Environmental Protection Agency

eDocument Workflow Data Ingestion Form

DERR - Hazardous Waste Permitting

Note: All HW Permitting Documents fall under "Permit-Intermediate" doc type.

Keyword Summary:

Secondary ID:	OHD980613541	**Stamped date on doc:**	4/29/2026
Facility Name:	Arcwood Environmental		
County:	Columbiana	**CBI: (See protocol below)**	
Program:	RCRA C – Hazardous Waste	**Request contains CBI/TS claim?**	No
Permit Type:	Permit-to-Install and Operate	**Was a "public" copy included?**	No
Permit Subtype:	Application and Support	**Financial Assurance Info (see protocol below)**	
Permit Classification:	Permit Application	**Request contains FA policy/account # info?**	No
Permit Purpose:	Class 1A Modification	**Contingency Plan Info (see protocol below)**	
Confidentiality Status:	Public Record for Publication	**Request contains facility staff pers/home phone #'s?**	No

Confidential Business Information (CBI) Protocol

Applications or requests that contain a claim of Confidential Business Information (CBI) **are not ingested** into the Agency's eDoc system. However, any claims must be made at the time of application submission, as required by both OAC Rule 3745-49-03 and OAC Rule 3745-50-30. Permittees must comply with the complete requirements of the above-cited rules, which include, among other things, submission of a corresponding "public" copy of the application or request which should be ingested into eDocs.

Financial Assurance Info Protocol

If the application contains "original signature" financial assurance documents, these documents **must be forwarded** to CO FA staff (Shawn Sellers or Melissa Cheung) as these types of documents must be secured in CO's fireproof file cabinet. Also, even if the FA information included in a mod application is not "original signature," if it includes information like insurance policy, bank account, letter of credit, or bond numbers, these impacted pages should simply be physically removed and not scanned/included as a part of the ingested application. In place of the removed page, a page can be inserted which states: "Pages of this application which contain financial assurance mechanism details specific to policy or account numbers have been removed from this web-available version of the document."

Contingency Plan Info Protocol

If the application contains facility staff personal/home phone number information, the impacted pages should simply be physically removed and not scanned/included as a part of the ingested application. In place of the removed page, a page can be inserted which states: "Pages of this application which contain facility staff personal/home phone number information have been removed from this web-available version of the document."

Form Completed by: Elijah Lucas 4/30/2026

Comments

Arcwood
ENVIRONMENTAL

RECEIVED
APR 2 9 2026
OHIO EPA NEDO

April 22, 2026
VIA PRIORITY MAIL
RETURN RECEIPT REQUESTED

Mr. Bradley Mitchell
OEPA-DHWM-CO
P.O. Box 1049
Columbus, Ohio 43216-1049

Re: Class 1A Permit Modification Request
Section C Revision 56
Arcwood Environmental-East Liverpool, Inc. - OHD 980 613 541/ 02-15-0589

Dear Mr. Mitchell:

Please consider this letter a request for a Class 1, with prior approval from the Director (1A), permit modification pursuant to Ohio Administrative Code Chapter 3745-50-51 (D) (b).

In a letter dated January 30, 2008, the Ohio EPA approved a Class 2 permit modification for Arcwood Environmental-East Liverpool, Inc. This Class 2 permit modification allowed Arcwood to accept and treat two specific types of compressed gases. Section C, Waste Characteristics and Waste Analysis Plan (WAP), of the Part B permit application was modified for this permit modification. Section C-2e(5)d and reads as follows:

> *If the Permittee requests to add additional compressed gases to their permit, the Permittee shall evaluate the specific gas waste stream to ensure it does not pose risks that were not addressed during the 2002 accident analysis. If the new gaseous waste stream does not pose any additional risks, the Permittee may add the compressed gas to the permit following the class 1A permit modification process. If the new gaseous waste stream does pose additional risk(s), the Permittee may add the compressed gas to the permit following the class 2 permit modification process. Examples of the criteria to be used to evaluate a new gas or gas mixture include, but are not limited to: (1) hazardous versus non-hazardous; (2) vapor pressure; (3) vapor density; (4) exposure guidelines; (5) solubility in water; (6) composition; and (7) flammability.*

In accordance with the permit modification approved January 30, 2008, Arcwood is requesting to add three (3) compressed gas waste streams to the approved compressed gas list found in Table C-1a(2)(i). Arcwood requests to add the following compressed gas to the approved list:

- Helium
- 1-Chloro-1-fluoroethylene up to 1% concentration
- Sulfur Hexafluoride

Arcwood has evaluated the compressed gases as required by section C-2e(5)d and determined that it does not pose any risks that were not addressed during the 2002 accident analysis.

Helium is a gas for research and development use. It is non-flammable with vapor densities lighter than air. Helium will be received in concentrations up to 100%.

1-Chloro-1-fluoroethylene is a flammable gas that will only be received in concentrations below the lower flammability of 6%. Arcwood is requesting that 1-Chloro-1-fluoroethylene only be approved as a trace component in gas mixtures with concentrations up to 1%.

Sulfur Hexafluoride is used in synthetic and analytical chemistry. It is non-flammable with vapor densities heavier than air. Sulfur Hexafluoride will be received in concentrations up to 100%.

The attached safety data sheets (SDS) describe the properties for all the gases listed.

The safety data sheets (SDS) accompany this modification for informational purposes only and should not be included as part of the permit application.

The proposed permit modification will affect the following sections of the facility's Part B permit application. Please add/replace the following pages accordingly:

Section C – Waste Characteristics and Waste Analysis Plan
All pages for Section C are Revision 56, dated April 22, 2026.

Replace Cover Page – New revision number and date
Replace Page C-15– Add new gases to approved list in Table C-1a(2)(i)

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are certain penalties for submitting false information including the possibility of fine and imprisonment for knowing violations.

Thank you and if you have any questions or comments, please call me at the above number.

Sincerely,

Carrie L Beringer

Carrie L. Beringer
Environmental and Compliance Manager
Arcwood Environmental-East Liverpool, Inc.

cc: Natalie Oryshkewych, OEPA-NEDO-DMWM
John Paquelet, OEPA – NEDO – DMWM
Nyall Mckenna – OEPA – NEDO – DMWM
Emilee Keener, USEPA – Region V

SECTION C
WASTE CHARACTERISTICS AND WASTE ANALYSIS PLAN

Arcwood Environmental – East Liverpool, Inc.
East Liverpool, Ohio

Revision 56 – April 22, 2026

The generator will certify through chemical analyses, material safety data sheets (MSDS), or other acceptable data that each waste shipment of compressed gas received is accurately characterized by the waste profile for that specific gas mixture.

The annual maximum quantity of gaseous waste treated will be limited by the total volume of waste permitted to be treated by incineration.

TABLE C-1a(2)(i)
APPROVED COMPRESSED GAS AND GAS MIXTURES

Telomer Gas	Chlorotrifluoroethane
Chlorodifluoromethane	Monochloropentafluoroethane)
Trifluoromethane	1,1 Dichlorotetrafluoroethane (CFC-114a)
Dichlorotetrafluoroethane	1,2 Dichlorotetrafluoroethane (Halocarbon R-114)
1,1,1,2–Tetrafluoroethane mixture (HFC-134A)	Difluoromethane(R32)
1,2-Dichloro-1,1,2-Trifluoroethane (HCFC-123a)	Trichlorofluoromethane(HalocarbonR-11)
Dichlorodifluoromethane	1,1,1 Trifluoroethane (Halocarbon 143a)
Pentafluoroethane(Halocarbon-R-125)(1,1,1,2,2 – Pentafluoroethane)	Chlorotetrafluoroethane (R-124)
Perfluoroethane (ZYRON 116)	Dichlorodifluoroethylene (R-1112)
Dichlorofluoromethane (R-21)	Octofluorocyclobutane (R-318)
Chlorotrifluoromethane (R-13)	Chlorotrifluoroethylene (R-1113) – Up to 2% concentration
Difluoroethane (R-152a) – Up to 1% concentration	Isobutane (R-600) – Up to 1% concentration
Chlorodifluoroethane (R-142b) – Up to 2% concentration	Sulfur Dioxide (R-764) – Up to 1% concentration
Dichlorodifluoromethane, 1,1, Difluoroethane	Bromotrifluoromethane (Halon 1301)
Chloromethane (R-40) – Up to 2% concentration	Chlorofluoromethane (R-31)
Argon – small quantities	Nitrogen – small quantities
Ethylene (R-1150) – Up to 1% concentration	Ethylene Oxide – Up to 1% concentration
Bromochlorodifluoromethane	Heptafluoropropane
Trans-1-Chloro-3,3,3-trifluoropropene	1,1,1,3,3-Pentafluoropropene
Honeywell Solstice N40 Refrigerant (R-448A)	RS-44 (R424A)
RS-52 (R428A)	Freon MO99 (R-438A)
R-245fa (1,1,1,3,3-Pentafluoropropane)	R-1233zd(E) (trans-1-Chloro-3,3,3-Trifluoropropene)
R-1131 (1-Chloro-1-Fluoroethylene)	R-401A (Chlorodifluoromethane, Difluoroethane, Chlorotetrafluoroethane)
2-Chloro-1,1-Difluoroethylene (R-1122)	134a High Boiler Column- Column Bottoms Waste (13-13A3)
Bromochlorodifluoromethane (Halon-1211)	Sulfur Hexafluoride
Helium	1-Chloro-1-fluoroethylene Up to 1% concentration

SAFETY DATA SHEET

Sulfur Hexafluoride

Airgas
an Air Liquide company

Section 1. Identification

GHS product identifier	: Sulfur Hexafluoride
Chemical name	: sulphur hexafluoride
Other means of identification	: Sulfur fluoride, (OC-6-11)-; Sulfur fluoride (SF6), (OC-6-11)-; Sulfur fluoride (SF6); Sulfur hexafluoride; Sulfur fluoride; Sulfur (VI)fluoride; Hexafluorosulfur; SF6; Sulfur hexafluoride (SF6); ISPAN SF6
Product type	: Gas.
Product use	: Synthetic/Analytical chemistry.
Synonym	: Sulfur fluoride, (OC-6-11)-; Sulfur fluoride (SF6), (OC-6-11)-; Sulfur fluoride (SF6); Sulfur hexafluoride; Sulfur fluoride; Sulfur (VI)fluoride; Hexafluorosulfur; SF6; Sulfur hexafluoride (SF6); ISPAN SF6
SDS #	: 001048
Supplier's details	: Airgas USA, LLC and its affiliates 259 North Radnor-Chester Road Suite 100 Radnor, PA 19087-5283 1-610-687-5253 Inside the US: 1-800-424-9300 (Chemtrec, 24 hours) Outside the US: 1-703-527-3887 (Chemtrec, 24 hours)
24-hour telephone	: Airgas Emergency Response Center 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 - Liquefied gas

GHS label elements

Hazard pictograms :

Signal word	: Warning
Hazard statements	: H280 - Contains gas under pressure; may explode if heated. May displace oxygen and cause rapid suffocation.

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. Always keep container in upright position.
Prevention	: Not applicable.
Response	: Not applicable.
Storage	: P410 + P403 - Protect from sunlight. Store in a well-ventilated place.
Disposal	: Not applicable.
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 : Substance

Chemical name : sulphur hexafluoride

Other means of identification : Sulfur fluoride, (OC-6-11)-; Sulfur fluoride (SF6), (OC-6-11)-; Sulfur fluoride (SF6); Sulfur hexafluoride; Sulfur fluoride; Sulfur (VI)fluoride; Hexafluorosulfur; SF6; Sulfur hexafluoride (SF6); ISPAN SF6

Product code : 001048

Ingredient name	%	CAS number
Sulfur Hexafluoride	100	2551-62-4

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. Get medical attention if irritation occurs.

Inhalation : Remove victim to fresh air and keep at rest in a position comfortable for breathing.

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

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 : No known significant effects or critical hazards.

Inhalation : No known significant effects or critical hazards.

Skin contact : No known significant effects or critical hazards.

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.

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training.

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:
sulfur oxides
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. Put on appropriate personal protective equipment.

For emergency responders : If specialized 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).

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.

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 breathing gas. 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.
Avoid contact with eyes, skin and clothing. Empty containers retain product residue and can be hazardous.

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.

Section 7. Handling and storage

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. See Section 10 for incompatible materials before handling or 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
Sulfur hexafluoride	None.

Biological exposure indices

No exposure indices known.

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

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 : Based on the hazard and potential for exposure, select a respirator that meets the appropriate standard or certification. Respirators must be used according to a respiratory protection program to ensure proper fitting, training, and other important aspects of use. 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. [Compressed gas.]
Color	: Colorless.
Odor	: Odorless.
Odor threshold	: Not available.
pH	: Not applicable.
Melting point/freezing point	: -50.8°C (-59.4°F)
Boiling point or initial boiling point and boiling range	: Not available.
Flash point	: [Product does not sustain combustion.]
Evaporation rate	: Not available.
Flammability (solid, gas)	: Not available.
Lower and upper explosive (flammable) limits	: Not available.
Vapor pressure	: 320 (psig)
Relative vapor density	: 5 [Air = 1]
Specific Volume (ft^3/lb)	: 2.5994
Gas Density (lb/ft^3)	: 0.3847
Relative density	: Not applicable.
Solubility in water	: 0.031 g/l
Partition coefficient: n-octanol/water	: 1.68
Auto-ignition temperature	: Not available.
Decomposition temperature	: Not available.
Flow time (ISO 2431)	: Not available.
Molecular weight	: 146.06 g/mole

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

Not available.

Conclusion/Summary [Product] : Not available.

Skin corrosion/irritation

Not available.

Conclusion/Summary [Product] : Not available.

Serious eye damage/eye irritation

Not available.

Conclusion/Summary [Product] : Not available.

Respiratory corrosion/irritation

Not available.

Conclusion/Summary [Product] : Not available.

Respiratory or skin sensitization

Not available.

Skin

Conclusion/Summary [Product] : Not available.

Respiratory

Conclusion/Summary [Product] : Not available.

Germ cell mutagenicity

Not available.

Conclusion/Summary [Product] : Not available.

Carcinogenicity

Not available.

Conclusion/Summary [Product] : Not available.

Reproductive toxicity

Not available.

Conclusion/Summary [Product] : Not available.

Specific target organ toxicity (single exposure)

Not available.

Section 11. Toxicological information

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

Eye contact : No known significant effects or critical hazards.

Inhalation : No known significant effects or critical hazards.

Skin contact : No known significant effects or critical hazards.

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.

Conclusion/Summary [Product] : 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.

Reproductive toxicity : No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates

N/A

Section 12. Ecological information

Toxicity

Not available.

Conclusion/Summary [Product] : Not available.

Persistence and degradability

Not available.

Conclusion/Summary [Product] : Not available.

Bioaccumulative potential

Product/ingredient name	$LogP_{ow}$	BCF	Potential
Sulfur hexafluoride	1.68	-	Low

Mobility in soil

Soil/Water partition coefficient : 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 pressure vessels should be returned to the supplier. 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	UN1080	UN1080	UN1080	UN1080	UN1080
UN proper shipping name	Sulfur hexafluoride	SULPHUR HEXAFLUORIDE	HEXAFLUORURO DE AZUFRE	SULPHUR HEXAFLUORIDE	Sulphur hexafluoride
Transport hazard class(es)	2.2 	2.2 	2.2 	2.2 	2.2 
Packing group	-	-	-	-	-
Environmental hazards	No.	No.	No.	No.	No.

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

Section 14. Transport information

Additional information

DOT Classification : **Limited quantity** Yes.
Packaging instruction Exceptions: 306. Non-bulk: 304. Bulk: 314, 315.
Quantity limitation Passenger aircraft/rail: 75 kg. Cargo aircraft: 150 kg.

TDG Classification : Product classified as per the following sections of the Transportation of Dangerous Goods Regulations: 2.13-2.17 (Class 2).
Explosive Limit and Limited Quantity Index 0.125
Passenger Carrying Road or Rail Index 75

Mexico Classification : **Special provisions** 392

IMDG : **Emergency schedules** F-C, S-V
Special provisions 392

IATA : **Quantity limitation** Passenger and Cargo Aircraft: 75 kg. Packaging instructions: 200. Cargo Aircraft Only: 150 kg. Packaging instructions: 200. Limited Quantities - Passenger Aircraft: Forbidden. Packaging instructions: Forbidden.

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 IMO instruments : Not available.

Section 15. Regulatory information

U.S. Federal regulations :

TSCA 8(a) CDR Exempt/Partial exemption: Not determined

TSCA 12(b) - Chemical export notification

Not applicable.

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 : Not 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 : Refer to Section 2: Hazards Identification of this SDS for classification of substance.

State regulations

Massachusetts : This material is listed.

New York : This material is not listed.

New Jersey : This material is listed.

Pennsylvania : This material is listed.

Section 15. Regulatory information

California Prop. 65

This product does not require a Safe Harbor warning under California Prop. 65.

International regulations

Chemical Weapon Convention List Schedules I, II & III Chemicals

Not listed.

Montreal Protocol

Not listed.

Stockholm Convention on Persistent Organic Pollutants

Not listed.

Rotterdam Convention on Prior Informed Consent (PIC)

Not listed.

UNECE Aarhus Protocol on POPs and Heavy Metals

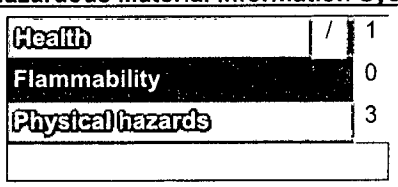
Not listed.

Inventory list

Australia	:	This material is listed or exempted.
Canada	:	This material is listed or exempted.
China	:	This material is listed or exempted.
Eurasian Economic Union	:	**Russian Federation inventory**: Not determined.
Japan	:	**Japan inventory (CSCL)**: This material is listed or exempted. **Japan inventory (ISHL)**: Not determined.
New Zealand	:	This material is listed or exempted.
Philippines	:	This material is listed or exempted.
Republic of Korea	:	This material is listed or exempted.
Taiwan	:	This material is listed or exempted.
Thailand	:	This material is listed or exempted.
Turkey	:	This material is listed or exempted.
United States	:	This material is active or exempted.
Viet Nam	:	This material is listed or exempted.

Section 16. Other information

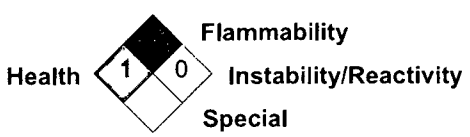
Hazardous Material Information System (U.S.A.)



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 and the associated label are not required on SDSs or products leaving a facility 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 trademark and service mark of the American Coatings Association, Inc.

The customer is responsible for determining the PPE code for this material. For more information on HMIS® Personal Protective Equipment (PPE) codes, consult the HMIS® Implementation Manual.

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.

 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

Classification	Justification
GASES UNDER PRESSURE - Liquefied gas	Expert judgment

History

Date of printing : 4/2/2025

Date of issue/Date of revision : 4/2/2025

Date of previous issue : 6/28/2023

Version : 2.02

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 = 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.

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.

1-Chloro-1-fluoroethylene

SYNQUEST LABORATORIES

Safety Data Sheet 1300703

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

Date of issue: 04/09/2019 Version: 1.0

SECTION 1: Identification

1.1. Identification

Product form	:	Substance
Substance name	:	1-Chloro-1-fluoroethylene
CAS No	:	2317-91-1
Product code	:	1300-7-03
Formula	:	C2H2ClF
Synonyms	:	1-Chloro-1-fluoroethene / 1-Fluoro-1-chloroethylene / Ethene, 1-chloro-1-fluoro- / Ethylene, 1-chloro-1-fluoro- / 1-Chloro-1-fluoroethene / 1-Fluoro-1-chloroethylene / Ethene, 1-chloro-1-fluoro- / Ethylene, 1-chloro-1-fluoro-
Other means of identification	:	MFCD00042129

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

Use of the substance/mixture	:	Laboratory chemicals Manufacture of substances Scientific research and development

1.3. Details of the supplier of the safety data sheet

SynQuest Laboratories, Inc.
P.O. Box 309
Alachua, FL 32615 - United States of America
T (386) 462-0788 - F (386) 462-7097
info@synquestlabs.com - www.synquestlabs.com

1.4. Emergency telephone number

Emergency number	:	(844) 523-4086 (3E Company - Account 10069)

SECTION 2: Hazard(s) identification

2.1. Classification of the substance or mixture

Classification (GHS-US)

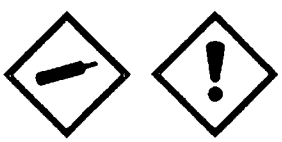
Simple Asphy	H380 - May displace oxygen and cause rapid suffocation
Flam. Gas 2	H221 - Flammable gas
Liquefied gas	H280 - Contains gas under pressure; may explode if heated
Skin Irrit. 2	H315 - Causes skin irritation
Eye Irrit. 2A	H319 - Causes serious eye irritation
STOT SE 3	H336 - May cause drowsiness or dizziness
STOT SE 3	H335 - May cause respiratory irritation

Full text of H-phrases: see section 16

2.2. Label elements

GHS-US labeling

Hazard pictograms (GHS-US) :



GHS04 GHS07

Signal word (GHS-US) : Warning

Hazard statements (GHS-US) :
H221 - Flammable gas
H280 - Contains gas under pressure; may explode if heated
H315 - Causes skin irritation
H319 - Causes serious eye irritation
H335 - May cause respiratory irritation
H336 - May cause drowsiness or dizziness
H380 - May displace oxygen and cause rapid suffocation

Precautionary statements (GHS-US) :
P210 - Keep away from heat/sparks/open flames/hot surfaces. No smoking
P261 - Avoid breathing fumes, gas, mist, spray, vapors
P264 - Wash skin thoroughly after handling
P271 - Use only outdoors or in a well-ventilated area
P280 - Wear protective gloves/protective clothing/eye protection/face protection
P302+P352 - If on skin: Wash with plenty of soap and water

P304+P340 - If inhaled: Remove person to fresh air and keep comfortable for breathing
P305+P351+P338 - If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P312 - Call a POISON CENTER or doctor/physician if you feel unwell
P321 - Specific treatment (see supplemental first aid instructions on this label)
P332+P313 - If skin irritation occurs: Get medical advice/attention
P337+P313 - If eye irritation persists: Get medical advice/attention
P362+P364 - Take off contaminated clothing and wash it before reuse
P377 - Leaking gas fire: Do not extinguish, unless leak can be stopped safely
P381 - Eliminate all ignition sources if safe to do so
P403 - Store in a well-ventilated place
P403+P233 - Store in a well-ventilated place. Keep container tightly closed
P405 - Store locked up
P410+P403 - Protect from sunlight. Store in a well-ventilated place
P501 - Dispose of contents/container to an approved waste disposal plant

2.3. Other hazards

Other hazards not contributing to the classification : May cause frostbite.

2.4. Unknown acute toxicity (GHS US)

Not applicable

SECTION 3: Composition/information on ingredients

3.1. Substance

Substance type : Mono-constituent

Name	Product identifier	%	Classification (GHS-US)
1-Chloro-1-fluoroethylene (Main constituent)	(CAS No) 2317-91-1	<= 100	Simple Asphy, H380 Flam. Gas 2, H221 Liquefied gas, H280 Skin Irrit. 2, H315 Eye Irrit. 2A, H319 STOT SE 3, H336 STOT SE 3, H335

Full text of H-phrases: see section 16

3.2. Mixture

Not applicable

SECTION 4: First aid measures

4.1. Description of first aid measures

First-aid measures general : In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). Move the affected personnel away from the contaminated area.

First-aid measures after inhalation : Remove person to fresh air and keep comfortable for breathing. If not breathing, give artificial respiration. Get immediate medical advice/attention.

First-aid measures after skin contact : Thaw frosted parts with lukewarm water. Do no rub affected area. Get immediate medical advice/attention.

First-aid measures after eye contact : Remove contact lenses, if present and easy to do. Continue rinsing. Immediately flush eyes thoroughly with water for at least 15 minutes. Get immediate medical advice/attention.

First-aid measures after ingestion : Due to its physical form, exposure to this chemical is not likely. Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth out with water. Get medical advice/attention.

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

Symptoms/injuries : The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11.

Symptoms/injuries after inhalation : May cause drowsiness or dizziness.

Symptoms/injuries after skin contact : Contact with the liquid the may cause cold burns/frostbite.

Symptoms/injuries after eye contact : Direct contact with the liquefied gas may cause severe and possibly permanent eye injury due to frostbite from rapid liquid evaporation.

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 : Alcohol resistant foam. Carbon dioxide. Dry powder. Water spray. Use extinguishing media appropriate for surrounding fire.

5.2. Special hazards arising from the substance or mixture

Fire hazard : Thermal decomposition generates: Carbon oxides. Hydrogen chloride. Hydrogen fluoride.

Explosion hazard : Contains gas under pressure; may explode if heated. Use water spray or fog for cooling exposed containers. May form flammable/explosive vapor-air mixture.

5.3. Advice for firefighters

Firefighting instructions : In case of fire: Evacuate area. Fight fire remotely due to the risk of explosion.

Protection during firefighting : Wear gas tight chemically protective clothing in combination with self contained breathing apparatus. For further information refer to section 8: "Exposure controls/personal protection".

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

General measures : Evacuate unnecessary personnel. Ensure adequate air ventilation. May cause suffocation by reducing oxygen available for breathing. Do not breathe gas, fumes, vapor or spray.

6.1.1. For non-emergency personnel

Emergency procedures : Only qualified personnel equipped with suitable protective equipment may intervene.

6.1.2. For emergency responders

Protective equipment : Do not attempt to take action without suitable protective equipment. For further information refer to section 8: "Exposure controls/personal protection".

Emergency procedures : Gas/vapor heavier than air. May accumulate in confined spaces, particularly at or below ground level. Consider the risk of potentially explosive atmospheres. Eliminate every possible source of ignition.

6.2. Environmental precautions

Avoid release to the environment. Notify authorities if product enters sewers or public waters.

6.3. Methods and material for containment and cleaning up

For containment : Stop leak if safe to do so.

Methods for cleaning up : Ventilate area.

Other information : For disposal of solid materials or residues refer to section 13 : "Disposal considerations".

6.4. Reference to other sections

No additional information available

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Additional hazards when processed : Pressurized container: Do not pierce or burn, even after use. Handle empty containers with care because residual vapors are flammable. Close valve after each use and when empty.

Precautions for safe handling : Do not handle until all safety precautions have been read and understood. Ensure good ventilation of the work station. Do not breathe fumes, gas, mist, spray, vapors. Wear personal protective equipment. Avoid contact with skin and eyes. Keep away from ignition sources (including static discharges). Proper grounding procedures to avoid static electricity should be followed. Use only non-sparking tools.

Safe handling of the gas receptacle : Securely chain cylinders when in use and protect against physical damage.

Hygiene measures : Handle in accordance with good industrial hygiene and safety procedures. Do not eat, drink or smoke when using this product. Always wash hands after handling the product.

7.2. Conditions for safe storage, including any incompatibilities

Technical measures : Comply with applicable regulations.

Storage conditions : Protect from sunlight. Do not expose to temperatures exceeding 50 °C. Keep container closed when not in use. Keep away from ignition sources.

Incompatible materials : Refer to Section 10 on Incompatible Materials.

Storage area : Store in dry, cool, well-ventilated area.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

No additional information available

8.2. Exposure controls

Appropriate engineering controls	: Ensure good ventilation of the work station. Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure. Systems under pressure should be regularly checked for leakage. Oxygen detectors should be used when asphyxiating gases may be released.
Hand protection	: Protective gloves. 29 CFR 1910.138: Hand Protection.
Eye protection	: Chemical goggles or safety glasses. Face shield. 29 CFR 1910.133: Eye and Face Protection.
Skin and body protection	: Wear suitable protective clothing.
Respiratory protection	: In case of inadequate ventilation wear respiratory protection. 29 CFR 1910.134: Respiratory Protection.
Thermal hazard protection	: Cold insulating gloves.
Other information	: Safety shoes. 29 CFR 1910.136: Foot Protection.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state	: Gas
Color	: No data available
Odor	: No data available
Odor threshold	: No data available
pH	: No data available
Melting point	: -169 °C
Freezing point	: No data available
Boiling point	: -24 °C
Flash point	: No data available
Relative evaporation rate (butyl acetate=1)	: No data available
Flammability (solid, gas)	: No data available
Explosion limits	: No data available
Explosive properties	: No data available
Oxidizing properties	: No data available
Vapor pressure	: 67 psia (@ 7 °C)
Relative density	: No data available
Relative vapor density at 20 °C	: No data available
Specific gravity / density	: 1.098 g/ml
Molecular mass	: 80.489 g/mol
Solubility	: No data available
Log Pow	: No data available
Auto-ignition temperature	: No data available
Decomposition temperature	: No data available
Viscosity	: No data available
Viscosity, kinematic	: No data available
Viscosity, dynamic	: No data available

9.2. Other information

No additional information available

SECTION 10: Stability and reactivity

10.1. Reactivity

No additional information available

10.2. Chemical stability

The product is stable at normal handling and storage conditions.

10.3. Possibility of hazardous reactions

May polymerize.

10.4. Conditions to avoid

Protect from sunlight. Do not expose to temperatures exceeding 50 °C. Keep away from heat, sparks and flame.

10.5. Incompatible materials

Alkali metals. Finely divided metals (Al, Mg, Zn). Strong oxidizing agents.

10.6. Hazardous decomposition products

Under normal conditions of storage and use, hazardous decomposition products should not be produced. Hazardous decomposition products in case of fire, see Section 5.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute toxicity	: Not classified
Skin corrosion/irritation	: Causes skin irritation.
Serious eye damage/irritation	: Causes serious eye irritation.
Respiratory or skin sensitization	: Not classified
Germ cell mutagenicity	: Not classified
Carcinogenicity	: Not classified
Reproductive toxicity	: Not classified
Specific target organ toxicity (single exposure)	: May cause drowsiness or dizziness. May cause respiratory irritation.
Specific target organ toxicity (repeated exposure)	: Not classified
Aspiration hazard	: Not classified
Symptoms/injuries after inhalation	: May cause drowsiness or dizziness.
Symptoms/injuries after skin contact	: Contact with the liquid the may cause cold burns/frostbite.
Symptoms/injuries after eye contact	: Direct contact with the liquefied gas may cause severe and possibly permanent eye injury due to frostbite from rapid liquid evaporation.

SECTION 12: Ecological information

12.1. Toxicity

No additional information available

12.2. Persistence and degradability

No additional information available

12.3. Bioaccumulative potential

No additional information available

12.4. Mobility in soil

No additional information available

12.5. Other adverse effects

No additional information available

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Waste treatment methods	: Remove to an authorized incinerator equipped with an afterburner and a flue gas scrubber.
Waste disposal recommendations	: Dispose of contents/container in accordance with licensed collector's sorting instructions.
Additional information	: Recycle the material as far as possible.

10.2 Safety and Hazard Properties

10.2.1 Flammable Limits

Lower flammable limit: 6.2% by volume; Upper flammable limit: 17.9% by volume

Fire Protection Guide to Hazardous Materials. 13 ed. Quincy, MA: National Fire Protection Association, 2002., p. 325-46

Hazardous Substances Data Bank (HSDB)

Source	Hazardous Substances Data Bank (HSDB)
Record Name	1-Chloro-1,1-difluoroethane
URL	https://pubchem.ncbi.nlm.nih.gov/source/hsdb/2881
Description	The Hazardous Substances Data Bank (HSDB) is a toxicology database that focuses on the toxicology of potentially hazardous chemicals. It provides information on human exposure, industrial hygiene, emergency handling procedures, environmental fate, regulatory requirements, nanomaterials, and related areas. The information in HSDB has been assessed by a Scientific Review Panel.
License	https://www.nlm.nih.gov/web_policies.html

SECTION 14: Transport information

Department of Transportation (DOT)

In accordance with DOT

Transport document description	: UN3161 Liquefied gas, flammable, n.o.s., 2.1
UN-No.(DOT)	: UN3161
Proper Shipping Name (DOT)	: Liquefied gas, flammable, n.o.s.
Transport hazard class(es) (DOT)	: 2.1 - Class 2.1 - Flammable gas 49 CFR 173.115
Hazard labels (DOT)	: 2.1 - 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)	: Forbidden
DOT Quantity Limitations Cargo aircraft only (49 CFR 175.75)	: 150 kg
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"
Other information	: No supplementary information available.

TDG

No additional information available

Transport by sea

UN-No. (IMDG)	: 3161
Proper Shipping Name (IMDG)	: LIQUEFIED GAS, FLAMMABLE, N.O.S.
Class (IMDG)	: 2 - Gases

Air transport

UN-No. (IATA)	: 3161
Proper Shipping Name (IATA)	: Liquefied gas, flammable, n.o.s.
Class (IATA)	: 2

SECTION 15: Regulatory information

15.1. US Federal regulations

All components of this product are listed, or excluded from listing, on the United States Environmental Protection Agency Toxic Substances Control Act (TSCA) inventory except for:

1-Chloro-1-fluoroethylene	CAS No 2317-91-1	100%

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

15.2. International regulations

CANADA

No additional information available

EU-Regulations
No additional information available

National regulations

1-Chloro-1-fluoroethylene (2317-91-1)
Listed on the Japanese ISHL (Industrial Safety and Health Law)

15.3. US State regulations

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

SECTION 16: Other information

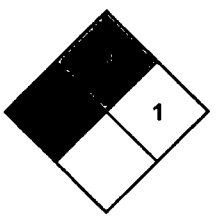
Full text of H-phrases:

Eye Irrit. 2A	Serious eye damage/eye irritation Category 2A
Flam. Gas 2	Flammable gases Category 2
Liquefied gas	Gases under pressure Liquefied gas
Simple Asphy	Simple Asphyxiant
Skin Irrit. 2	Skin corrosion/irritation Category 2
STOT SE 3	Specific target organ toxicity (single exposure) Category 3
STOT SE 3	Specific target organ toxicity (single exposure) Category 3
H221	Flammable gas
H280	Contains gas under pressure; may explode if heated
H315	Causes skin irritation
H319	Causes serious eye irritation
H335	May cause respiratory irritation
H336	May cause drowsiness or dizziness
H380	May displace oxygen and cause rapid suffocation

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 : 3 - Liquids and solids that can be ignited under almost all ambient conditions.

NFPA reactivity : 1 - Normally stable, but can become unstable at elevated temperatures and pressures or may react with water with some release of energy, but not violently.



HMIS III Rating

Health : 2 Moderate Hazard - Temporary or minor injury may occur

Flammability : 3 Serious Hazard - Materials capable of ignition under almost all normal temperature conditions. Includes flammable liquids with flash points below 73 F and boiling points above 100 F. as well as liquids with flash points between 73 F and 100 F. (Classes IB & IC)

Physical : 1 Slight Hazard - Materials that are normally stable but can become unstable (self-react) at high temperatures and pressures. Materials may react non-violently with water or undergo hazardous polymerization in the absence of inhibitors.

SDS US (GHS HazCom 2012)

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is offered solely for your consideration, investigation, and verification. It does not represent any guarantee of the properties of the product nor that the hazard precautions or procedures described are the only ones which exist. SynQuest shall not be held liable or any damage resulting from handling or from contact with the above product.

Chemical Safety Data Sheet MSDS / SDS

HELIUM

Revision Date:2026-04-11 Revision Number:1

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

Product identifier

Product name	: HELIUM
CBnumber	: CB3776496
CAS	: 7440-59-7
EINECS Number	: 231-168-5
Synonyms	: HE,helium

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

Relevant identified uses	: For R&D use only. Not for medicinal, household or other use.
Uses advised against	: none

Company Identification

Company	: Chemicalbook
Address	: Building 1, Huihuang International, Shangdi 10th Street, Haidian District, Beijing
Telephone	: 010-86108875

SECTION 2: Hazards identification

Classification of the substance or mixture

Not classified.

Label elements

Pictogram(s)

Signal word Warning

Hazard statement(s)

H280 Contains gas under pressure; may explode if heated

Precautionary statement(s)

P410+P403 Protect from sunlight. Store in a well-ventilated place.

Prevention

none

Response

none

Storage

none

Disposal

none

Other hazards

no data available

SECTION 3: Composition/information on ingredients

Substance

Product name	: HELIUM
Synonyms	: HE,helium
CAS	: 7440-59-7
EC number	: 231-168-5
MF	: He
MW	: 4

SECTION 4: First aid measures

Description of first aid measures

If inhaled

Fresh air, rest. Artificial respiration may be needed. Refer for medical attention.

Following skin contact

ON FROSTBITE: rinse with plenty of water, do NOT remove clothes. Refer for medical attention .

Following eye contact

First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then refer for medical attention.

Following ingestion

Rinse mouth with water. Do not induce vomiting. Never give anything by mouth to an unconscious person. Call a doctor or Poison Control Center immediately.

Most important symptoms and effects, both acute and delayed

Excerpt from ERG Guide 121 [Gases - Inert]: Vapors may cause dizziness or asphyxiation without warning. Vapors from liquefied gas are initially heavier than air and spread along ground. (ERG, 2016)

Excerpt from ERG Guide 120 [Gases - Inert (Including Refrigerated Liquids)]: Vapors may cause dizziness or asphyxiation without warning. Vapors from liquefied gas are initially heavier than air and spread along ground. Contact with gas or liquefied gas may cause burns, severe injury and/or frostbite. (ERG, 2016)

Indication of any immediate medical attention and special treatment needed

Immediate first aid: Ensure that adequate decontamination has been carried out. If patient is not breathing, start artificial respiration, preferably with a demand-valve resuscitator, bag-valve-mask device, or pocket mask, as trained. Perform CPR as necessary. Immediately flush contaminated eyes with gently flowing water. Do not induce vomiting. If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain an open airway and prevent aspiration. Keep patient quiet and maintain normal body temperature.

Obtain medical attention. Simple asphyxiants and related compounds

SECTION 5: Firefighting measures

Extinguishing media

Suitable extinguishing media: Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide. Special protective equipment for firefighters: Wear self contained breathing apparatus for fire fighting if necessary.

Specific Hazards Arising from the Chemical

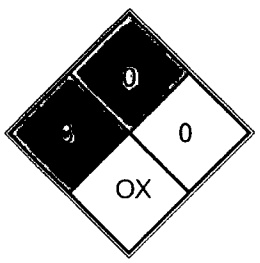
Excerpt from ERG Guide 121 [Gases - Inert]: Non-flammable gases. Containers may explode when heated. Ruptured cylinders may rocket. (ERG, 2016)

Excerpt from ERG Guide 120 [Gases - Inert (Including Refrigerated Liquids)]: Non-flammable gases. Containers may explode when heated. Ruptured cylinders may rocket. (ERG, 2016)

Advice for firefighters

In case of fire in the surroundings, use appropriate extinguishing media. In case of fire: keep cylinder cool by spraying with water.

NFPA 704



■	HEALTH	3	Short exposure could cause serious temporary or moderate residual injury (e.g. liquid hydrogen, sulfuric acid, calcium hypochlorite, hexafluorosilicic acid)
■	FIRE	0	Materials that will not burn under typical fire conditions, including intrinsically noncombustible materials such as concrete, stone, and sand. Materials that will not burn in air when exposed to a temperature of 820 °C (1,500 °F) for a period of 5 minutes.(e.g. Carbon tetrachloride)
□	REACT	0	Normally stable, even under fire exposure conditions, and is not reactive with water (e.g. helium,N2)
□	SPEC. HAZ.	OX	

SECTION 6: Accidental release measures

Personal precautions, protective equipment and emergency procedures

Ventilation. NEVER direct water jet on liquid. Personal protection: self-contained breathing apparatus.

Environmental precautions

Ventilation. NEVER direct water jet on liquid. Personal protection: self-contained breathing apparatus.

Methods and materials for containment and cleaning up

Personal precautions: Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Environmental precautions: Do not let product enter drains. Methods and materials for containment and cleaning up: Clean up promptly by sweeping or vacuum.

SECTION 7: Handling and storage

Precautions for safe handling

Handling in a well ventilated place. Wear suitable protective clothing. Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Use non-sparking tools. Prevent fire caused by electrostatic discharge steam.

Conditions for safe storage, including any incompatibilities

Fireproof if in building. Keep in a well-ventilated room.Conditions for safe storage: Keep container tightly closed in a dry and well-ventilated place.

SECTION 8: Exposure controls/personal protection

Control parameters

Occupational Exposure limit values

Component	Helium			
CAS No.	7440-59-7			
	Limit value - Eight hours		**Limit value - Short term**	
	ppm	**mg/m^3**	**ppm**	**mg/m^3**
Canada - Ontario	(1)	?	?	?
New Zealand	(1)	?	?	?
	Remarks			
Canada - Ontario	(1) Simple asphyxiant			
New Zealand	(1) Simple asphyxiant			

Biological limit values

no data available

Exposure controls

Ensure adequate ventilation. Handle in accordance with good industrial hygiene and safety practice. Set up emergency exits and the risk-elimination area.

Individual protection measures

Eye/face protection

Wear safety goggles or face shield.

Skin protection

Cold-insulating gloves. Protective clothing.

Respiratory protection

Use ventilation.

Thermal hazards

no data available

SECTION 9: Physical and chemical properties

Information on basic physicochemical properties

Physical state	gas
Colour	Colorless gas
Odour	Odorless
Melting point/freezing point	-272.2°C(lit.)
Boiling point or initial boiling point and boiling range	-268.934°C(lit.)
Flammability	Not combustible. Heating will cause rise in pressure with risk of bursting.
Lower and upper explosion limit/flammability limit	no data available
Flash point	none
Auto-ignition temperature	no data available
Decomposition temperature	no data available
pH	no data available
Kinematic viscosity	1.953 at 20 deg C, 0.1 MPa; 1.977 at 20 deg C, 20 MPa
Solubility	Very slightly soluble in water: at 0 deg C, 0.97 mL/100 mL; at 50 deg C, 1.08 mL/100 mL
Partition coefficient n-octanol/water	0.28
Vapour pressure	no data available
Density and/or relative density	0.1785（0°C）
Relative vapour density	0.14 (vs air)
Particle characteristics	no data available

SECTION 10: Stability and reactivity

Reactivity

No rapid reaction with air. No rapid reaction with water.

Chemical stability

Chemical stability: Stable under recommended storage conditions.

Possibility of hazardous reactions

Not combustible. Heating will cause rise in pressure with risk of bursting.The gas is lighter than air.Chemically inert. These substances undergo no chemical reactions under any known circumstances. They are nonflammable, noncombustible and nontoxic. They can asphyxiate.

Conditions to avoid

no data available

Incompatible materials

Materials to avoid: Strong oxidizing agents.

Hazardous decomposition products

no data available

SECTION 11: Toxicological information

Acute toxicity

- Oral: no data available
- Inhalation: no data available
- Dermal: no data available

Skin corrosion/irritation

no data available

Serious eye damage/irritation

no data available

Respiratory or skin sensitization

no data available

Germ cell mutagenicity

no data available

Carcinogenicity

no data available

Reproductive toxicity

no data available

STOT-single exposure

The liquid may cause frostbite. Asphyxiation.

STOT-repeated exposure

no data available

Aspiration hazard

On loss of containment this substance can cause suffocation by lowering the oxygen content of the air in confined areas.

SECTION 12: Ecological information

Toxicity

Toxicity to fish: no data available

Toxicity to daphnia and other aquatic invertebrates: no data available

Toxicity to algae: no data available

Toxicity to microorganisms: no data available

Persistence and degradability

no data available

Bioaccumulative potential

no data available

Mobility in soil

no data available

Other adverse effects

no data available

SECTION 13: Disposal considerations

Disposal methods

Product

The material can be disposed of by removal to a licensed chemical destruction plant or by controlled incineration with flue gas scrubbing. Do not contaminate water, foodstuffs, feed or seed by storage or disposal. Do not discharge to sewer systems.

Contaminated packaging

Containers can be triply rinsed (or equivalent) and offered for recycling or reconditioning. Alternatively, the packaging can be punctured to make it unusable for other purposes and then be disposed of in a sanitary landfill. Controlled incineration with flue gas scrubbing is possible for combustible packaging materials.

SECTION 14: Transport information

UN Number

ADR/RID: UN1963 (For reference only, please check.)

IMDG: UN1963 (For reference only, please check.)

IATA: UN1963 (For reference only, please check.)

UN Proper Shipping Name

ADR/RID: HELIUM, REFRIGERATED LIQUID (For reference only, please check.)

IMDG: HELIUM, REFRIGERATED LIQUID (For reference only, please check.)

IATA: HELIUM, REFRIGERATED LIQUID (For reference only, please check.)

Transport hazard class(es)

ADR/RID: 2.2 (For reference only, please check.)

IMDG: 2.2 (For reference only, please check.)

IATA: 2.2 (For reference only, please check.)

Packing group, if applicable

ADR/RID: (For reference only, please check.)

IMDG: (For reference only, please check.)

IATA: (For reference only, please check.)

Environmental hazards

ADR/RID: No

IMDG: No

IATA: No

Special precautions for user

no data available

Transport in bulk according to IMO instruments

no data available

SECTION 15: Regulatory information

Safety, health and environmental regulations specific for the product in question

European Inventory of Existing Commercial Chemical Substances (EINECS)

Listed.

EC Inventory

Listed.

United States Toxic Substances Control Act (TSCA) Inventory

Listed.

China Catalog of Hazardous chemicals 2015

Listed.

New Zealand Inventory of Chemicals (NZIoC)

Listed.

PICCS

Listed.

Vietnam National Chemical Inventory

Listed.

IECSC

Listed.

Korea Existing Chemicals List (KECL)

Listed.

SECTION 16: Other information

Abbreviations and acronyms

CAS: Chemical Abstracts Service

ADR: European Agreement concerning the International Carriage of Dangerous Goods by Road

RID: Regulation concerning the International Carriage of Dangerous Goods by Rail

IMDG: International Maritime Dangerous Goods

IATA: International Air Transportation Association

TWA: Time Weighted Average

STEL: Short term exposure limit

LC50: Lethal Concentration 50%

LD50: Lethal Dose 50%

EC50: Effective Concentration 50%

References

IPCS - The International Chemical Safety Cards (ICSC), website: http://www.ilo.org/dyn/icsc/showcard.home

HSDB - Hazardous Substances Data Bank, website: https://toxnet.nlm.nih.gov/newtoxnet/hsdb.htm

IARC - International Agency for Research on Cancer, website: http://www.iarc.fr/

eChemPortal - The Global Portal to Information on Chemical Substances by OECD, website: http://www.echemportal.org/echemportal/index?pageID=0&request_locale=en

CAMEO Chemicals, website: http://cameochemicals.noaa.gov/search/simple

ChemIDplus, website: http://chem.sis.nlm.nih.gov/chemidplus/chemidlite.jsp

ERG - Emergency Response Guidebook by U.S. Department of Transportation, website: http://www.phmsa.dot.gov/hazmat/library/erg

Germany GESTIS-database on hazard substance, website: http://www.dguv.de/ifa/gestis/gestis-stoffdatenbank/index-2.jsp

ECHA - European Chemicals Agency, website: https://echa.europa.eu/

Other Information

UN number 1046 is for helium, compressed.High concentrations in the air cause a deficiency of oxygen with the risk of unconsciousness or death.Check oxygen content before entering area.