2-Chloro-1,1,2-trifluoroethyl difluoromethyl ether
Safety Data Sheet 2107702
according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations
Date of issue: 04/29/2016    Version: 1.0

SECTION 1: Identification

1.1. Identification

Product form: Substance
Substance name: 2-Chloro-1,1,2-trifluoroethyl difluoromethyl ether
CAS No: 13838-16-9
Product code: 2107-7-02
Formula: C₃H₂ClF₅O
Synonyms: 2-Chloro-1-(difluoromethoxy)-1,1,2-trifluoroethane; Enflurane; Ethrane; Methylfluurether
Other means of identification: MFCD00069095

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

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

1.3. Details of the supplier of the safety data sheet

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

1.4. Emergency telephone number

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

SECTION 2: Hazard(s) identification

2.1. Classification of the substance or mixture

Classification (GHS-US)

Skin Irr. 2 H315 - Causes skin irritation
Eye Irr. 2A H319 - Causes serious eye irritation
STOT SE 3 H335 - May cause drowsiness or dizziness
STOT SE 3 H336 - May cause respiratory irritation
STOT RE 2 H373 - May cause damage to organs (cardiovascular system, central nervous system) through prolonged or repeated exposure

Full text of H-phrases: see section 16

2.2. Label elements

GHS-US labeling

Hazard pictograms (GHS-US):

GHS07

GHS08

Signal word (GHS-US): Warning

Hazard statements (GHS-US):

H315 - Causes skin irritation
H319 - Causes serious eye irritation
H335 - May cause respiratory irritation
H336 - May cause drowsiness or dizziness
H373 - May cause damage to organs (cardiovascular system, central nervous system) through prolonged or repeated exposure

Precautionary statements (GHS-US):

P260 - Do not breathe dust/lume/gas/mist/vapors/spray
P264 - Wash skin thoroughly after handling
P271 - Use only outdoors or in a well-ventilated area
P280 - Wear protective gloves/protective clothing/eye protection/face protection
P302+P352 - If on skin: Wash with plenty of soap and water
P304+P318+P338 - If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P312 - Call a POISON CENTER or doctor/physician if you feel unwell
P314 - Get medical advice/attention if you feel unwell
P321 - Specific treatment (see supplemental first aid instructions on this label)
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2.3. Other hazards
No additional information available

2.4. Unknown acute toxicity (GHS US)
Not applicable

SECTION 3: Composition/information on ingredients

3.1. Substance
Substance type: Mono-constituent

<table>
<thead>
<tr>
<th>Name</th>
<th>Product identifier</th>
<th>%</th>
<th>Classification (GHS-US)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-Chloro-1,1,2-trifluoroethyl difluoromethyl ether (Main constituent)</td>
<td>(CAS No) 13838-16-9</td>
<td>&lt;= 100</td>
<td>Skin Irrit. 2, H315</td>
</tr>
</tbody>
</table>

Full text of H-phrases: see section 16

3.2. Mixture
Not applicable

SECTION 4: First aid measures

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

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

First-aid measures after skin contact: Wash with plenty of soap and water. Get medical advice/attention.

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

First-aid measures after ingestion: Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth out with water. Get medical advice/attention.

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

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

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

SECTION 5: Firefighting measures

5.1. Extinguishing media

5.2. Special hazards arising from the substance or mixture

Explosion hazard: Risk of explosion if heated under confinement. Use water spray or fog for cooling exposed containers.

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

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

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures
General measures: Evacuate unnecessary personnel. Ensure adequate air ventilation. Do not breathe gas, fumes, vapor or spray.
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6.1.1. For non-emergency personnel
Emergency procedures : Only qualified personnel equipped with suitable protective equipment may intervene.

6.1.2. For emergency responders
Protective equipment : Do not attempt to take action without suitable protective equipment. For further information refer to section 8: “Exposure controls/personal protection”.
Emergency procedures : Gas/vapor heavier than air. May accumulate in confined spaces, particularly at or below ground level.

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

6.3. Methods and material for containment and cleaning up
For containment : Stop leak if safe to do so. Dike for recovery or absorb with appropriate material.
Methods for cleaning up : Take up large spills with pump or vacuum and finish with dry chemical absorbent. Use explosion-proof equipment. Take up small spills with dry chemical absorbent. Sweep or shovel spills into appropriate container for disposal. Ventilate area.
Other information : For disposal of solid materials or residues refer to section 13 : “Disposal considerations”.

6.4. Reference to other sections
No additional information available

SECTION 7: Handling and storage

7.1. Precautions for safe handling
Precautions for safe handling : Do not handle until all safety precautions have been read and understood. Ensure good ventilation of the work station. Do not breathe fumes, mist, spray, vapors. Wear personal protective equipment. Avoid contact with skin and eyes.
Hygiene measures : Handle in accordance with good industrial hygiene and safety procedures. Do not eat, drink or smoke when using this product. Always wash hands after handling the product.

7.2. Conditions for safe storage, including any incompatibilities
Technical measures : Comply with applicable regulations.
Storage conditions : Keep container closed when not in use.
Incompatible materials : Refer to Section 10 on Incompatible Materials.
Storage area : Store in dry, cool, well-ventilated area.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

| 2-Chloro-1,1,2-trifluoroethyl difluoromethyl ether (13838-16-9) |
|------------------|------------------|------------------|
| ACGIH            | ACGIH TWA (ppm)  | 75 ppm           |

8.2. Exposure controls
Appropriate engineering controls : Ensure good ventilation of the work station. Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure.
Eye protection : Chemical goggles or safety glasses. Face shield. 29 CFR 1910.133: Eye and Face Protection.
Skin and body protection : Wear suitable protective clothing.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical state</td>
<td>Liquid</td>
</tr>
<tr>
<td>Color</td>
<td>No data available</td>
</tr>
<tr>
<td>Odor</td>
<td>No data available</td>
</tr>
<tr>
<td>Odor threshold</td>
<td>No data available</td>
</tr>
<tr>
<td>pH</td>
<td>No data available</td>
</tr>
<tr>
<td>Melting point</td>
<td>No data available</td>
</tr>
<tr>
<td>Freezing point</td>
<td>No data available</td>
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</tbody>
</table>
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<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boiling point</td>
<td>56.6 °C</td>
</tr>
<tr>
<td>Flash point</td>
<td>No data available</td>
</tr>
<tr>
<td>Relative evaporation rate (butyl acetate=1)</td>
<td>No data available</td>
</tr>
<tr>
<td>Flammability (solid, gas)</td>
<td>No data available</td>
</tr>
<tr>
<td>Explosion limits</td>
<td>No data available</td>
</tr>
<tr>
<td>Explosive properties</td>
<td>No data available</td>
</tr>
<tr>
<td>Oxidizing properties</td>
<td>No data available</td>
</tr>
<tr>
<td>Vapor pressure</td>
<td>175 mm Hg (@ 25 °C)</td>
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<tr>
<td>Relative density</td>
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</tr>
<tr>
<td>Relative vapor density at 20 °C</td>
<td>No data available</td>
</tr>
<tr>
<td>Specific gravity / density</td>
<td>1.5167 g/ml (@ 25 °C)</td>
</tr>
<tr>
<td>Molecular mass</td>
<td>184.49 g/mol</td>
</tr>
<tr>
<td>Solubility</td>
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</tr>
<tr>
<td>Log Pow</td>
<td>No data available</td>
</tr>
<tr>
<td>Auto-ignition temperature</td>
<td>No data available</td>
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<tr>
<td>Decomposition temperature</td>
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<tr>
<td>Viscosity</td>
<td>No data available</td>
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<tr>
<td>Viscosity, kinematic</td>
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</tr>
<tr>
<td>Viscosity, dynamic</td>
<td>No data available</td>
</tr>
</tbody>
</table>

#### 9.2. Other information

Refractive index : 1.3025 (@ 20 °C)

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### SECTION 10: Stability and reactivity

#### 10.1. Reactivity

No additional information available

#### 10.2. Chemical stability

The product is stable at normal handling and storage conditions.

#### 10.3. Possibility of hazardous reactions

No additional information available

#### 10.4. Conditions to avoid

Keep away from heat, sparks and flame.

#### 10.5. Incompatible materials

Strong oxidizing agents.

#### 10.6. Hazardous decomposition products

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

### SECTION 11: Toxicological information

#### 11.1. Information on toxicological effects

**Acute toxicity** : Not classified

<table>
<thead>
<tr>
<th><strong>2-Chloro-1,1,2-trifluoroethyl difluoromethyl ether (13838-16-9)</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>LD50 oral rat</td>
</tr>
<tr>
<td>LC50 inhalation rat (ppm)</td>
</tr>
</tbody>
</table>

**Skin corrosion/irritation** : Causes skin irritation.

**Serious eye damage/irritation** : Causes serious eye irritation.

**Respiratory or skin sensitization** : Not classified

**Germ cell mutagenicity** : Not classified

**Carcinogenicity** : Not classified

**Reproductive toxicity** : Not classified

**Specific target organ toxicity (single exposure)** : May cause drowsiness or dizziness. May cause respiratory irritation.
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**Specific target organ toxicity (repeated exposure)**: May cause damage to organs (cardiovascular system, central nervous system) through prolonged or repeated exposure.

**Aspiration hazard**: Not classified

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

### SECTION 12: Ecological information

**12.1. Toxicity**

No additional information available

**12.2. Persistence and degradability**

No additional information available

**12.3. Bioaccumulative potential**

No additional information available

**12.4. Mobility in soil**

No additional information available

**12.5. Other adverse effects**

No additional information available

### SECTION 13: Disposal considerations

**13.1. Waste treatment methods**

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

### SECTION 14: Transport information

**Department of Transportation (DOT)**

- In accordance with DOT
- Transport document description: UN3334 Aviation regulated liquid, n.o.s., 9
- UN-No.(DOT): UN3334
- Proper Shipping Name (DOT): Aviation regulated liquid, n.o.s.
- Transport hazard class(es) (DOT): 9 - Class 9 - Miscellaneous hazardous material 49 CFR 173.140
- Hazard labels (DOT): 9 - Class 9 (Miscellaneous dangerous materials)

- DOT Packaging Non Bulk (49 CFR 173.xxx): 204
- DOT Symbols: A - Material is regulated as a hazardous material only when transported by air,G - Identifies PSN requiring a technical name
- DOT Special Provisions (49 CFR 172.102): A35 - This includes any material which is not covered by any of the other classes but which has an anesthetic, narcotic, noxious or other similar properties such that, in the event of spillage or leakage on an aircraft, extreme annoyance or discomfort could be caused to crew members so as to prevent the correct performance of assigned duties.
- DOT Packaging Exceptions (49 CFR 173.xxx): 155
- DOT Quantity Limitations Passenger aircraft/rail (49 CFR 173.27): No limit
- DOT Quantity Limitations Cargo aircraft only (49 CFR 175.75): No limit
- DOT Vessel Stowage Location: A - The material may be stowed “on deck” or “under deck” on a cargo vessel and on a passenger vessel.
- Other information: No supplementary information available.

**TDG**

No additional information available
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Transport by sea
UN-No. (IMDG) : 3334
Proper Shipping Name (IMDG) : AVIATION REGULATED LIQUID, N.O.S.
Class (IMDG) : 9 - Miscellaneous dangerous compounds

Air transport
UN-No. (IATA) : 3334
Proper Shipping Name (IATA) : Aviation regulated liquid, n.o.s.
Class (IATA) : 9 - Miscellaneous Dangerous Goods
Packing group (IATA) : III - Minor Danger

SECTION 15: Regulatory information

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

| 2-Chloro-1,1,2-trifluoroethyl difluoromethyl ether | CAS No 13838-16-9 | 100% |
---|---|---|

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

15.2. International regulations
CANADA
No additional information available

EU-Regulations
No additional information available

National regulations

| 2-Chloro-1,1,2-trifluoroethyl difluoromethyl ether (13838-16-9) |
---|
Listed on the AICS (Australian Inventory of Chemical Substances)
Listed on the Korean ECL (Existing Chemicals List)

15.3. US State regulations

| 2-Chloro-1,1,2-trifluoroethyl difluoromethyl ether (13838-16-9) |
---|
State or local regulations | U.S. - Massachusetts - Right To Know List

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

SECTION 16: Other information

Full text of H-phrases:

| Eye Irrit. 2A | Serious eye damage/eye irritation Category 2A |
| Skin Irrit. 2 | Skin corrosion/irritation Category 2 |
| STOT RE 2 | Specific target organ toxicity (repeated exposure) Category 2 |
| STOT SE 3 | Specific target organ toxicity (single exposure) Category 3 |
| STOT SE 3 | Specific target organ toxicity (single exposure) Category 3 |
| H315 | Causes skin irritation |
| H319 | Causes serious eye irritation |
| H335 | May cause respiratory irritation |
| H336 | May cause drowsiness or dizziness |
| H373 | May cause damage to organs through prolonged or repeated exposure |
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NFPA health hazard
: 3 - Short exposure could cause serious temporary or residual injury even though prompt medical attention was given.

NFPA fire hazard
: 0 - Materials that will not burn.

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

HMIS III Rating
Health: 2 Moderate Hazard - Temporary or minor injury may occur
* - Chronic (long-term) health effects may result from repeated overexposure

Flammability: 0 Minimal Hazard - Materials that will not burn

Physical: 0 Minimal Hazard - Materials that are normally stable, even under fire conditions, and will NOT react with water, polymerize, decompose, condense, or self-react. Non-Explosives.

SDS US (GHS HazCom 2012)
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is offered solely for your consideration, investigation, and verification. It does not represent any guarantee of the properties of the product nor that the hazard precautions or procedures described are the only ones which exist. SynQuest shall not be held liable or any damage resulting from handling or from contact with the above product.