2)		
AIHA	WEEL TWA (ppm)	1000 ppm
Difluoromethane (75-10-5)		
AIHA	WEEL TWA (ppm)	1000 ppm

8.2. Appropriate engineering controls

Ensure adequate ventilation, especially in confined areas. Local exhaust should be used when large amounts are released. Mechanical ventilation should be used in low or enclosed places.

8.3. Individual protection measures/Personal protective equipment

Personal protective equipment:

Avoid all unnecessary exposure.

Hand protection:

Wear protective gloves

Eye protection:

Chemical goggles or safety glasses

Respiratory protection:

Not required under normal conditions. If concentrations exceed exposure limits, use NIOSH approved respirator.

Thermal protection:

If there is a risk of contact with the liquid, all protective equipment worn should be suitable for use with extremely low temperatures of materials.

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	: Colorless gas.
Color	: Colorless
Odor	: ether-like
Odor threshold	: No data available
pH	: No data available
Melting point	: No data available
Freezing point	: No data available
Boiling point	: -42.3 °C
Flash point	: No data available
Relative evaporation rate (butyl acetate=1)	: No data available
Flammability (solid, gas)	: Non flammable.
Vapor pressure	: No data available
Relative vapor density at 20 °C	: No data available
Relative density	: No data available
Solubility	: No data available
Log Pow	: No data available
Auto-ignition temperature	: No data available

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Decomposition temperature	: No data available
Viscosity, kinematic	: No data available
Viscosity, dynamic	: No data available
Explosion limits	: No data available
Explosive properties	: No data available
Oxidizing properties	: No data available

9.2. Other information

Gas group	: Liquefied gas
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SECTION 10: Stability and reactivity

10.1. Reactivity

No additional information available.

10.2. Chemical stability

Not established.

10.3. Possibility of hazardous reactions

Not established.

10.4. Conditions to avoid

Direct sunlight. Extremely high or low temperatures.

10.5. Incompatible materials

Strong acids. Strong bases. Alkali metals.

10.6. Hazardous decomposition products

This material can be decomposed by high temperatures (open flames, glowing metal surfaces, etc.) forming hydrofluoric acid and possibly carbonyl fluoride. Carbon monoxide. Carbon dioxide.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute toxicity	: Not classified
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Ethane, pentafluoro- (354-33-6)	
LC50 inhalation rat (mg/l)	2910 g/m ³ (Exposure time: 4 h)
ATE US (vapors)	2910 mg/l/4h
ATE US (dust, mist)	2910 mg/l/4h
Difluoromethane (75-10-5)	
LC50 inhalation rat (mg/l)	1890 g/m ³ (Exposure time: 4 h)
ATE US (vapors)	1890 mg/l/4h
ATE US (dust, mist)	1890 mg/l/4h
1,1,1,2-Tetrafluoroethane (811-97-2)	
LC50 inhalation rat (mg/l)	1500 g/m ³ (Exposure time: 4 h)
ATE US (vapors)	1500 mg/l/4h
ATE US (dust, mist)	1500 mg/l/4h
Butane (106-97-8)	
LC50 inhalation rat (mg/l)	658 g/m ³ (Exposure time: 4 h)
ATE US (vapors)	658 mg/l/4h
ATE US (dust, mist)	658 mg/l/4h
Isopentane (78-78-4)	
LC50 inhalation rat (mg/l)	28,000 g/m ³ (Exposure time: 4 h)

Skin corrosion/irritation	: Not classified
Serious eye damage/irritation	
Respiratory or skin sensitization	: Not classified
Germ cell mutagenicity	: Not classified
Carcinogenicity	: Not classified
Reproductive toxicity	: Not classified

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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	: Not expected to present a significant hazard under anticipated conditions of normal use.

SECTION 12: Ecological information

12.1. Toxicity

No additional information available.

12.2. Persistence and degradability

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Persistence and degradability	Not established.
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12.3. Bioaccumulative potential

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Bioaccumulative potential	Not established.
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12.4. Mobility in soil

No additional information available.

12.5. Other adverse effects

Other information : Avoid release to the environment.

SECTION 13: Disposal considerations

13.1. Disposal methods

Product/Packaging disposal recommendations	: Dispose in a safe manner in accordance with local/national regulations.
Ecology - waste materials	: Avoid release to the environment.

SECTION 14: Transport information

Department of Transportation (DOT)

In accordance with DOT

Transport document description	: UN1078 Refrigerant gases, n.o.s. (1,1,1,2 Tetrafluoroethane, Pentafluoroethane), 2.2
UN-No.(DOT)	: UN1078
Proper Shipping Name (DOT)	: Refrigerant gases, n.o.s. (1,1,1,2 Tetrafluoroethane, Pentafluoroethane)
Class (DOT)	: 2.2 - Class 2.2 - Non-flammable compressed gas 49 CFR 173.115
Hazard labels (DOT)	: 2.2 - Non-flammable gas



DOT Packaging Non Bulk (49 CFR 173.xxx)	: 304
DOT Packaging Bulk (49 CFR 173.xxx)	: 314;315
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 Quantity Limitations Passenger aircraft/rail (49 CFR 173.27)	: 75 kg
DOT Quantity Limitations Cargo aircraft only (49 CFR 175.75)	: 150 kg

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DOT Vessel Stowage Location : A - The material may be stowed "on deck" or "under deck" on a cargo vessel and on a passenger vessel.
Emergency Response Guide (ERG) Number : 126
Other information : No supplementary information available.

TDG

No additional information available

Transport by sea

No additional information available.

Air transport

No additional information available.

SECTION 15: Regulatory information

15.1. US Federal regulations

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SARA Section 311/312 Hazard Classes : Gas under pressure

Difluoromethane (75-10-5)

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

Isopentane (78-78-4)

Listed CAA 112 (r) regulated flammable substance.

15.2. International regulations

CANADA

No additional information available.

EU-Regulations

No additional information available.

National regulations

No additional information available.

15.3. US State regulations

⚠ WARNING: This product can expose you to chloroform, which is known to the State of California to cause cancer and birth defects or other reproductive harm. For more information, go to www.p65warnings.ca.gov.

SECTION 16: Other information

Other information : None.

Full text of H-phrases:

H280	Contains gas under pressure; may explode if heated
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SDS US (GHS HazCom 2012)

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.