Section 1. Identification

GHS product identifier: Flammable Gas Mixture: 1,3-Butadiene / 1-Butene / Benzene / Cis-2-Butene / Cyclohexene / Cyclopentane / Cylopropane / Ethane / Ethylene / Isobutane / Isobutylene / Isopentane / Methane / N-Butane / N-Pentane / Propane / Propylene / Trans-2-Butene

Other means of identification: Not available.

Product type: Gas.

Product use: Synthetic/Analytical chemistry.

SDS #: 027106

Supplier's details: Airgas USA, LLC and its affiliates
259 North Radnor-Chester Road
Suite 100
Radnor, PA 19087-5283
1-610-687-5253

24-hour telephone: 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: FLAMMABLE GASES - Category 1
GASES UNDER PRESSURE - Compressed gas
GERM CELL MUTAGENICITY - Category 1
CARCINOGENICITY - Category 1

GHS label elements
Hazard pictograms:

Signal word: Danger

Hazard statements: Extremely flammable gas.
May form explosive mixtures with air.
Contains gas under pressure; may explode if heated.
May displace oxygen and cause rapid suffocation.
May cause genetic defects.
May cause cancer.

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. Approach suspected leak area with caution.

Prevention: Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Wear protective gloves. Wear eye or face protection. Wear protective clothing. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.

Response: IF exposed or concerned: Get medical attention. Leaking gas fire: Do not extinguish, unless leak can be stopped safely. Eliminate all ignition sources if safe to do so.
Section 2. Hazards identification

Storage: Store locked up. Protect from sunlight. Store in a well-ventilated place.

Disposal: Dispose of contents and container in accordance with all local, regional, national and international regulations.

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

<table>
<thead>
<tr>
<th>Substance/mixture</th>
<th>Other means of identification</th>
<th>Product code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mixture</td>
<td>Not available.</td>
<td>027106</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ingredient name</th>
<th>%</th>
<th>CAS number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Propane</td>
<td>1 - 97.899</td>
<td>74-98-6</td>
</tr>
<tr>
<td>isobutane</td>
<td>1 - 97.899</td>
<td>75-28-5</td>
</tr>
<tr>
<td>N-Butane</td>
<td>1 - 97.899</td>
<td>106-97-8</td>
</tr>
<tr>
<td>ethane</td>
<td>0.0001 - 5</td>
<td>74-84-0</td>
</tr>
<tr>
<td>propylene</td>
<td>0.0001 - 5</td>
<td>115-07-1</td>
</tr>
<tr>
<td>1-Butene</td>
<td>0.0001 - 5</td>
<td>106-98-9</td>
</tr>
<tr>
<td>Cis-2-Butene</td>
<td>0.0001 - 5</td>
<td>590-18-1</td>
</tr>
<tr>
<td>Isobutylene</td>
<td>0.0001 - 5</td>
<td>115-11-7</td>
</tr>
<tr>
<td>methane</td>
<td>0.0001 - 5</td>
<td>74-82-8</td>
</tr>
<tr>
<td>Trans-2-Butene</td>
<td>0.0001 - 5</td>
<td>624-64-6</td>
</tr>
<tr>
<td>ethylene</td>
<td>0.0001 - 0.9999</td>
<td>74-85-1</td>
</tr>
<tr>
<td>1,3-butadiene</td>
<td>0.1 - 0.9999</td>
<td>106-99-0</td>
</tr>
<tr>
<td>benzene</td>
<td>0.0001 - 0.05</td>
<td>71-43-2</td>
</tr>
<tr>
<td>cyclohexene</td>
<td>0.0001 - 0.05</td>
<td>110-83-8</td>
</tr>
<tr>
<td>cyclopentane</td>
<td>0.0001 - 0.05</td>
<td>287-92-3</td>
</tr>
<tr>
<td>isopentane</td>
<td>0.0001 - 0.05</td>
<td>78-78-4</td>
</tr>
<tr>
<td>n-pentane</td>
<td>0.0001 - 0.05</td>
<td>109-66-0</td>
</tr>
<tr>
<td>cyclopropane</td>
<td>0.0001 - 0.05</td>
<td>75-19-4</td>
</tr>
</tbody>
</table>

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. Continue to rinse for at least 10 minutes. Get medical attention.

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 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.

Skin contact: Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. To avoid the risk of static discharges and gas ignition, soak contaminated clothing thoroughly with water before removing it. Continue to rinse for at least 10 minutes. Get medical attention. Wash clothing before reuse. Clean shoes thoroughly before reuse.

Ingestion: As this product is a gas, refer to the inhalation section.

Most important symptoms/effects, acute and delayed

Date of issue/Date of revision: 2/29/2020  Date of previous issue: 2/28/2020  Version: 1.01
**Section 4. First aid measures**

**Potential acute health effects**

- **Eye contact**: Contact with rapidly expanding gas may cause burns or frostbite.
- **Inhalation**: No known significant effects or critical hazards.
- **Skin contact**: Contact with rapidly expanding gas may cause burns or frostbite.
- **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. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.

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. Extremely flammable gas. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion.

**Hazardous thermal decomposition products**

- Decomposition products may include the following materials: carbon dioxide, carbon monoxide

**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. If involved in fire, shut off flow immediately if it can be done without risk. If this is impossible, withdraw from area and allow fire to burn. Fight fire from protected location or maximum possible distance. Eliminate all ignition sources if safe to do so.

**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: Accidental releases pose a serious fire or explosion hazard. No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing gas. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. 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. Use spark-proof tools and explosion-proof equipment.

Large spill: Immediately contact emergency personnel. Stop leak if without risk. Use spark-proof tools and explosion-proof equipment. 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. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. 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. Use only non-sparking tools. Empty containers retain product residue and can be hazardous. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Avoid exposure - obtain special instructions before use. Do not handle until all safety precautions have been read and understood.

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 handling, 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). Eliminate all ignition sources. 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). Store locked up. Keep container tightly closed and sealed until ready for use. See Section 10 for incompatible materials before handling or use.
## Section 8. Exposure controls/personal protection

### Ingredient name | Exposure limits
--- | ---

isobutane | NIOSH REL (United States, 10/2016). TWA: 1900 mg/m³ 10 hours. TWA: 800 ppm 10 hours. ACGIH TLV (United States, 3/2017). STEL: 1000 ppm 15 minutes.


ethane | ACGIH TLV (United States, 3/2017). Oxygen Depletion [Asphyxiating].

propylene | ACGIH TLV (United States, 3/2017). TWA: 500 ppm 8 hours. ACGIH TLV (United States, 1/2005). TWA: 500 ppm 8 hours. Form: All forms


Cis-2-Butene | ACGIH TLV (United States, 3/2017). TWA: 250 ppm 8 hours.


methane | None.

Trans-2-Butene | ACGIH TLV (United States, 3/2017). TWA: 250 ppm 8 hours.

ethylene | ACGIH TLV (United States, 3/2017). TWA: 200 ppm 8 hours.


benzene | ACGIH TLV (United States, 3/2017). Absorbed through skin. STEL: 8 mg/m³ 15 minutes. STEL: 2.5 ppm 15 minutes. TWA: 1.6 mg/m³ 8 hours. TWA: 0.5 ppm 8 hours.
### Section 8. Exposure controls/personal protection

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</tr>
</thead>
<tbody>
<tr>
<td>cyclohexene</td>
<td>STEL: 1 ppm 15 minutes. TWA: 0.1 ppm 10 hours.</td>
<td>STEL: 5 ppm 15 minutes. TWA: 1 ppm 8 hours.</td>
<td>STEL: 5 ppm 15 minutes. TWA: 1 ppm 8 hours.</td>
<td>AMP: 50 ppm 10 minutes. CEIL: 25 ppm TWA: 10 ppm 8 hours.</td>
<td>TWA: 300 ppm 8 hours. TWA: 1010 mg/m³ 8 hours.</td>
<td>TWA: 300 ppm 8 hours. TWA: 1015 mg/m³ 8 hours.</td>
<td>TWA: 300 ppm 10 hours. TWA: 1015 mg/m³ 10 hours.</td>
<td>TWA: 300 ppm 8 hours. TWA: 1015 mg/m³ 8 hours.</td>
<td>TWA: 300 ppm 8 hours. TWA: 1015 mg/m³ 8 hours.</td>
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<tr>
<td>cyclopentane</td>
<td>TWA: 1720 mg/m³ 8 hours. TWA: 600 ppm 8 hours.</td>
<td>TWA: 1720 mg/m³ 10 hours. TWA: 600 ppm 10 hours.</td>
<td>TWA: 1720 mg/m³ 8 hours. TWA: 600 ppm 8 hours.</td>
<td>TWA: 1720 mg/m³ 8 hours. TWA: 600 ppm 8 hours.</td>
<td>TWA: 1720 mg/m³ 8 hours. TWA: 600 ppm 8 hours.</td>
<td>TWA: 1720 mg/m³ 8 hours. TWA: 600 ppm 8 hours.</td>
<td>TWA: 1720 mg/m³ 10 hours. TWA: 1015 mg/m³ 10 hours.</td>
<td>TWA: 1720 mg/m³ 8 hours. TWA: 600 ppm 8 hours.</td>
<td>TWA: 1720 mg/m³ 8 hours. TWA: 600 ppm 8 hours.</td>
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</tr>
<tr>
<td>isopentane</td>
<td>None.</td>
<td>TWA: 1000 ppm 8 hours.</td>
<td>TWA: 1000 ppm 8 hours.</td>
<td>TWA: 1000 ppm 8 hours.</td>
<td>TWA: 1000 ppm 8 hours.</td>
<td>TWA: 1000 ppm 8 hours.</td>
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</tr>
<tr>
<td>n-pentane</td>
<td>None.</td>
<td>TWA: 1000 ppm 8 hours.</td>
<td>TWA: 1000 ppm 8 hours.</td>
<td>TWA: 1000 ppm 8 hours.</td>
<td>TWA: 1000 ppm 8 hours.</td>
<td>TWA: 1000 ppm 8 hours.</td>
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<td>TWA: 1000 ppm 8 hours.</td>
<td>TWA: 1000 ppm 8 hours.</td>
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<td></td>
</tr>
<tr>
<td>cyclopropane</td>
<td>None.</td>
<td>STEL: 2250 mg/m³ 15 minutes.</td>
<td>STEL: 750 ppm 15 minutes.</td>
<td>STEL: 2250 mg/m³ 15 minutes.</td>
<td>STEL: 750 ppm 15 minutes.</td>
<td>STEL: 2250 mg/m³ 15 minutes.</td>
<td>STEL: 750 ppm 15 minutes.</td>
<td>STEL: 2250 mg/m³ 15 minutes.</td>
<td>STEL: 750 ppm 15 minutes.</td>
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</tr>
</tbody>
</table>

**Appropriate engineering controls**: Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.
### Section 8. Exposure controls/personal protection

#### 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.

**Body protection**

Personal protective equipment for the body should be selected based on the task being performed and the risks involved. For the greatest protection from static discharges, clothing should include anti-static overalls, boots and gloves.

**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.

### Section 9. Physical and chemical properties

**Appearance**

**Physical state**

Gas.

**Color**

Not available.

**Odor**

Not available.

**Odor threshold**

Not available.

**pH**

Not available.

**Melting point**

-105°C (-157°F) This is based on data for the following ingredient: Trans-2-Butene. Weighted average: -161.82°C (-259.3°F)

**Boiling point**

Not available.

**Critical temperature**

Lowest known value: -82.45°C (-116.4°F) (methane).

**Flash point**

Not available.

**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**: Highest known value: 2.1 (Air = 1) (butane). Weighted average: 1.86 (Air = 1)
- **Gas Density (lb/ft³)**: Weighted average: 0.16
- **Relative density**: Not applicable.
- **Solubility**: Not available.
- **Solubility in water**: Not available.
- **Partition coefficient: n-octanol/water**: Not available.
- **Auto-ignition temperature**: Not available.
- **Decomposition temperature**: Not available.
- **Viscosity**: Not applicable.
- **Flow time (ISO 2431)**: Not available.

**Vapor density** includes:
- Benzene
- Cis-2-Butene
- Cyclohexene
- Cyclopentane
- Cylopropane
- Ethane
- Ethylene
- Isobutane
- Isobutylene
- Isopentane
- Methane
- N-Butane
- N-Pentane
- Propane
- Propylene
- Trans-2-Butene

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**: Avoid all possible sources of ignition (spark or flame). Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition.
- **Incompatible materials**: Oxidizers
- **Hazardous decomposition products**: Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11. Toxicological information

**Acute toxicity**

<table>
<thead>
<tr>
<th>Product/ingredient name</th>
<th>Result</th>
<th>Species</th>
<th>Dose</th>
<th>Exposure</th>
</tr>
</thead>
<tbody>
<tr>
<td>isobutane</td>
<td>LC50 Inhalation Vapor</td>
<td>Rat</td>
<td>658000 mg/m³</td>
<td>4 hours</td>
</tr>
<tr>
<td>N-Butane</td>
<td>LC50 Inhalation Vapor</td>
<td>Rat</td>
<td>658000 mg/m³</td>
<td>4 hours</td>
</tr>
<tr>
<td>Isobutylene</td>
<td>LC50 Inhalation Vapor</td>
<td>Rat</td>
<td>550000 mg/m³</td>
<td>4 hours</td>
</tr>
<tr>
<td>1,3-butadiene</td>
<td>LC50 Inhalation Vapor</td>
<td>Rat</td>
<td>128000 ppm</td>
<td>4 hours</td>
</tr>
<tr>
<td>benzene</td>
<td>LC50 Inhalation Gas.</td>
<td>Rat</td>
<td>10000 ppm</td>
<td>7 hours</td>
</tr>
<tr>
<td>cyclopentane</td>
<td>LD50 Oral</td>
<td>Rat</td>
<td>930 mg/kg</td>
<td>-</td>
</tr>
<tr>
<td>isopentane</td>
<td>LC50 Inhalation Vapor</td>
<td>Rat</td>
<td>11400 mg/kg</td>
<td>-</td>
</tr>
<tr>
<td>n-pentane</td>
<td>LC50 Inhalation Vapor</td>
<td>Rat</td>
<td>280000 mg/m³</td>
<td>4 hours</td>
</tr>
</tbody>
</table>

**Irritation/Corrosion**

Information on toxicological effects

Date of issue/Date of revision : 2/29/2020  Date of previous issue : 2/28/2020  Version : 1.01
## Section 11. Toxicological information

<table>
<thead>
<tr>
<th>Product/ingredient name</th>
<th>Result</th>
<th>Species</th>
<th>Score</th>
<th>Exposure</th>
<th>Observation</th>
</tr>
</thead>
<tbody>
<tr>
<td>benzene</td>
<td>Eyes - Moderate irritant</td>
<td>Rabbit</td>
<td>-</td>
<td>88 milligrams</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Eyes - Severe irritant</td>
<td>Rabbit</td>
<td>-</td>
<td>24 hours 2 milligrams</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Skin - Mild irritant</td>
<td>Rat</td>
<td>-</td>
<td>8 hours 60 microliters</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Skin - Mild irritant</td>
<td>Rabbit</td>
<td>-</td>
<td>24 hours 15 milligrams</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Skin - Moderate irritant</td>
<td>Rabbit</td>
<td>-</td>
<td>24 hours 20 milligrams</td>
<td>-</td>
</tr>
</tbody>
</table>

### Sensitization
Not available.

### Mutagenicity
Not available.

### Carcinogenicity
Not available.

### Reproductive toxicity
Not available.

### Teratogenicity
Not available.

### Specific target organ toxicity (single exposure)

<table>
<thead>
<tr>
<th>Name</th>
<th>Category</th>
<th>Route of exposure</th>
<th>Target organs</th>
</tr>
</thead>
<tbody>
<tr>
<td>ethylene</td>
<td>Category 3</td>
<td>Not applicable.</td>
<td>Narcotic effects</td>
</tr>
<tr>
<td>isopentane</td>
<td>Category 3</td>
<td>Not applicable.</td>
<td>Narcotic effects</td>
</tr>
<tr>
<td>n-pentane</td>
<td>Category 3</td>
<td>Not applicable.</td>
<td>Narcotic effects</td>
</tr>
<tr>
<td>cyclopropane</td>
<td>Category 3</td>
<td>Not applicable.</td>
<td>Narcotic effects</td>
</tr>
</tbody>
</table>

### Specific target organ toxicity (repeated exposure)

<table>
<thead>
<tr>
<th>Name</th>
<th>Category</th>
<th>Route of exposure</th>
<th>Target organs</th>
</tr>
</thead>
<tbody>
<tr>
<td>benzene</td>
<td>Category 1</td>
<td>Not determined</td>
<td>Not determined</td>
</tr>
</tbody>
</table>

### Aspiration hazard
Not available.

### Information on the likely routes of exposure
Not available.

### Potential acute health effects

- **Eye contact**: Contact with rapidly expanding gas may cause burns or frostbite.
- **Inhalation**: No known significant effects or critical hazards.
- **Skin contact**: Contact with rapidly expanding gas may cause burns or frostbite.
- **Ingestion**: As this product is a gas, refer to the inhalation section.
Section 11. Toxicological information

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.

General : No known significant effects or critical hazards.
Carcinogenicity : May cause cancer. Risk of cancer depends on duration and level of exposure.
Mutagenicity : May cause genetic defects.
Teratogenicity : No known significant effects or critical hazards.
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

<table>
<thead>
<tr>
<th>Product/ingredient name</th>
<th>Result</th>
<th>Species</th>
<th>Exposure</th>
</tr>
</thead>
<tbody>
<tr>
<td>benzene</td>
<td>Acute EC50 29000 µg/l Fresh water</td>
<td>Algae - Pseudokirchneriella subcapitata</td>
<td>72 hours</td>
</tr>
<tr>
<td></td>
<td>Acute EC50 1600000 µg/l Fresh water</td>
<td>Algae - Selenastrum sp.</td>
<td>96 hours</td>
</tr>
<tr>
<td></td>
<td>Acute EC50 9230 µg/l Fresh water</td>
<td>Daphnia - Daphnia magna - Neonate</td>
<td>48 hours</td>
</tr>
<tr>
<td></td>
<td>Acute LC50 21 mg/l Marine water</td>
<td>Crustaceans - Artemia salina - Neonate</td>
<td>48 hours</td>
</tr>
<tr>
<td></td>
<td>Acute LC50 5.28 ul/L Fresh water</td>
<td>Fish - Oncorhynchus gorbuscha - Fry</td>
<td>96 hours</td>
</tr>
<tr>
<td></td>
<td>Chronic EC10 &gt;1360 mg/l Fresh water</td>
<td>Algae - Scenedesmus subspicatus</td>
<td>96 hours</td>
</tr>
<tr>
<td></td>
<td>Chronic NOEC 98 mg/l Fresh water</td>
<td>Daphnia - Daphnia magna</td>
<td>21 days</td>
</tr>
<tr>
<td></td>
<td>Chronic NOEC 1.5 to 5.4 ul/L Marine water</td>
<td>Fish - Morone saxatilis - Juvenile (Fledgling, Hatchling, Weanling)</td>
<td>4 weeks</td>
</tr>
<tr>
<td>cyclohexene</td>
<td>Acute EC50 5300 µg/l Fresh water</td>
<td>Daphnia - Daphnia magna</td>
<td>48 hours</td>
</tr>
<tr>
<td></td>
<td>Acute EC50 4500 µg/l Fresh water</td>
<td>Fish - Poecilia reticulata</td>
<td>96 hours</td>
</tr>
</tbody>
</table>

Persistence and degradability

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Section 12. Ecological information

Bioaccumulative potential

<table>
<thead>
<tr>
<th>Product/ingredient name</th>
<th>LogP&lt;sub&gt;ow&lt;/sub&gt;</th>
<th>BCF</th>
<th>Potential</th>
</tr>
</thead>
<tbody>
<tr>
<td>Propane</td>
<td>1.09</td>
<td>-</td>
<td>low</td>
</tr>
<tr>
<td>isobutane</td>
<td>2.8</td>
<td>-</td>
<td>low</td>
</tr>
<tr>
<td>N-Butane</td>
<td>2.89</td>
<td>-</td>
<td>low</td>
</tr>
<tr>
<td>ethane</td>
<td>1.09</td>
<td>-</td>
<td>low</td>
</tr>
<tr>
<td>propylene</td>
<td>1.77</td>
<td>-</td>
<td>low</td>
</tr>
<tr>
<td>1-Butene</td>
<td>2.4</td>
<td>-</td>
<td>low</td>
</tr>
<tr>
<td>Cis-2-Butene</td>
<td>2.33</td>
<td>-</td>
<td>low</td>
</tr>
<tr>
<td>Isobutylene</td>
<td>2.34</td>
<td>-</td>
<td>low</td>
</tr>
<tr>
<td>methane</td>
<td>1.09</td>
<td>-</td>
<td>low</td>
</tr>
<tr>
<td>Trans-2-Butene</td>
<td>2.31</td>
<td>-</td>
<td>low</td>
</tr>
<tr>
<td>ethylene</td>
<td>1.13</td>
<td>-</td>
<td>low</td>
</tr>
<tr>
<td>1,3-butadiene</td>
<td>1.99</td>
<td>10</td>
<td>low</td>
</tr>
<tr>
<td>benzene</td>
<td>2.13</td>
<td>11</td>
<td>low</td>
</tr>
<tr>
<td>cyclohexene</td>
<td>2.99</td>
<td>23 to 45</td>
<td>low</td>
</tr>
<tr>
<td>cyclopentane</td>
<td>3</td>
<td>70.8</td>
<td>low</td>
</tr>
<tr>
<td>isopentane</td>
<td>3</td>
<td>171</td>
<td>low</td>
</tr>
<tr>
<td>n-pentane</td>
<td>3.45</td>
<td>171</td>
<td>low</td>
</tr>
<tr>
<td>cyclopropane</td>
<td>1.72</td>
<td>-</td>
<td>low</td>
</tr>
</tbody>
</table>

Mobility in soil

Soil/water partition coefficient (K<sub>oc</sub>) : 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

<table>
<thead>
<tr>
<th>DOT</th>
<th>TDG</th>
<th>Mexico</th>
<th>IMDG</th>
<th>IATA</th>
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</thead>
<tbody>
<tr>
<td>UN number</td>
<td>UN1954</td>
<td>UN1954</td>
<td>UN1954</td>
<td>UN1954</td>
</tr>
<tr>
<td>UN proper shipping name</td>
<td>COMPRESSED GAS, FLAMMABLE, N. O.S. (butane, isobutane)</td>
<td>COMPRESSED GAS, FLAMMABLE, N. O.S. (butane, isobutane)</td>
<td>COMPRESSED GAS, FLAMMABLE, N. O.S. (butane, isobutane)</td>
<td>COMPRESSED GAS, FLAMMABLE, N. O.S. (butane, isobutane)</td>
</tr>
<tr>
<td>Transport hazard class(es)</td>
<td>2.1</td>
<td>2.1</td>
<td>2.1</td>
<td>2.1</td>
</tr>
</tbody>
</table>

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Section 14. Transport information

| Packing group | - | - | - | - | - |

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

Additional information

**DOT Classification**
- **Reportable quantity**: 1000.1 lbs / 454.05 kg. Package sizes shipped in quantities less than the product reportable quantity are not subject to the RQ (reportable quantity) transportation requirements.

**TDG Classification**
- Product classified as per the following sections of the Transportation of Dangerous Goods Regulations: 2.13-2.17 (Class 2).

**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 and the IBC Code**: Not available.

Section 15. Regulatory information

**U.S. Federal regulations**
- **TSCA 8(a) PAIR**: cyclohexene; cyclopentane; pentane
- **TSCA 8(a) CDR Exempt/Partial exemption**: Not determined
- **Clean Water Act (CWA) 307**: benzene
- **Clean Water Act (CWA) 311**: benzene
- **Clean Air Act (CAA) 112 regulated flammable substances**: butane; Isobutane; propane; Trans-2-Butene; methane; Isobutylene; Cis-2-Butene; 1-Butene; Propylene; ethane

**Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs)**
- **Listed**: Not listed

**Clean Air Act Section 602 Class I Substances**
- **Not listed**: Not listed

**Clean Air Act Section 602 Class II Substances**
- **Not listed**: Not listed

**DEA List I Chemicals (Precursor Chemicals)**
- **Not listed**: Not listed

**DEA List II Chemicals (Essential Chemicals)**
- **Not listed**: 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.
Section 15. Regulatory information

<table>
<thead>
<tr>
<th>Ingredient name</th>
<th>No significant risk level</th>
<th>Maximum acceptable dosage level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benzene</td>
<td>Yes.</td>
<td>Yes.</td>
</tr>
<tr>
<td>1,3-Butadiene</td>
<td>Yes.</td>
<td>-</td>
</tr>
</tbody>
</table>

State regulations

Massachusetts: The following components are listed: BUTANE; ISOBUTANE; PROPANE; 2-BUTENE-TRANS; METHANE; MARSH GAS; 2-METHYLPROPENE; 2-BUTENE-CIS; 1-BUTENE; PROPYLENE; PROPENE; ETHANE.

New York: None of the components are listed.

New Jersey: The following components are listed: BUTANE; Isobutane; PROPANE, 2-METHYL-; PROPANE; 2-BUTENE-TRANS; METHANE; ISOBUTYLENE; 1-PROPENE, 2-METHYL-; 2-BUTENE-CIS; 2-BUTENE, (2Z)-; 1,3-BUTADIENE; BIETHYLENE; 1-BUTENE; PROPYLENE; 1-PROPENE; ETHANE.

Pennsylvania: The following components are listed: BUTANE; PROPANE, 2-METHYL-; PROPANE; 2-BUTENE, (E)-; METHANE; 1-PROPENE, 2-METHYL-; 2-BUTENE, (Z)-; 1, 3-BUTADIENE; 1-BUTENE; 1-PROPENE; ETHANE.

California Prop. 65

⚠️ WARNING: This product can expose you to chemicals including Benzene, 1,3-Butadiene, which are known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

International regulations

Chemical Weapon Convention List Schedules I, II & III Chemicals
Not listed.

Montreal Protocol (Annexes A, B, C, E)
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: All components are listed or exempted.
Canada: All components are listed or exempted.
China: Not determined.
Europe: All components are listed or exempted.
Japan: Japan inventory (ENCS): All components are listed or exempted. Japan inventory (ISHL): Not determined.
Malaysia: Not determined.
New Zealand: All components are listed or exempted.

SARA 313 notifications must not be detached from the SDS and any copying and redistribution of the SDS shall include copying and redistribution of the notice attached to copies of the SDS subsequently redistributed.
Section 15. Regulatory information

<table>
<thead>
<tr>
<th>Country</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Philippines</td>
<td>All components are listed or exempted.</td>
</tr>
<tr>
<td>Republic of Korea</td>
<td>All components are listed or exempted.</td>
</tr>
<tr>
<td>Taiwan</td>
<td>Not determined.</td>
</tr>
<tr>
<td>Thailand</td>
<td>Not determined.</td>
</tr>
<tr>
<td>Turkey</td>
<td>Not determined.</td>
</tr>
<tr>
<td>United States</td>
<td>All components are listed or exempted.</td>
</tr>
<tr>
<td>Viet Nam</td>
<td>Not determined.</td>
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</tbody>
</table>

Section 16. Other information

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

<table>
<thead>
<tr>
<th>Health</th>
<th>Flammability</th>
<th>Physical hazards</th>
</tr>
</thead>
<tbody>
<tr>
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<td>🟡</td>
<td>🟠</td>
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<tr>
<td>2</td>
<td>4</td>
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</tbody>
</table>

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.)

<table>
<thead>
<tr>
<th>Flammability</th>
<th>Instability/Reactivity</th>
<th>Health</th>
</tr>
</thead>
<tbody>
<tr>
<td>🟢</td>
<td>🟢</td>
<td>🟢</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
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</tr>
</tbody>
</table>

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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.

Procedure used to derive the classification

<table>
<thead>
<tr>
<th>Classification</th>
<th>Justification</th>
</tr>
</thead>
<tbody>
<tr>
<td>FLAMMABLE GASES - Category 1</td>
<td>On basis of test data</td>
</tr>
<tr>
<td>GASES UNDER PRESSURE - Compressed gas</td>
<td>On basis of test data</td>
</tr>
<tr>
<td>GERM CELL MUTAGENICITY - Category 1</td>
<td>Calculation method</td>
</tr>
<tr>
<td>CARCINOGENICITY - Category 1</td>
<td>Calculation method</td>
</tr>
</tbody>
</table>

History

<table>
<thead>
<tr>
<th>Date of printing</th>
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<th>Date of previous issue</th>
<th>Version</th>
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<tbody>
<tr>
<td>2/29/2020</td>
<td>2/29/2020</td>
<td>2/28/2020</td>
<td>1.01</td>
</tr>
</tbody>
</table>
Section 16. Other information

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

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.