Enflurane (1.0000% - 9.9999%), Oxygen (19.50% - 23.50%) in Nitrogen

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

Date of issue: 04/22/2015 Version: 2.0

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

1.1. Product identifier
Product form: Mixture
Product name: Enflurane (1.0000% - 9.9999%), Oxygen (19.50% - 23.50%) in Nitrogen
Product code: HC-2003-03450

1.2. Relevant identified uses of the substance or mixture and uses advised against
Use of the substance/mixture: 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)
Compressed gas
Repr. 1A
STOT SE 3
H280
H335
H360
H335
Full text of H-phrases: see section 16

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

Signal word (GHS-US): Danger
Hazard statements (GHS-US):
H280 - Contains gas under pressure; may explode if heated
H335 - May cause respiratory irritation
H360 - May damage fertility or the unborn child (Inhalation)
CGA-HG24 - Supports combustion.

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
P304+P340 - If inhaled: Remove person to fresh air and keep comfortable for breathing
P308+P313 - If exposed or concerned: Get medical advice/attention
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 55°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

05/19/2015
EN (English US)
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2.4. Unknown acute toxicity (GHS US)
Not applicable

SECTION 3: Composition/information on ingredients

3.1. Substance
Not applicable

3.2. Mixture

<table>
<thead>
<tr>
<th>Name</th>
<th>Product identifier</th>
<th>%</th>
<th>Classification (GHS-US)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrogen</td>
<td>(CAS No) 7727-37-9</td>
<td>20.51 - 79.5</td>
<td>Compressed gas, H280</td>
</tr>
<tr>
<td>Oxygen</td>
<td>(CAS No) 7782-44-7</td>
<td>19.5 - 23.5</td>
<td>Ox. Gas 1, H270</td>
</tr>
</tbody>
</table>
| Enflurane  | (CAS No) 13838-16-9 | 1 - 9.9999  | 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

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: Adverse effects not expected from this product.

First-aid measures after eye contact: Adverse effects not expected from this product.

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: May cause respiratory irritation.

Symptoms/injuries after skin contact: Adverse effects not expected from this product.

Symptoms/injuries after eye contact: Adverse effects not expected from this product.

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.

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 fire fighters. 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 fire fighters. 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: Flammable materials.

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 (1.0000% - 9.9999%), Oxygen (19.50% - 23.50%) in Nitrogen</th>
<th>ACGIH</th>
<th>Not applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>OSHA</td>
<td>Not applicable</td>
<td></td>
</tr>
</tbody>
</table>

| Enflurane (13838-16-9) | ACGIH | Not applicable |
| OSHA | Not applicable |

| Oxygen (7782-44-7) | ACGIH | Not applicable |
| OSHA | Not applicable |

| Nitrogen (7727-37-9) | ACGIH | Not applicable |
| OSHA | Not applicable |

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. Consider work permit system e.g. for maintenance activities.
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| Skin and body protection | Wear suitable protective clothing, e.g. - lab coats, coveralls or flame resistant clothing. |
| Respiratory protection | None necessary during normal and routine operations. See Sections 5 & 6. |
| Thermal hazard protection | None necessary during normal and routine operations. |
| Environmental exposure controls | Refer to local regulations for restriction of emissions to the atmosphere. See section 13 for specific methods for waste gas treatment. |
| Other information | Wear safety shoes while handling containers. 29 CFR 1910.136: Foot Protection. |

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

| Physical state | Gas |
| Appearance | Clear, colorless gas. |
| Color | Colorless |
| Odor | Slightly sweet |
| Odor threshold | No data available |
| pH | No data available |
| Melting point | No data available |
| Freezing point | No data available |
| Boiling point | No data available |
| Flash point | Not applicable - not flammable |
| Relative evaporation rate (butyl acetate=1) | No data available |
| Flammability (solid, gas) | See Section 2.1 and 2.2 |
| Explosion limits | Not applicable - not flammable |
| Explosive properties | Not applicable - not flammable. |
| Oxidizing properties | Supports combustion. |
| Vapor pressure | No data available |
| Relative density | No data available |
| Relative vapor density at 20 °C | No data available |
| Molecular mass | Not applicable for gas-mixtures. |
| Relative gas density | Heavier than or similar to air |
| Solubility | No data available |
| Log Pow | No data available |
| Log Kow | No data available |
| Auto-ignition temperature | No data available |
| Decomposition temperature | No data available |
| Viscosity | No data available |
| Viscosity, kinematic | No data available |
| Viscosity, dynamic | No data available |

9.2. Other information

Additional information | Gas/vapour heavier than air. May accumulate in confined spaces, particularly at or below ground level. |

SECTION 10: Stability and reactivity

10.1. Reactivity

None known.

10.2. Chemical stability

Stable under normal conditions.

10.3. Possibility of hazardous reactions

Can form explosive mixtures with flammable materials.

10.4. Conditions to avoid

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

### 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

<table>
<thead>
<tr>
<th>Acute toxicity</th>
<th>Not classified</th>
</tr>
</thead>
</table>

**Enflurane (13838-16-9)**
- LD50 oral rat: 5450 µl/kg
- LC50 inhalation rat (ppm): 12124 ppm/4h
- ATE US (gases): 12124.000 ppmV/4h

**Oxygen (7782-44-7)**
- LC50 inhalation rat (ppm): 800000 ppm/4h

**Nitrogen (7727-37-9)**
- LC50 inhalation rat (ppm): 820000 ppm/4h

#### Skin corrosion/irritation
- Not classified

#### Serious eye damage/irritation
- Not classified

#### Respiratory or skin sensitization
- Not classified

#### Germ cell mutagenicity
- Not classified

#### Carcinogenicity
- Not classified

#### Reproductive toxicity
- May damage fertility or the unborn child (Inhalation).

#### Specific target organ toxicity (single exposure)
- May cause respiratory irritation.

#### Specific target organ toxicity (repeated exposure)
- Not classified

#### Aspiration hazard
- Not classified

#### Symptoms/injuries after inhalation
- May cause respiratory irritation.

#### Symptoms/injuries after skin contact
- Adverse effects not expected from this product.

#### Symptoms/injuries after eye contact
- Adverse effects not expected from this product.

#### 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

**Oxygen (7782-44-7)**
- Persistence and degradability: No ecological damage caused by this product.

**Nitrogen (7727-37-9)**
- Persistence and degradability: No ecological damage caused by this product.

#### 12.3. Bioaccumulative potential

**Oxygen (7782-44-7)**
- Log Pow: Not applicable for inorganic gases.
- Bioaccumulative potential: No ecological damage caused by this product.
Enflurane (1.0000% - 9.9999%), Oxygen (19.50% - 23.50%) in Nitrogen
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<table>
<thead>
<tr>
<th>Nitrogen (7727-37-9)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Log Pow</td>
</tr>
<tr>
<td>Bioaccumulative potential</td>
</tr>
</tbody>
</table>

12.4. Mobility in soil

<table>
<thead>
<tr>
<th>Oxygen (7782-44-7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ecology - soil</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Nitrogen (7727-37-9)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ecology - soil</td>
</tr>
</tbody>
</table>

12.5. Other adverse effects

Effect on ozone layer          : No known effects from this product.
Effect on the global warming : No known ecological damage caused by 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

Department of Transportation (DOT)

In accordance with DOT

Transport document description : UN1956 Compressed gas, n.o.s. (Oxygen, Nitrogen)

UN-No.(DOT)               : UN1956
Proper Shipping Name (DOT) : Compressed gas, n.o.s.
Hazard labels (DOT)       : 2.2 - Non-flammable gas

DOT Packaging Non Bulk (49 CFR 173.xxx) : 302;305
DOT Packaging Bulk (49 CFR 173.xxx) : 314;315
DOT Symbols               : G - Identifies PSN requiring a technical name
DOT Packaging Exceptions (49 CFR 173.xxx) : 306;307
DOT Quantity Limitations Passenger aircraft/rail (49 CFR 173.27) : 75 kg
DOT Quantity Limitations Cargo aircraft only (49 CFR 175.75) : 150 kg
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 1956, 2.2, (E)
Class (ADR)               : 2 - Gases
Hazard identification number (Kemler No.) : 20
Classification code (ADR) : 1A
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Hazard labels (ADR) : 2.2 - Non-flammable compressed gas

Orange plates : 20

Tunnel restriction code (ADR) : E
Limited quantities (ADR) : 120ml
Excepted quantities (ADR) : E1

Transport by sea
UN-No. (IMDG) : 1956
Proper Shipping Name (IMDG) : COMPRESSED GAS, N.O.S.
Class (IMDG) : 2 - Gases

Air transport
UN-No.(IATA) : 1956
Proper Shipping Name (IATA) : COMPRESSED GAS, N.O.S.
Class (IATA) : 2

SECTION 15: Regulatory information

15.1. US Federal regulations
Oxygen (7782-44-7)
Listed on the United States TSCA (Toxic Substances Control Act) inventory
Nitrogen (7727-37-9)
Listed on the United States TSCA (Toxic Substances Control Act) inventory

15.2. International regulations
CANADA
No additional information available
Oxygen (7782-44-7)
Listed on the Canadian DSL (Domestic Sustances List)
WHMIS Classification
Class A - Compressed Gas
Class C - Oxidizing Material
Nitrogen (7727-37-9)
Listed on the Canadian DSL (Domestic Sustances List)
WHMIS Classification
Class A - Compressed Gas

EU-Regulations
No additional information available
Oxygen (7782-44-7)
Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)
Nitrogen (7727-37-9)
Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)

Classification according to Regulation (EC) No. 1272/2008 [CLP]
Not classified

Classification according to Directive 67/548/EEC [DSD] or 1999/45/EC [DPD]
No additional information available

National regulations
Enflurane (1.0000% - 9.9999%), Oxygen (19.50% - 23.50%) in Nitrogen
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15.3. US State regulations

Oxygen (7782-44-7)
U.S. - Massachusetts - Right To Know List
U.S. - New Jersey - Right to Know Hazardous Substance List
U.S. - Pennsylvania - RTK (Right to Know) List

Nitrogen (7727-37-9)
U.S. - Massachusetts - Right To Know List
U.S. - New Jersey - Right to Know Hazardous Substance List
U.S. - Pennsylvania - RTK (Right to Know) List

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.

Full text of H-phrases:

<table>
<thead>
<tr>
<th>Acute Tox. 4 (Inhalation:gas)</th>
<th>Acute toxicity (inhalation:gas) Category 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute Tox. 4 (Inhalation:vapour)</td>
<td>Acute toxicity (inhalation:vapour) Category 4</td>
</tr>
<tr>
<td>Compressed gas</td>
<td>Gases under pressure Compressed gas</td>
</tr>
<tr>
<td>Eye Irrit. 2A</td>
<td>Serious eye damage/eye irritation Category 2A</td>
</tr>
<tr>
<td>Ox. Gas 1</td>
<td>Oxidizing gases Category 1</td>
</tr>
<tr>
<td>Repr. 1A</td>
<td>Reproductive toxicity Category 1A</td>
</tr>
<tr>
<td>Skin Irrit. 2</td>
<td>Skin corrosion/irritation Category 2</td>
</tr>
<tr>
<td>STOT SE 3</td>
<td>Specific target organ toxicity (single exposure) Category 3</td>
</tr>
<tr>
<td>STOT SE 3</td>
<td>Specific target organ toxicity (single exposure) Category 3</td>
</tr>
<tr>
<td>H270</td>
<td>May cause or intensify fire; oxidizer</td>
</tr>
<tr>
<td>H280</td>
<td>Contains gas under pressure; may explode if heated</td>
</tr>
<tr>
<td>H315</td>
<td>Causes skin irritation</td>
</tr>
<tr>
<td>H319</td>
<td>Causes serious eye irritation</td>
</tr>
<tr>
<td>H332</td>
<td>Harmful if inhaled</td>
</tr>
<tr>
<td>H335</td>
<td>May cause respiratory irritation</td>
</tr>
<tr>
<td>H336</td>
<td>May cause drowsiness or dizziness</td>
</tr>
<tr>
<td>H360</td>
<td>May damage fertility or the unborn child</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.