



MATERIAL SAFETY DATA SHEET

PRODUCT NAME: FREON C-318

1 Chemical Product and Company Identification

BOC Gases,
Division of
The BOC Group, Inc.
575 Mountain Avenue
Murray Hill, NJ 07974

TELEPHONE NUMBER: (908) 464-8100
24-HOUR EMERGENCY TELEPHONE
NUMBER: CHEMTREC (800) 424-9300

BOC Gases
Division of
BOC Canada Limited
5975 Falbourne Street, Unit 2
Mississauga, Ontario L5R 3V8

TELEPHONE NUMBER: (905) 501-1700
24-HOUR EMERGENCY TELEPHONE
NUMBER: (905) 501-0802
EMERGENCY RESPONSE PLAN NO: 20101

PRODUCT NAME: Freon C-318
CHEMICAL NAME: Perfluorocyclobutane
COMMON NAMES/SYNONYMS: Perfluorocyclobutane, octafluorocyclobutane, cyclooctafluorobutane, Freon C-318, Halocarbon C-138, Propellant C318
TDG (Canada) CLASSIFICATION: 2.2
WHMIS CLASSIFICATION: A, D2B

PREPARED BY: Loss Control (908)464-8100/(905)273-7700.

PREPARATION DATE: 4/9/97

REVIEW DATES: Not Applicable

2. Composition, Information on Ingredients

| INGREDIENT | % VOLUME | PEL-OSHA ¹ | TLV-ACGIH ² | LD ₅₀ or LC ₅₀ Route/Species |
|--|----------|-----------------------|------------------------|---|
| Freon C-318 FORMULA: C ₄ F ₈ CAS: 115-25-3 RTECS #: GU1779500 | 100 | None Established | None Established | LCLo: 780000 ppm/ 2 H mouse/inhalation |

¹ As stated in 29 CFR 1910, Subpart Z (revised July 1, 1993)

² As stated in the ACGIH 1996-97 Threshold Limit Values for Chemical Substances and Physical Agents

3. Hazards Identification

EMERGENCY OVERVIEW

This product does not contain oxygen and may cause asphyxia if released in a confined area. Fluorocarbons may cause irregular heart beat (cardiac arrhythmias) at high concentrations. Nonflammable. Thermal decomposition produces highly toxic F₂.

ROUTE OF ENTRY:

| | | | | |
|--------------------|-----------------------|-------------------|-------------------|-----------------|
| Skin Contact No | Skin Absorption No | Eye Contact No | Inhalation Yes | Ingestion No |
|--------------------|-----------------------|-------------------|-------------------|-----------------|

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Revised: 4/9/97

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HEALTH EFFECTS:

| | | |
|--------------------------------------|---------------------------|---------------------|
| Exposure Limits No | Irritant No | Sensitization No |
| Teratogen No | Reproductive Hazard No | Mutagen No |
| Synergistic Effects None Reported | | |

Carcinogenicity: -- NTP: No IARC: No OSHA: No

EYE EFFECTS:

Persons with potential exposure should not wear contact lenses.

SKIN EFFECTS:

None anticipated as product is a gas at room temperature.

INGESTION EFFECTS:

Ingestion is not likely.

INHALATION EFFECTS:

Product is relatively non-toxic.

No narcotic or central nervous system effects have been reported for Freon C-318.

High concentrations may cause cardiac arrhythmias.

Oxygen deficiency may occur in the presence of high concentrations resulting in asphyxiation. Maintain oxygen levels above 19.5%.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE:

Pre-existing heart condition.

NFPA HAZARD CODES

Health: 0
Flammability: 0
Reactivity: 0

HMIS HAZARD CODES

Health: 0
Flammability: 0
Reactivity: 0

RATINGS SYSTEM

0 = No Hazard
1 = Slight Hazard
2 = Moderate Hazard
3 = Serious Hazard
4 = Severe Hazard

4. First Aid Measures

EYES:

Never introduce ointment or oil into the eyes without medical advice! If pain is present, refer the victim to an ophthalmologist for treatment and follow up.

SKIN:

Remove contaminated clothing and flush affected areas with lukewarm water. If irritation persists, seek medical attention.

INGESTION:

Unlikely as product is a gas at room temperature.

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INHALATION:

PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF OVER EXPOSURE. RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS. Remove victim to fresh air. Administer artificial respiration if breathing has stopped and supplement with oxygen by a trained individual. Further treatment should be symptomatic and supportive. Seek medical attention as soon as possible for follow up treatment. Remove to fresh air. If necessary, give oxygen or provide artificial respiration. Call a physician.

NOTE TO PHYSICIAN: A patient adversely affected by exposure to this product should not be given inhalers containing epinephrine, (adrenalin) or similar heart stimulant as these would increase the risk of cardiac arrhythmias.

5. Fire Fighting Measures

| | | |
|---|---------------------------|-----------------------------------|
| Conditions of Flammability: Nonflammable | | |
| Flash point: None | Method: Not Applicable | Autoignition Temperature: None |
| LEL(%): None | UEL(%): None | |
| Hazardous combustion products: None. Decomposes to toxic gases at fire temperatures | | |
| Sensitivity to mechanical shock: None | | |
| Sensitivity to static discharge: None | | |

FIRE AND EXPLOSION HAZARDS:

If involved in a fire, product may decompose yielding toxic F, and other oxidation products. Cylinder may rupture from pressure when involved in a fire situation.

EXTINGUISHING MEDIA:

None required. Use media appropriate for surrounding fire.

FIRE FIGHTING INSTRUCTIONS:

Firefighters should wear a full-facepiece NIOSH/MSHA approved self-contained breathing apparatus (SCBA) operated in positive-pressure mode and full turn-out or bunker gear. Additional chemical protective clothing may be necessary to prevent exposure to decomposition products.

Continue to cool fire-exposed cylinders until well after flames are extinguished.

6. Accidental Release Measures

Evacuate all personnel from affected area. Use appropriate protective equipment. If leak is in user's equipment, be certain to purge piping with inert gas prior to attempting repairs. If leak is in container or container valve, contact the appropriate emergency telephone number listed in Section 1 or call your closest BOC location.

7. Handling and Storage

Product is non-corrosive and may be used with any common structural material. Silver and carbon bearing alloys can act as catalysts for decomposing the product at high temperatures. Alloys containing more than 2% magnesium should not be used if water is present.

7. Handling and Storage

Use only in well-ventilated areas. Valve protection caps must remain in place unless container is secured with valve outlet piped to use point. Do not drag, slide or roll cylinders. Use a suitable hand truck for cylinder movement. Use a pressure reducing regulator when connecting cylinder to lower pressure (<150 psig) piping or systems. Do not heat cylinder by any means to increase the discharge rate of product from the cylinder. Use a check valve or trap in the discharge line to prevent hazardous back flow into the cylinder. Protect cylinders from physical damage.

Store in cool, dry, well-ventilated area of non-combustible construction away from heavily trafficked areas and emergency exits. Do not allow the temperature where cylinders are stored to exceed 125 °F (52 °C). Cylinders should be stored upright and firmly secured to prevent falling or being knocked over. Full and empty cylinders should be segregated. Use a "first in-first out" inventory system to prevent full cylinders being stored for excessive periods of time. For additional handling recommendations, consult Compressed Gas Association Pamphlet P-1. Handle with reasonable care. Store in a cool, dry place.

Never carry a compressed gas cylinder or a container of a gas in cryogenic liquid form in an enclosed space such as a car trunk, van or station wagon. A leak can result in a fire, explosion, asphyxiation or a toxic exposure.

8. Exposure Controls, Personal Protection

EXPOSURE LIMITS¹:

| INGREDIENT | % VOLUME | PEL-OSHA ² | TLV-ACGIH ³ | LD ₅₀ or LC ₅₀ Route/Species |
|--|----------|-----------------------|------------------------|---|
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¹ Refer to individual state of provincial regulations, as applicable, for limits which may be more stringent than those listed here.

² As stated in 29 CFR 1910, Subpart Z (revised July 1, 1993)

³ As stated in the ACGIH 1996-1997 Threshold Limit Values for Chemical Substances and Physical Agents.

ENGINEERING CONTROLS:

General ventilation used in combination with local exhaust as necessary to prevent accumulation of high concentrations and maintain atmospheric oxygen.

EYE/FACE PROTECTION:

Safety glasses as necessary for the job.

SKIN PROTECTION:

Protective gloves as necessary for the job.

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RESPIRATORY PROTECTION:

A Type C respirator with full-face piece equipped with an escape bottle or a self-contained breathing apparatus should be available for emergency use. Operate this equipment in the positive pressure demand mode.

OTHER/GENERAL PROTECTION:

Safety shoes.

9. Physical and Chemical Properties

| PARAMETER | VALUE | UNITS |
|-------------------------------------|---------------------------|--------------|
| Physical state (gas, liquid, solid) | : Gas | |
| Vapor pressure at 70 °F | : No Data | |
| Vapor density @ 27 °C, (Air = 1) | : 8.2 | |
| Evaporation point | : Not Applicable | |
| Boiling point | : 21 | °F |
| | : -6 | °C |
| Freezing point | : -42 | °F |
| | : -41 | °C |
| pH | : Not Applicable | |
| Specific gravity | : Not Available | |
| Oil/water partition coefficient | : Not Applicable | |
| Solubility (H2O) | : No Data | |
| Odor threshold | : Not Applicable | |
| Odor and appearance | : Colorless, odorless gas | |

10. Stability and Reactivity

STABILITY:

Stable

INCOMPATIBLE MATERIALS:

None known.

HAZARDOUS DECOMPOSITION PRODUCTS:

Decomposes at fire temperatures to F- (HF, etc.), and other oxidation products.

HAZARDOUS POLYMERIZATION:

Will not occur.

11. Toxicological Information

INHALATION: No anesthetic or central nervous system effects have been reported for cyclooctafluorobutane. In absence of sufficient oxygen, cyclooctafluorobutane may cause asphyxiation. Arrhythmias were induced in Swiss-mice (inhalation for 6 min - octafluorocyclobutane) by 20% concentrations octafluorocyclobutane combined with 6 µg/kg epinephrine administered 2 minutes after start of inhalation.

12. Ecological Information

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No data given.

13. Disposal Considerations

Do not attempt to dispose of residual waste or unused quantities. Return in the shipping container PROPERLY LABELED, WITH ANY VALVE OUTLET PLUGS OR CAPS SECURED AND VALVE PROTECTION CAP IN PLACE to BOC Gases or authorized distributor for proper disposal.

14. Transport Information

| PARAMETER | United States DOT | Canada TDG |
|------------------------|-----------------------------|-----------------------------|
| PROPER SHIPPING NAME: | Octafluorocyclobutane RC318 | Octafluorocyclobutane RC318 |
| HAZARD CLASS: | 2.2 | 2.2 |
| IDENTIFICATION NUMBER: | UN 1976 | UN 1976 |
| SHIPPING LABEL: | NONFLAMMABLE GAS | NONFLAMMABLE GAS |

15. Regulatory Information

SARA TITLE III NOTIFICATIONS AND INFORMATION

SARA TITLE III - HAZARD CLASSES:

Sudden Release of Pressure Hazard

SARA TITLE III - SECTION 313 SUPPLIER NOTIFICATION; SARA 302 (EHS); CERCLA:

This product does not contain toxic chemicals subject to the reporting requirements of section 313 or CERCLA (Section 304) release reporting requirements. Octafluorocyclobutane is not listed as an Extremely Hazardous Substance (EHS) under Section 302 of SARA.

16. Other Information

Compressed gas cylinders shall not be refilled without the express written permission of the owner. Shipment of a compressed gas cylinder which has not been filled by the owner or with his/her (written) consent is a violation of transportation regulations.

DISCLAIMER OF EXPRESSED AND IMPLIED WARRANTIES:

Although reasonable care has been taken in the preparation of this document, we extend no warranties and make no representations as to the accuracy or completeness of the information contained herein, and assume no responsibility regarding the suitability of this information for the user's intended purposes or for the consequences of its use. Each individual should make a determination as to the suitability of the information for their particular purpose(s).