### SECTION 1: Identification of the substance/mixture and of the company/undertaking

#### 1.1. Product identifier

<table>
<thead>
<tr>
<th>Product form</th>
<th>Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Substance name</td>
<td>Enflurane</td>
</tr>
<tr>
<td>Chemical name</td>
<td>Ethane, 2-chloro-1(difluoromethoxy)-1,1,2-trifluoro-, (+-)</td>
</tr>
<tr>
<td>CAS No</td>
<td>13838-16-9</td>
</tr>
<tr>
<td>Product code</td>
<td>SG-1001-00234</td>
</tr>
<tr>
<td>Formula</td>
<td>C3H2ClF5O</td>
</tr>
</tbody>
</table>

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

**Use of the substance/mixture**

- Anesthetic Liquid
- Test gas/Calibration gas.

#### 1.3. Details of the supplier of the safety data sheet

**Air Liquide**

2700 Post Oak Boulevard  
Houston, TX 77056 - USA  
T 1-800-819-1704  
www.us.airliquide.com

#### 1.4. Emergency telephone number

**Emergency number**

CHEMTREC: 1-800-424-9300

### SECTION 2: Hazards identification

#### 2.1. Classification of the substance or mixture

**Classification (GHS-US)**

- Acute Tox. 4 (Inhalation:gas) H332
- Acute Tox. 4 (Inhalation:vapour) H332
- Skin Irrit. 2 H315
- Eye Irrit. 2A H319
- Repr. 1A H360
- STOT SE 3 H336
- STOT SE 3 H335

Full text of H-phrases: see section 16

#### 2.2. Label elements

**GHS-US labeling**

**Signal word (GHS-US)**

- Danger

**Hazard pictograms (GHS-US)**

- GHS07
- GHS08

**Hazard statements (GHS-US)**

- H315 - Causes skin irritation
- H319 - Causes serious eye irritation
- H332 - Harmful if inhaled
- H335 - May cause respiratory irritation
- H336 - May cause drowsiness or dizziness
- H360 - May damage fertility or the unborn child

**Precautionary statements (GHS-US)**

- P202 - Do not handle until all safety precautions have been read and understood
- P261 - Avoid breathing gas
- P271 - Use only outdoors or in a well-ventilated area
- P280 - Wear eye protection, face protection, protective gloves, protective clothing
- P302+P352 - If on skin: Wash with plenty of water
- P304+P340 - If inhaled: Remove person to fresh air and keep comfortable for breathing
- P305+P351+P338 - If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
- P308+P313 - If exposed or concerned: Get medical advice/attention
- P362 - Take off contaminated clothing and wash before reuse
Enflurane
Safety Data Sheet
according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

P403 - Store in a well-ventilated place
P405 - Store locked up
P501 - Dispose of contents/container in accordance with local/regional/national/international regulations
CGA-PG02 - Protect from sunlight when ambient temperature exceeds 52°C (125°F)
CGA-PG05 - Use a back flow preventive device in the piping
CGA-PG06 - Close valve after each use and when empty
CGA-PG10 - Use only with equipment rated for cylinder pressure
CGA-PG14 - Approach suspected leak area with caution
CGA-PG21 - Open valve slowly

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>Enflurane (Main constituent)</td>
<td>(CAS No) 13838-16-9</td>
<td>100</td>
<td>Acute Tox. 4 (Inhalation:gas), H332</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Acute Tox. 4 (Inhalation:vapour), H332</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Skin Irrit. 2, H315</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Eye Irrit. 2A, H319</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Repr. 1A, H360</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>STOT SE 3, H336</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>STOT SE 3, H335</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 after inhalation: Remove victim to fresh air and keep at rest in a position comfortable for breathing. If you feel unwell, seek medical advice.
First aid measures after skin contact: Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower. Wash contaminated clothing before reuse. If skin irritation occurs: Get medical advice/attention.
First aid measures after eye contact: Rinse immediately with plenty of water for 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation develops, seek medical attention.
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
Symptoms/injuries after inhalation: Harmful if inhaled. May cause drowsiness or dizziness. May cause respiratory irritation.
Symptoms/injuries after skin contact: Causes skin irritation.
Symptoms/injuries after eye contact: Causes eye irritation.
Symptoms/injuries after ingestion: Ingestion is not considered a potential route of exposure.
Symptoms/injuries upon intravenous administration: Not known.
Chronic symptoms: May damage fertility. May damage the unborn child.

4.3 Indication of any immediate medical attention and special treatment needed
If you feel unwell, seek medical advice. If breathing is difficult, give oxygen.

SECTION 5: Firefighting measures

5.1 Extinguishing media
Suitable extinguishing media: Use extinguishing media appropriate for surrounding fire.
Unsuitable extinguishing media: Do not use water jet to extinguish.

5.2 Special hazards arising from the substance or mixture
Fire hazard: The product is not flammable.
Explosion hazard: Product is not explosive. Heat may build pressure, rupturing closed containers, spreading fire and increasing risk of burns and injuries.

03/19/2015 EN (English US)
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Reactivity: None known.

5.3. Advice for firefighters

Firefighting instructions: In case of fire: Evacuate area. Fight fire remotely due to the risk of explosion. Use water spray or fog for cooling exposed containers. Exercise caution when fighting any chemical fire.

Protection during firefighting: Standard protective clothing and equipment (e.g., Self Contained Breathing Apparatus) for firefighters. Do not enter fire area without proper protective equipment, including respiratory protection.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

General measures: Ensure adequate ventilation.

6.1.1. For non-emergency personnel

Protective equipment: Wear protective equipment consistent with the site emergency plan.


6.1.2. For emergency responders

Protective equipment: Standard protective clothing and equipment (e.g., Self Contained Breathing Apparatus) for firefighters. Equip cleanup crew with proper protection.

Emergency procedures: Evacuate and limit access. Ventilate area.

6.2. Environmental precautions

Try to stop release if safe to do so.

6.3. Methods and material for containment and cleaning up

For containment: Try to stop release if safe to do so.

Methods for cleaning up: Dispose of this material and its container in accordance with local regulations.

6.4. Reference to other sections

See also Sections 8 and 13.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Additional hazards when processed: Pressurized container: Do not pierce or burn, even after use. Use equipment rated for cylinder pressure. Close valve after each use and when empty.

Precautions for safe handling: Do not handle until all safety precautions have been read and understood. Use only outdoors or in a well-ventilated area.

Hygiene measures: Do not eat, drink or smoke when using this product.

7.2. Conditions for safe storage, including any incompatibilities

Technical measures: Comply with applicable regulations.

Storage conditions: Do not expose to temperatures exceeding 52°C (125°F). Keep container closed when not in use. Protect cylinder from physical damage. Store in well ventilated area. Store locked up.

Incompatible products: None known.

Incompatible materials: None known.

7.3. Specific end use(s)

See Section 1.2.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

<table>
<thead>
<tr>
<th>Enflurane (13838-16-9)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>ACGIH: Not applicable</td>
<td>OSHA: Not applicable</td>
</tr>
</tbody>
</table>

8.2. Exposure controls

Appropriate engineering controls: Ensure exposure is below occupational exposure limits. Provide adequate general and local exhaust ventilation. Systems under pressure should be regularly checked for leakages. Oxygen detectors should be used when asphyxiating gases may be released. Consider work permit system e.g. for maintenance activities.
### SECTION 9: Physical and chemical properties

**9.1. Information on basic physical and chemical properties**

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical state</td>
<td>Gas</td>
</tr>
<tr>
<td>Appearance</td>
<td>Clear, colorless gas.</td>
</tr>
<tr>
<td>Molecular mass</td>
<td>Not applicable for gas-mixtures.</td>
</tr>
<tr>
<td>Color</td>
<td>Colorless</td>
</tr>
<tr>
<td>Odor</td>
<td>Odorless</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>Relative evaporation rate (butyl acetate=1)</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>
</tr>
<tr>
<td>Boiling point</td>
<td>No Data Available</td>
</tr>
<tr>
<td>Flash point</td>
<td>No Data Available</td>
</tr>
<tr>
<td>Critical temperature</td>
<td>474.8 K Ref:NIST</td>
</tr>
<tr>
<td>Auto-ignition temperature</td>
<td>No data available</td>
</tr>
<tr>
<td>Decomposition temperature</td>
<td>No data available</td>
</tr>
<tr>
<td>Flammability (solid, gas)</td>
<td>See Section 2.1 and 2.2</td>
</tr>
<tr>
<td>Vapor pressure</td>
<td>30.26 (174.5 - 175) kPa mm Hg @ 20 deg C</td>
</tr>
<tr>
<td>Relative vapor density at 20 °C</td>
<td>No data available</td>
</tr>
<tr>
<td>Relative density</td>
<td>1.9</td>
</tr>
<tr>
<td>Relative gas density</td>
<td>Similar to air</td>
</tr>
<tr>
<td>Solubility</td>
<td>Organic solvent:Miscible with organic solvents, with fates, and with oils.</td>
</tr>
<tr>
<td>Log Pow</td>
<td>No data available</td>
</tr>
<tr>
<td>Log Kow</td>
<td>No data available</td>
</tr>
<tr>
<td>Viscosity, kinematic</td>
<td>No data available</td>
</tr>
<tr>
<td>Viscosity, dynamic</td>
<td>No data available</td>
</tr>
<tr>
<td>Explosive properties</td>
<td>Not applicable - not flammable.</td>
</tr>
<tr>
<td>Oxidizing properties</td>
<td>None.</td>
</tr>
<tr>
<td>Explosive limits</td>
<td>Not applicable - not flammable.</td>
</tr>
</tbody>
</table>

**9.2. Other information**

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Miscibility</td>
<td>Miscible with common organic solvents, with dehydrated alcohol, with trichloroethylene, with fats and with oils</td>
</tr>
</tbody>
</table>

### SECTION 10: Stability and reactivity

**10.1. Reactivity**

None known.

**10.2. Chemical stability**

Stable under normal conditions.

**10.3. Possibility of hazardous reactions**

None known.

**10.4. Conditions to avoid**

None under recommended storage and handling conditions (see section 7).
10.5. Incompatible materials

None known.

10.6. Hazardous decomposition products

Under normal conditions of storage and use hazardous decomposition products should not be produced.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute toxicity

Inhalation: gas: Harmful if inhaled. Inhalation: vapour: Harmful if inhaled.

<table>
<thead>
<tr>
<th>Enflurane (13838-16-9)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LD50 oral rat</td>
</tr>
<tr>
<td>LC50 inhalation rat (ppm)</td>
</tr>
<tr>
<td>ATE US (gases)</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

(Based on available data, the classification criteria are not met. This product is not considered to be a carcinogen by IARC, ACGIH, NTP, or OSHA.)

Reproductive toxicity: May damage fertility or the unborn child.

Specific target organ toxicity (single exposure): May cause drowsiness or dizziness. May cause respiratory irritation.

Specific target organ toxicity (repeated exposure): Not classified

Aspiration hazard: Not classified

Symptoms/injuries after inhalation: Harmful if inhaled. May cause drowsiness or dizziness. May cause respiratory irritation.

Symptoms/injuries after skin contact: Causes skin irritation.

Symptoms/injuries after eye contact: Causes eye irritation.

Symptoms/injuries after ingestion: Ingestion is not considered a potential route of exposure.

Symptoms/injuries upon intravenous administration: Not known.

Chronic symptoms: May damage fertility. May damage the unborn child.

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

Effect on ozone layer: No known effects from this product.

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Waste treatment methods: Contact supplier if guidance is required. Do not discharge into any place where its accumulation could be dangerous. Ensure that the emission levels from local regulations or operating permits are not exceeded.

Waste disposal recommendations: Refer to the CGA Pamphlet P-63 "Disposal of Gases" available at www.cganet.com for more guidance on suitable disposal methods.
SECTION 14: Transport information

In accordance with DOT

Transport document description : UN3334 Aviation regulated liquid, n.o.s. (Enflurane), 9, III
UN-No.(DOT) : UN3334

Proper Shipping Name (DOT) : Aviation regulated liquid, n.o.s.

Department of Transportation (DOT) Hazard Classes : 9 - Class 9 - Miscellaneous hazardous material 49 CFR 173.140

DOT Symbols : A - Material is regulated as a hazardous material only when be transported by air,G - Identifies PSN requiring a technical name

Packing group (DOT) : III - Minor Danger

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 Packaging Non Bulk (49 CFR 173.xxx) : 204
DOT Quantity Limitations Passenger aircraft/rail (49 CFR 173.27) : No limit
DOT Quantity Limitations Cargo aircraft only (49 CFR 173.75) : 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.

Additional information

Other information : No supplementary information available.

ADR

Transport document description : UN 3334 aviation regulated liquid, n.o.s., 9, III
Packing group (ADR) : III
Class (ADR) : 9 - Miscellaneous dangerous substances and articles

Classification code (ADR) : M11

Transport by sea

UN-No. (IMDG) : 3334

Air transport

UN-No.(IATA) : 3334

SECTION 15: Regulatory information

15.1. US Federal regulations

No additional information available

15.2. International regulations

CANADA

No additional information available

EU-Regulations

No additional information available

Classification according to Regulation (EC) No. 1272/2008 [CLP]

Skin Irrit. 2 : H315
Eye Irrit. 2 : H319
STOT SE 3 : H335

Full text of H-phrases: see section 16

Classification according to Directive 67/548/EEC [DSD] or 1999/45/EC [DPD]

Not classified

15.2.2. National regulations

15.3. US State regulations

No additional information available
**SECTION 16: Other information**

**Indication of changes**: Revised safety data sheet in accordance with OSHA final rule on GHS implementation promulgated March 26, 2012.

**Other information**: This Safety Data Sheet is offered pursuant to OSHA’s Hazard Communication Standard, 29 CFR, 1910.1200. Other government regulations must be reviewed for applicability to this product.

<table>
<thead>
<tr>
<th>Full text of H-phares:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute Tox. 4 (Inhalation:gas)</td>
</tr>
<tr>
<td>Acute Tox. 4 (Inhalation:vapour)</td>
</tr>
<tr>
<td>Eye Irrit. 2A</td>
</tr>
<tr>
<td>Repr. 1A</td>
</tr>
<tr>
<td>Skin Irrit. 2</td>
</tr>
<tr>
<td>STOT SE 3</td>
</tr>
<tr>
<td>STOT SE 3</td>
</tr>
<tr>
<td>H315</td>
</tr>
<tr>
<td>H319</td>
</tr>
<tr>
<td>H332</td>
</tr>
<tr>
<td>H335</td>
</tr>
<tr>
<td>H336</td>
</tr>
<tr>
<td>H360</td>
</tr>
</tbody>
</table>

**SDS US (GHS HazCom 2012)**

This Safety Data Sheet is offered pursuant to OSHA’s Hazard Communication Standard, 29 CFR, 1910.1200. Other government regulations must be reviewed for applicability to this product. To the best of Air Liquide America Corporation’s knowledge, the information contained herein is reliable and accurate as of this date; however, accuracy, suitability or completeness are not guaranteed and no warranties of any type, either express or implied, are provided. The information contained herein relates only to this specific product. If this product is combined with other materials, all component properties must be considered. Data may be changed from time to time. Be sure to consult the latest edition.