SAFETY DATA SHEET
Halocarbon C-318 (Octafluorocyclobutane)

Section 1. Identification

GHS product identifier : Halocarbon C-318 (Octafluorocyclobutane)
Chemical name : octafluorocyclobutane
Other means of identification : Cyclobutane, 1,1,2,2,3,3,4,4-octafluoro-; Cyclobutane, octafluoro-
Product use : Synthetic/Analytical chemistry.
Synonym : Cyclobutane, 1,1,2,2,3,3,4,4-octafluoro-; Cyclobutane, octafluoro-
SDS # : 001056
Supplier’s details : Airgas USA, LLC and its affiliates
259 North Radnor-Chester Road
Suite 100
Radnor, PA 19087-5283
1-610-687-5253

Emergency telephone number (with hours of operation) : 1-866-734-3438

Section 2. Hazards identification

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).
Classification of the substance or mixture : GASES UNDER PRESSURE - Liquefied gas

GHS label elements
Hazard pictograms :

Signal word : Warning
Hazard statements : Contains gas under pressure; may explode if heated. May cause frostbite. 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 : Use and store only outdoors or in a well ventilated place.
Response : Not applicable.
Storage : Protect from sunlight. Protect from sunlight when ambient temperature exceeds 52°C/125°F. Store in a well-ventilated place.
Disposal : Not applicable.
Hazards not otherwise classified : Liquid can cause burns similar to frostbite.

Date of issue/Date of revision : 10/16/2014. Date of previous issue : 10/10/2014. Version : 0.02
Section 3. Composition/information on ingredients

Substance/mixture: Substance
Chemical name: octafluorocyclobutane
Other means of identification: Cyclobutane, 1,1,2,2,3,3,4,4-octafluoro-; Cyclobutane, octafluoro-

CAS number/other identifiers:
- CAS number: 115-25-3
- Product code: 001056

<table>
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<th>Ingredient name</th>
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<tr>
<td>Octafluorocyclobutane</td>
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</table>

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

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

Section 4. First aid measures

Description of necessary first aid measures

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

Inhalation: Remove victim to fresh air and keep at rest in a position comfortable for breathing. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention if adverse health effects persist or are severe. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband. In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.

Skin contact: Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Get medical attention if symptoms occur. In case of contact with liquid, warm frozen tissues slowly with lukewarm water and get medical attention. Do not rub affected area. Wash clothing before reuse. Clean shoes thoroughly before reuse.

Ingestion: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Get medical attention if adverse health effects persist or are severe. Ingestion of liquid can cause burns similar to frostbite. If frostbite occurs, get medical attention. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband. As this product rapidly becomes a gas when released, refer to the inhalation section.

Most important symptoms/effects, acute and delayed

Potential acute health effects

- **Eye contact**: Liquid can cause burns similar to frostbite.
- **Inhalation**: Exposure to decomposition products may cause a health hazard. Serious effects may be delayed following exposure.
- **Skin contact**: Dermal contact with rapidly evaporating liquid could result in freezing of the tissues or frostbite.
- **Frostbite**: Try to warm up the frozen tissues and seek medical attention.
- **Ingestion**: Ingestion of liquid can cause burns similar to frostbite.
Section 4. First aid measures

Over-exposure signs/symptoms

Eye contact: Adverse symptoms may include the following: frostbite
Inhalation: No specific data.
Skin contact: Adverse symptoms may include the following: frostbite
Ingestion: Adverse symptoms may include the following: frostbite

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

Notes to physician:
In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.

Specific treatments:
No specific treatment.

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

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

Decomposition products may include the following materials:
carbon dioxide
carbon monoxide
halogenated compounds
carbonyl halides

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. For incidents involving large quantities, thermally insulated undergarments and thick textile or leather gloves should be worn.

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. Do not touch or walk through spilled material. Avoid breathing gas. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.
Section 6. Accidental release measures

For emergency responders: If specialised clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

Environmental precautions: Ensure emergency procedures to deal with accidental gas releases are in place to avoid contamination of the environment. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. 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. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and storage

Precautions for safe handling

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

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

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

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

None.

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

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Section 8. Exposure controls/personal protection

**Hand protection**
Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if 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.

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. If contact with the liquid is possible, insulated gloves suitable for low temperatures should be worn. 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.

**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 splashing liquids, mists, gases or dusts. If contact is possible, the following protection should be used, unless the assessment indicates a higher degree of protection: safety glasses with side-shields.

**Body protection**
Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

**Other skin protection**
Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

**Respiratory protection**
Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Section 9. Physical and chemical properties

**Appearance**

**Physical state**
Gas. [Liquefied compressed gas.]

**Color**
Not available.

**Molecular weight**
200.04 g/mole

**Molecular formula**
C₄-F₈

**Boiling/condensation point**
-6.04°C (21.1°F)

**Melting/freezing point**
-41.4°C (-42.5°F)

**Critical temperature**
115.2°C (239.4°F)

**Odor**
Not available.

**Odor threshold**
Not available.

**pH**
Not available.

**Flash point**
[Product does not sustain combustion.]

**Burning time**
Not applicable.

**Burning rate**
Not applicable.

**Evaporation rate**
Not available.

**Flammability (solid, gas)**
Not available.

**Lower and upper explosive (flammable) limits**
Not available.

**Vapor pressure**
Not available.
Section 9. Physical and chemical properties

- **Vapor density**: 7.33 (air=1)
- **Specific Volume (ft³/lb)**: 2.7933
- **Gas Density (lb/ft³)**: 0.358
- **Relative density**: Not applicable.
- **Solubility in water**: Not available.
- **Partition coefficient: n-octanol/water**: Not available.
- **Auto-ignition temperature**: Not available.
- **Decomposition temperature**: Not available.
- **SADT**: Not available.
- **Viscosity**: Not applicable.

Section 10. Stability and reactivity

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

Section 11. Toxicological information

- **Information on toxicological effects**
  - **Acute toxicity**: Not available.
  - **Irritation/Corrosion**: Not available.
  - **Sensitization**: Not available.
  - **Mutagenicity**: Not available.
  - **Carcinogenicity**: Not available.
Section 11. Toxicological information

Reproductive toxicity
Not available.

Teratogenicity
Not available.

Specific target organ toxicity (single exposure)
Not available.

Specific target organ toxicity (repeated exposure)
Not available.

Aspiration hazard
Not available.

Information on the likely routes of exposure

Inhalation:
Exposure to decomposition products may cause a health hazard. Serious effects may be delayed following exposure.

Ingestion of liquid can cause burns similar to frostbite.

Skin contact:
Dermal contact with rapidly evaporating liquid could result in freezing of the tissues or frostbite.

Liquid can cause burns similar to frostbite.

Eye contact:
Adverse symptoms may include the following:

Inhalation:
No specific data.

Skin contact:
Adverse symptoms may include the following:

Ingestion:
Adverse symptoms may include the following:

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact:
Adverse symptoms may include the following:

Inhalation:
No specific data.

Skin contact:
Adverse symptoms may include the following:

Ingestion:
Adverse symptoms may include the following:

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

Short term exposure
Potential immediate effects:
Not available.

Potential delayed effects:
Not available.

Long term exposure
Potential immediate effects:
Not available.

Potential delayed effects:
Not available.

Potential chronic health effects
Not available.

General:
No known significant effects or critical hazards.

Carcinogenicity:
No known significant effects or critical hazards.

Mutagenicity:
No known significant effects or critical hazards.

Teratogenicity:
No known significant effects or critical hazards.
Section 11. Toxicological information

Developmental effects: No known significant effects or critical hazards.
Fertility effects: No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates
Not available.

Section 12. Ecological information

Toxicity
Not available.

Persistence and degradability
Not available.

Bioaccumulative potential
Not available.

Mobility in soil

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

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

Section 13. Disposal considerations

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

Section 14. Transport information

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<tr>
<th>UN number</th>
<th>DOT</th>
<th>TDG</th>
<th>Mexico</th>
<th>IMDG</th>
<th>IATA</th>
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<td>UN proper shipping name</td>
<td>OCTAFLUOROCYCLOBUTANE, OR REFRIGERANT GAS RC 318</td>
<td>OCTAFLUOROCYCLOBUTANE, OR REFRIGERANT GAS RC 318</td>
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Transport hazard class(es): 2.2

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Section 14. Transport information

| Packing group | - | - | - | - | - | - |
| Additional information | Limited quantity | Explosive Limit and Limited Quantity Index | - | - | Passenger and Cargo Aircraft | Quantity limitation: 75 kg |
| | Yes. | 0.125 | - | - | Cargo Aircraft Only | Quantity limitation: 150 kg |
| | Packaging instruction | Passenger Carrying Road or Rail Index | 75 | - | |
| | Passenger aircraft | Quantity limitation: 75 kg | - | - | |
| | Cargo aircraft | Quantity limitation: 150 kg | - | - | |
| | Special provisions | - | - | - | - |
| T50 | - | - | - | - | |

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

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

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

Section 15. Regulatory information

U.S. Federal regulations:
- TSCA 8(a) CDR Exempt/Partial exemption: Not determined
- United States inventory (TSCA 8b): This material is listed or exempted

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: Sudden release of pressure

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Date of previous issue: 10/10/2014.
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### Section 15. Regulatory information

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<th>Name</th>
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<th>Fire hazard</th>
<th>Sudden release of pressure</th>
<th>Reactive</th>
<th>Immediate (acute) health hazard</th>
<th>Delayed (chronic) health hazard</th>
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<tr>
<td>Octafluorocyclobutane</td>
<td>100</td>
<td>No.</td>
<td>Yes.</td>
<td>No.</td>
<td>No.</td>
<td>No.</td>
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</tbody>
</table>

**State regulations**

- **Massachusetts**: This material is not listed.
- **New York**: This material is not listed.
- **New Jersey**: This material is listed.
- **Pennsylvania**: This material is not listed.
- **Canada inventory**: This material is listed or exempted.

**International regulations**

- **International lists**
  - **Australia inventory (AICS)**: This material is listed or exempted.
  - **China inventory (IECSC)**: This material is listed or exempted.
  - **Japan inventory**: This material is listed or exempted.
  - **Korea inventory**: This material is listed or exempted.
  - **Malaysia Inventory (EHS Register)**: Not determined.
  - **New Zealand Inventory of Chemicals (NZIoC)**: Not determined.
  - **Philippines inventory (PICCS)**: This material is listed or exempted.
  - **Taiwan inventory (CSNN)**: Not determined.

- **Chemical Weapons Convention List Schedule I Chemicals**: Not listed
- **Chemical Weapons Convention List Schedule II Chemicals**: Not listed
- **Chemical Weapons Convention List Schedule III Chemicals**: Not listed

**Canada**

- **WHMIS (Canada)**
  - **Class A: Compressed gas**.
  - **CEPA Toxic substances**: This material is not listed.
  - **Canadian ARET**: This material is not listed.
  - **Canadian NPRI**: This material is not listed.
  - **Alberta Designated Substances**: This material is not listed.
  - **Ontario Designated Substances**: This material is not listed.
  - **Quebec Designated Substances**: This material is not listed.

### Section 16. Other information

- **Canada Label requirements**: Class A: Compressed gas.

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

### Table

<table>
<thead>
<tr>
<th>Category</th>
<th>Value</th>
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<tr>
<td>Health</td>
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<tr>
<td>Flammability</td>
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<td>Physical hazards</td>
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</table>

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Section 16. Other information

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

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

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

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

History

| Date of printing   | 10/16/2014. |
| Date of issue/Date of revision | 10/16/2014. |
| Date of previous issue | 10/10/2014. |
| Version           | 0.02        |

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
UN = United Nations
ACGIH = American Conference of Governmental Industrial Hygienists
AIHA = American Industrial Hygiene Association
CAS = Chemical Abstract Services
CEPA = Canadian Environmental Protection Act
CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act (EPA)
CFR = United States Code of Federal Regulations
CPR = Controlled Products Regulations
DSL = Domestic Substances List
GWP = Global Warming Potential
IARC = International Agency for Research on Cancer
ICAO = International Civil Aviation Organisation
Inh = Inhalation
LC = Lethal concentration
LD = Lethal dosage
NDSL = Non-Domestic Substances List
NIOSH = National Institute for Occupational Safety and Health

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Section 16. Other information

TDG – Canadian Transportation of Dangerous Goods Act and Regulations
TLV – Threshold Limit Value
TSCA – Toxic Substances Control Act
WEEL – Workplace Environmental Exposure Level
WHMIS – Canadian Workplace Hazardous Material Information System

References

Indicates information that has changed from previously issued version.

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.

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