Methyl Fluoride (R41)
Safety Data Sheet P-4623
Date of issue: 01/01/1979 Revision date: 10/17/2016 Supersedes: 03/03/2015

SECTION: 1. Product and company identification

1.1. Product identifier
Product form: Substance
Name: Methyl Fluoride (R41)
CAS No: 593-53-3
Formula: CH3F
Other means of identification: Fluoromethane (R41)

1.2. Relevant identified uses of the substance or mixture and uses advised against
Use of the substance/mixture: Industrial use. Use as directed.

1.3. Details of the supplier of the safety data sheet
Praxair, Inc.
10 Riverview Drive
Danbury, CT 06810 - USA
T 1-800-772-9247 (1-800-PRAXAIR) - F 1-716-879-2146
www.praxair.com

1.4. Emergency telephone number
Emergency number: Onsite Emergency: 1-800-645-4633
CHEMTREC, 24hr/day 7days/week
— Within USA: 1-800-424-9300, Outside USA: 001-703-527-3887
(collect calls accepted, Contract 17729)

SECTION 2: Hazard identification

2.1. Classification of the substance or mixture
GHS-US classification
Flam. Gas 1 H220
Liquefied gas H280

2.2. Label elements
GHS-US labeling
Hazard pictograms (GHS-US):

Signal word (GHS-US): DANGER
Hazard statements (GHS-US):
H220 - EXTREMELY FLAMMABLE GAS
H280 - CONTAINS GAS UNDER PRESSURE; MAY EXPLODE IF HEATED
OSHA-H01 - MAY DISPLACE OXYGEN AND CAUSE RAPID SUFFOCATION
CGA-HG04 - MAY FORM EXPLOSIVE MIXTURES WITH AIR
CGA-HG01 - MAY CAUSE FROSTBITE

Precautionary statements (GHS-US):
P202 - Do not handle until all safety precautions have been read and understood
P210 - Keep away from Heat, Open flames, Sparks, Hot surfaces. - No smoking
P271+P403 - Use and store only outdoors or in a well-ventilated place
P377 - Leaking gas fire: Do not extinguish, unless leak can be stopped safely
P381 - Eliminate all ignition sources if safe to do so
CGA-PG05 - Use a back flow preventive device in the piping
CGA-PG12 - Do not open valve until connected to equipment prepared for use
CGA-PG06 - Close valve after each use and when empty
CGA-PG11 - Never put cylinders into unventilated areas of passenger vehicles
CGA-PG02 - Protect from sunlight when ambient temperature exceeds 52°C (125°F)
Methyl Fluoride (R41)

Safety Data Sheet


Date of issue: 01/01/1979
Revision date: 10/17/2016
Supersedes: 03/03/2015

2.3. Other hazards

Other hazards not contributing to the classification:
- Contact with liquid may cause cold burns/frostbite.

2.4. Unknown acute toxicity (GHS US)

No data available

SECTION 3: Composition/Information on ingredients

3.1. Substance

<table>
<thead>
<tr>
<th>Name</th>
<th>Product identifier</th>
<th>%</th>
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<tbody>
<tr>
<td>Methyl Fluoride (R41)</td>
<td>(CAS No) 593-53-3</td>
<td>100</td>
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</table>

3.2. Mixture

Not applicable

SECTION 4: First aid measures

4.1. Description of first aid measures

- First-aid measures general: Fluorocarbons have a sensitizing effect on the muscular tissue of the heart. Do not administer medicines from the adrenalin-ephedrine group.
- First-aid measures after inhalation: Remove to fresh air and keep at rest in a position comfortable for breathing. If not breathing, give artificial respiration. If breathing is difficult, trained personnel should give oxygen. Call a physician.
- First-aid measures after skin contact: The liquid may cause frostbite. For exposure to liquid, immediately warm frostbite area with warm water not to exceed 105°F (41°C). Water temperature should be tolerable to normal skin. Maintain skin warming for at least 15 minutes or until normal coloring and sensation have returned to the affected area. In case of massive exposure, remove clothing while showering with warm water. Seek medical evaluation and treatment as soon as possible.
- First-aid measures after eye contact: Immediately flush eyes thoroughly with water for at least 15 minutes. Hold the eyelids open and away from the eyeballs to ensure that all surfaces are flushed thoroughly. Contact an ophthalmologist immediately.
- First-aid measures after ingestion: Ingestion is not considered a potential route of exposure.

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

No additional information available

4.3. Indication of any immediate medical attention and special treatment needed

None.

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media: Carbon dioxide, Dry chemical, Water spray or fog.

5.2. Special hazards arising from the substance or mixture

- Fire hazard: EXTREMELY FLAMMABLE GAS. If venting or leaking gas catches fire, do not extinguish flames. Flammable vapors may spread from leak, creating an explosive reignition hazard. Vapors can be ignited by pilot lights, other flames, smoking, sparks, heaters, electrical equipment, static discharge, or other ignition sources at locations distant from product handling point. Explosive atmospheres may linger. Before entering an area, especially a confined area, check the atmosphere with an appropriate device.
- Explosion hazard: EXTREMELY FLAMMABLE GAS. Forms explosive mixtures with air and oxidizing agents.
- Reactivity: No reactivity hazard other than the effects described in sub-sections below.
5.3. Advice for firefighters

Firefighting instructions: DANGER: FLAMMABLE LIQUID AND VAPOR. Evacuate all personnel from danger area. Use self-contained breathing apparatus. Immediately cool surrounding containers with water spray from maximum distance, taking care not to extinguish flames. Avoid spreading burning liquid with water. Remove ignition sources if safe to do so. If flames are accidentally extinguished, explosive reignition may occur. Reduce vapors with water spray or fog. Stop flow of liquid if safe to do so, while continuing cooling water spray. Remove all containers from area of fire if safe to do so. Allow fire to burn out. On-site fire brigades must comply with OSHA 29 CFR 1910.156 and applicable standards under 29 CFR 1919 Subpart L - Fire Protection.

Special protective equipment for fire fighters: Standard protective clothing and equipment (Self Contained Breathing Apparatus) for fire fighters.

Other information: Containers are equipped with a pressure relief device. (Exceptions may exist where authorized by DOT.).

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

General measures: DANGER: Flammable, liquefied gas. FORMS EXPLOSIVE MIXTURES WITH AIR. Immediately evacuate all personnel from danger area. Use self-contained breathing apparatus where needed. Remove all sources of ignition if safe to do so. Reduce vapors with fog or fine water spray, taking care not to spread liquid with water. Shut off flow if safe to do so. Ventilate area or move container to a well-ventilated area. Flammable vapors may spread from leak and could explode if reignited by sparks or flames. Explosive atmospheres may linger. Before entering area, especially confined areas, check atmosphere with an appropriate device.

6.1.1. For non-emergency personnel

No additional information available

6.1.2. For emergency responders

No additional information available

6.2. Environmental precautions

Try to stop release. Prevent waste from contaminating the surrounding environment. Prevent soil and water pollution. Dispose of contents/container in accordance with local/regional/national/international regulations. Contact supplier for any special requirements.

6.3. Methods and material for containment and cleaning up

No additional information available

6.4. Reference to other sections

See also sections 8 and 13.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Precautions for safe handling: Leak-check system with soapy water; never use a flame

Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Use only non-sparking tools. Use only explosion-proof equipment

Wear leather safety gloves and safety shoes when handling cylinders. Protect cylinders from physical damage; do not drag, roll, slide or drop. While moving cylinder, always keep in place removable valve cover. Never attempt to lift a cylinder by its cap; the cap is intended solely to protect the valve. When moving cylinders, even for short distances, use a cart (trolley, hand truck, etc.) designed to transport cylinders. Never insert an object (e.g., wrench, screwdriver, pry bar) into cap openings; doing so may damage the valve and cause a leak. Use an adjustable strap wrench to remove overtight or rusted caps. Slowly open the valve. If the valve is hard to open, discontinue use and contact your supplier. Close the container valve after each use; keep closed even when empty. Never apply flame or localized heat directly to any part of the container. High temperatures may damage the container and could cause the pressure relief device to fail prematurely, venting the container contents. For other precautions in using this product, see section 16.
7.2. Conditions for safe storage, including any incompatibilities

Storage conditions: Store only where temperature will not exceed 125°F (52°C). Post “No Smoking/No Open Flames” signs in storage and use areas. There must be no sources of ignition. Separate packages and protect against potential fire and/or explosion damage following appropriate codes and requirements (e.g., NFPA 30, NFPA 55, NFPA 70, and/or NFPA 221 in the U.S.) or according to requirements determined by the Authority Having Jurisdiction (AHJ). Always secure containers upright to keep them from falling or being knocked over. Install valve protection cap, if provided, firmly in place by hand when the container is not in use. Store full and empty containers separately. Use a first-in, first-out inventory system to prevent storing full containers for long periods. For other precautions in using this product, see section 16.

OTHER PRECAUTIONS FOR HANDLING, STORAGE, AND USE: When handling product under pressure, use piping and equipment adequately designed to withstand the pressures to be encountered. Never work on a pressurized system. Use a back flow preventive device in the piping. Gases can cause rapid suffocation because of oxygen deficiency; store and use with adequate ventilation. If a leak occurs, close the container valve and blow down the system in a safe and environmentally correct manner in compliance with all international, federal/national, state/provincial, and local laws; then repair the leak. Never place a container where it may become part of an electrical circuit.

7.3. Specific end use(s)

None.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

<table>
<thead>
<tr>
<th>Methyl Fluoride (R41) (593-53-3)</th>
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<tr>
<td>ACGIH</td>
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<tr>
<td>USA OSHA</td>
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8.2. Exposure controls

Appropriate engineering controls: Use an explosion-proof local exhaust system. Local exhaust and general ventilation must be adequate to meet exposure standards. MECHANICAL (GENERAL): Inadequate - Use only in a closed system. Use explosion proof equipment and lighting.

Eye protection: Wear safety glasses when handling cylinders; vapor-proof goggles and a face shield during cylinder changeout or whenever contact with product is possible. Select eye protection in accordance with OSHA 29 CFR 1910.133.

Skin and body protection: Wear metatarsal shoes and work gloves for cylinder handling, and protective clothing where needed. Wear appropriate chemical gloves during cylinder changeout or wherever contact with product is possible. Select per OSHA 29 CFR 1910.132, 1910.136, and 1910.138.

Respiratory protection: When workplace conditions warrant respirator use, follow a respiratory protection program that meets OSHA 29 CFR 1910.134, ANSI Z88.2, or MSHA 30 CFR 72.710 (where applicable). Use an air-supplied or air-purifying cartridge if the action level is exceeded. Ensure that the respirator has the appropriate protection factor for the exposure level. If cartridge type respirators are used, the cartridge must be appropriate for the chemical exposure. For emergencies or instances with unknown exposure levels, use a self-contained breathing apparatus (SCBA). None necessary. Self contained breathing apparatus (SCBA) or positive pressure airline with mask are to be used in oxygen-deficient atmospheres.

Thermal hazard protection: Wear cold insulating gloves when transferring or breaking transfer connections. Standard EN 511 - Cold insulating gloves. None necessary.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state: Gas
Molecular mass: 34 g/mol
Color: Colorless.
Odor: Ethereal.
Odor threshold: No data available
pH: Not applicable.
Relative evaporation rate (butyl acetate=1): No data available
Methyl Fluoride (R41)
Safety Data Sheet P-4623

Date of issue: 01/01/1979  Revision date: 10/17/2016  Supersedes: 03/03/2015

Relative evaporation rate (ether=1) : Not applicable.
Melting point : -142 °C
Freezing point : No data available
Boiling point : -78.4 °C
Flash point : Not applicable.
Critical temperature : 44.9 °C
Auto-ignition temperature : Not known.
Decomposition temperature : No data available
Flammability (solid, gas) : 1 - 22.2 °C
Vapor pressure : 3300 kPa
Critical pressure : 5880 kPa
Relative vapor density at 20 °C : No data available
Relative density : 0.61
Relative gas density : 1.2
Solubility : Water: 2295 mg/l
Log Pow : 0.51
Log Kow : Not applicable.
Viscosity, kinematic : Not applicable.
Viscosity, dynamic : Not applicable.
Explosive properties : Not applicable.
Oxidizing properties : None.
Explosion limits : No data available

9.2. Other information
Gas group : Liquefied gas
Additional information : Gas/vapor heavier than air. May accumulate in confined spaces, particularly at or below ground level

SECTION 10: Stability and reactivity

10.1. Reactivity
No reactivity hazard other than the effects described in sub-sections below.

10.2. Chemical stability
Stable under normal conditions.

10.3. Possibility of hazardous reactions
May occur.

10.4. Conditions to avoid
Keep away from heat/sparks/open flames/hot surfaces. – No smoking.

10.5. Incompatible materials
Water. Oxidizing agents.

10.6. Hazardous decomposition products
Thermal decomposition yields toxic products which can be corrosive in the presence of moisture. Hydrogen fluoride. Fluorine. Carbon dioxide. Carbon monoxide.

SECTION 11: Toxicological information

11.1. Information on toxicological effects
Acute toxicity : Not classified
Skin corrosion/irritation : Not classified
pH: Not applicable.
Serious eye damage/irritation: Not classified
pH: Not applicable.
Respiratory or skin sensitization: Not classified
Germ cell mutagenicity: Not classified
Carcinogenicity: Not classified
Reproductive toxicity: Not classified
Specific target organ toxicity (single exposure): Not classified
Specific target organ toxicity (repeated exposure): Not classified
Aspiration hazard: Not classified

**SECTION 12: Ecological information**

12.1. **Toxicity**
Ecology - general: No data available. No known ecological damage caused by this product.

12.2. **Persistence and degradability**
**Methyl Fluoride (R41) (593-53-3)**
Persistence and degradability: No ecological damage caused by this product.

12.3. **Bioaccumulative potential**
**Methyl Fluoride (R41) (593-53-3)**
Log Pow: 0.51
Log Kow: Not applicable.
Bioaccumulative potential: Not expected to bioaccumulate due to the low log Kow (log Kow < 4). Refer to section 9.

12.4. **Mobility in soil**
**Methyl Fluoride (R41) (593-53-3)**
Mobility in soil: No data available.
Ecology - soil: Because of its high volatility, the product is unlikely to cause ground or water pollution.

12.5. **Other adverse effects**
Effect on ozone layer: None
Global warming potential [CO2=1]: 97
Effect on the global warming: Contains fluorinated greenhouse gases covered by the Kyoto protocol

**SECTION 13: Disposal considerations**

13.1. **Waste treatment methods**
Waste disposal recommendations: Do not attempt to dispose of residual or unused quantities. Return container to supplier.

**SECTION 14: Transport information**

In accordance with DOT
Transport document description: UN2454 Methyl fluoride, 2.1
UN-No.(DOT): UN2454
Proper Shipping Name (DOT): Methyl fluoride
Class (DOT): 2.1 - Class 2.1 - Flammable gas 49 CFR 173.115
Hazard labels (DOT): 2.1 - Flammable gas
Methyl Fluoride (R41)
Safety Data Sheet P-4623

Date of issue: 01/01/1979   Revision date: 10/17/2016   Supersedes: 03/03/2015

Additional information

Emergency Response Guide (ERG) Number : 115
Other information : No supplementary information available.
Special transport precautions : Avoid transport on vehicles where the load space is not separated from the driver’s compartment. Ensure vehicle driver is aware of the potential hazards of the load and knows what to do in the event of an accident or an emergency. Before transporting product containers:
- Ensure there is adequate ventilation.
- Ensure that containers are firmly secured.
- Ensure cylinder valve is closed and not leaking.
- Ensure valve outlet cap nut or plug (where provided) is correctly fitted.
- Ensure valve protection device (where provided) is correctly fitted.

Transport by sea
UN-No. (IMDG) : 2454
Proper Shipping Name (IMDG) : Methyl Fluoride (Refrigerant Gas R41)
Class (IMDG) : 2 - Gases
MFAG-No : 115

Air transport
UN-No. (IATA) : 2454
Proper Shipping Name (IATA) : Methyl fluoride
Class (IATA) : 2
Civil Aeronautics Law : Gases under pressure/Gases flammable under pressure

SECTION 15: Regulatory information

15.1. US Federal regulations
Methyl Fluoride (R41) (593-53-3)
Listed on the United States TSCA (Toxic Substances Control Act) inventory
SARA Section 311/312 Hazard Classes
Immediate (acute) health hazard
Sudden release of pressure hazard
Fire hazard

15.2. International regulations

CANADA
Methyl Fluoride (R41) (593-53-3)
Listed on the Canadian NDSL (Non-Domestic Substances List)

EU-Regulations
Methyl Fluoride (R41) (593-53-3)
Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)

15.2.2. National regulations
Methyl Fluoride (R41) (593-53-3)
Listed on IECSC (Inventory of Existing Chemical Substances Produced or Imported in China)
Listed on the Japanese ISHL (Industrial Safety and Health Law)
Listed on NZIoC (New Zealand Inventory of Chemicals)
Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances)
Listed on INSQ (Mexican National Inventory of Chemical Substances)

15.3. US State regulations
Methyl Fluoride (R41) (593-53-3)
U.S. - California - Proposition 65 - Carcinogens List : No
U.S. - California - Proposition 65 - Developmental : No
**Methyl Fluoride (R41)**

Safety Data Sheet P-4623


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### Toxicity

| U.S. - California - Proposition 65 - Reproductive Toxicity - Female | No |
| U.S. - California - Proposition 65 - Reproductive Toxicity - Male | No |
| State or local regulations | U.S. - New Jersey - Right to Know Hazardous Substance List |

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### SECTION 16: Other information

**Other information**

When you mix two or more chemicals, you can create additional, unexpected hazards. Obtain and evaluate the safety information for each component before you produce the mixture. Consult an industrial hygienist or other trained person when you evaluate the end product. Before using any plastics, confirm their compatibility with this product.

Praxair asks users of this product to study this SDS and become aware of the product hazards and safety information. To promote safe use of this product, a user should (1) notify employees, agents, and contractors of the information in this SDS and of any other known product hazards and safety information, (2) furnish this information to each purchaser of the product, and (3) ask each purchaser to notify its employees and customers of the product hazards and safety information.

The opinions expressed herein are those of qualified experts within Praxair, Inc. We believe that the information contained herein is current as of the date of this Safety Data Sheet. Since the use of this information and the conditions of use are not within the control of Praxair, Inc, it is the user's obligation to determine the conditions of safe use of the product.

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**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**

4 - Will rapidly or completely vaporize at normal pressure and temperature, or is readily dispersed in air and will burn readily.

**NFPA reactivity**

0 - Normally stable, even under fire exposure conditions, and are not reactive with water.

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**HMIS III Rating**

| Health | 1 Slight Hazard - Irritation or minor reversible injury possible |
| Flammability | 4 Severe Hazard |
| Physical | 3 Serious Hazard |

SDS US (GHS HazCom 2012) - Praxair

This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product.

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EN (English US)  
SDS ID: P-4623  
8/8

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