

# Carbon Monoxide (0.00001% - 0.0999%) in Hydrogen

## Safety Data Sheet

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

Date of issue: 03/09/2015

Supersedes: 08/20/2014

Version: 1.1

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

### 1.1. Product identifier

|              |  |
|--------------|--|
| Product form | : Mixture  |
| Product name | : Carbon Monoxide (0.00001% - 0.0999%) in Hydrogen |
| Product code | : SG-2002-00236                                    |

### 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](http://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)

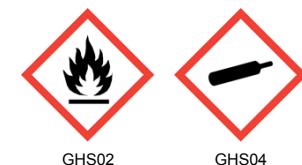
|                |      |
|----------------|------|
| Flam. Gas 1    | H220 |
| Compressed gas | H280 |

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)

: 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

Precautionary statements (GHS-US)

: P202 - Do not handle until all safety precautions have been read and understood

P210 - Keep away from heat, hot surfaces, open flames, sparks. - No smoking

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

P377 - Leaking gas fire: Do not extinguish, unless leak can be stopped safely

P381 - Eliminate all ignition sources if safe to do so

P403 - Store in a well-ventilated place

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

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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

| Name            | Product identifier | %                 | Classification (GHS-US)   |
|-----------------|--------------------|-------------------|---|
| Hydrogen        | (CAS No) 1333-74-0 | 99.9001 - 99.9999 | Flam. Gas 1, H220<br>Compressed gas, H280   |
| Carbon monoxide | (CAS No) 630-08-0  | 0.00001 - 0.0999  | Flam. Gas 1, H220<br>Compressed gas, H280<br>Acute Tox. 3 (Inhalation:gas), H331<br>Repr. 1A, H360<br>STOT RE 1, H372 |

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 displace oxygen and cause rapid suffocation.

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 : Adverse effects not expected from this product.

### 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 : This product is flammable.

Explosion hazard : Heat may build pressure, rupturing closed containers, spreading fire and increasing risk of burns and injuries. May form flammable/explosive vapor-air mixture.

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.

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Emergency procedures : Escape the danger area by the closest safe route. Close doors and windows of adjacent premises. Keep containers closed. Mark the danger area. Seal off low-lying areas. Keep upwind.

### 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. Remove ignition sources. Monitor concentration of released product. Consider the risk of potentially explosive atmospheres. Wear self-contained breathing apparatus when entering atmospheres of unknown contaminant concentration until proven to be safe.

### 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. Handle empty containers with care because residual vapors are flammable. In use, may form flammable vapor-air mixture.

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. Keep away from heat/sparks/open flames/hot surfaces. – No smoking. Use only non-sparking tools.

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. Proper grounding procedures to avoid static electricity should be followed.

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.

Incompatible products : None known.

Incompatible materials : Oxidizing materials. Air.

### 7.3. Specific end use(s)

See Section 1.2.

## SECTION 8: Exposure controls/personal protection

### 8.1. Control parameters

| Carbon Monoxide (0.00001% - 0.0999%) in Hydrogen |                |
|--|----------------|
| ACGIH  | Not applicable |
| OSHA   | Not applicable |

| Carbon monoxide (630-08-0) |                        |          |
|----------------------------|------------------------|----------|
| ACGIH                      | ACGIH TWA (ppm)        | 25 ppm   |
| OSHA                       | OSHA PEL (TWA) (mg/m³) | 55 mg/m³ |
| OSHA                       | OSHA PEL (TWA) (ppm)   | 50 ppm   |

| Hydrogen (1333-74-0) |                |
|----------------------|----------------|
| ACGIH                | Not applicable |
| OSHA                 | Not applicable |

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### 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.

Hand protection

: Wear working gloves when handling gas containers. 29 CFR 1910.138: Hand Protection.

Eye protection

: Wear safety glasses with side shields. 29 CFR 1910.133: Eye and Face Protection.

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.

Molecular mass

: Not applicable for gas-mixtures.

Color

: Colorless

Odor

: Odorless

Odor threshold

: No Data Available

pH

: No data available

Relative evaporation rate (butyl acetate=1)

: No data available

Relative evaporation rate (ether=1)

: Not applicable for gas-mixtures.

Melting point

: No Data Available

Freezing point

: No data available

Boiling point

: No Data Available

Flash point

: No Data Available

Auto-ignition temperature

: No data available

Decomposition temperature

: No data available

Flammability (solid, gas)

: See Section 2.1 and 2.2

Vapor pressure

: No data available

Relative vapor density at 20 °C

: No data available

Relative density

: No data available

Relative gas density

: Lighter or similar to air

Solubility

: Water: Solubility in water of component(s) of the mixture :

• : Insoluble • : 1.6 mg/l

Log Pow

: No data available

Log Kow

: No data available

Viscosity, kinematic

: No data available

Viscosity, dynamic

: No data available

Explosive properties

: Without adequate ventilation formation of explosive mixtures may be possible.

Oxidizing properties

: None.

Explosive limits

: No data available

### 9.2. Other information

Additional information

: None.

## SECTION 10: Stability and reactivity

### 10.1. Reactivity

None known.

### 10.2. Chemical stability

Stable under normal conditions.

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### 10.3. Possibility of hazardous reactions

Can form explosive mixture with air.

### 10.4. Conditions to avoid

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

### 10.5. Incompatible materials

Oxidizing materials. Air.

### 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 : Not classified

#### Carbon monoxide (630-08-0)

|                           |                  |
|---------------------------|------------------|
| LC50 inhalation rat (ppm) | 1880 ppm/4h      |
| ATE US (gases)            | 1880.000 ppmV/4h |

#### Hydrogen (1333-74-0)

|                           |               |
|---------------------------|---------------|
| 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 : Not classified

Specific target organ toxicity (single exposure) : Not classified

Specific target organ toxicity (repeated exposure) : Not classified

Aspiration hazard : Not classified

Symptoms/injuries after inhalation : May displace oxygen and cause rapid suffocation.

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 : Adverse effects not expected from this product.

## SECTION 12: Ecological information

### 12.1. Toxicity

No additional information available

### 12.2. Persistence and degradability

#### Carbon monoxide (630-08-0)

|                               |   |
|-------------------------------|---|
| Persistence and degradability | Will not undergo hydrolysis. Not readily biodegradable. Not applicable for inorganic gases. |
|-------------------------------|---|

#### Hydrogen (1333-74-0)

|                               |  |
|-------------------------------|--|
| Persistence and degradability | No ecological damage caused by this product. |
|-------------------------------|--|

### 12.3. Bioaccumulative potential

#### Carbon monoxide (630-08-0)

|         |      |
|---------|------|
| Log Pow | 1.78 |
|---------|------|

|                           |   |
|---------------------------|---|
| Bioaccumulative potential | Not expected to bioaccumulate due to the low log Kow (log Kow < 4). Refer to section 9. |
|---------------------------|---|

#### Hydrogen (1333-74-0)

|            |                               |
|------------|-------------------------------|
| BCF fish 1 | (no bioaccumulation expected) |
|------------|-------------------------------|

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### Hydrogen (1333-74-0)

|                           |  |
|---------------------------|--|
| Log Pow                   | Not applicable for inorganic gases.          |
| Bioaccumulative potential | No ecological damage caused by this product. |

### 12.4. Mobility in soil

#### Carbon monoxide (630-08-0)

|                |   |
|----------------|---|
| Ecology - soil | Because of its high volatility, the product is unlikely to cause ground or water pollution. |
|----------------|---|

#### Hydrogen (1333-74-0)

|                |  |
|----------------|--|
| Ecology - soil | No ecological damage caused by this product. |
|----------------|--|

### 12.5. Other adverse effects

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

Effect on the global warming : Contains greenhouse gas(es) not covered by 842/2006/EC.

## 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 gas should be flared through a suitable burner with flash back arrestor. Do not discharge into areas where there is a risk of forming an explosive mixture with air. |
| Waste disposal recommendations | : Refer to the CGA Pamphlet P-63 "Disposal of Gases" available at <a href="http://www.cganet.com">www.cganet.com</a> for more guidance on suitable disposal methods.  |

## SECTION 14: Transport information

In accordance with DOT

Transport document description : UN1954 Compressed gas, flammable, n.o.s. (Carbon Monoxide, Hydrogen), 2.1

UN-No.(DOT) : UN1954

Proper Shipping Name (DOT) : Compressed gas, flammable, n.o.s.

Department of Transportation (DOT) Hazard Classes : 2.1 - Class 2.1 - Flammable gas 49 CFR 173.115

Hazard labels (DOT) : 2.1 - Flammable gas



DOT Symbols : G - Identifies PSN requiring a technical name

DOT Packaging Exceptions (49 CFR 173.xxx) : 306

DOT Packaging Non Bulk (49 CFR 173.xxx) : 302;305

DOT Packaging Bulk (49 CFR 173.xxx) : 314;315

DOT Quantity Limitations Passenger aircraft/rail (49 CFR 173.27) : Forbidden

DOT Quantity Limitations Cargo aircraft only (49 CFR 175.75) : 150 kg

DOT Vessel Stowage Location : D - The material must be stowed "on deck only" on a cargo vessel and on a passenger vessel carrying a number of passengers limited to not more than the larger of 25 passengers or one passenger per each 3 m of overall vessel length, but the material is prohibited on passenger vessels in which the limiting number of passengers is exceeded.

DOT Vessel Stowage Other : 40 - Stow "clear of living quarters"

### Additional information

Other information : No supplementary information available.

### ADR

Transport document description : UN 1954, 2.1, (B/D)

Class (ADR) : 2 - Gases

Hazard identification number (Kemler No.) : 23

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Classification code (ADR) : 1F

Hazard labels (ADR) : 2.1 - Flammable gases



Orange plates



Tunnel restriction code (ADR) : B/D

LQ : 0

Excepted quantities (ADR) : E0

### Transport by sea

UN-No. (IMDG) : 1954

Proper Shipping Name (IMDG) : COMPRESSED GAS, FLAMMABLE, N.O.S.

Class (IMDG) : 2 - Gases

### Air transport

UN-No.(IATA) : 1954

Proper Shipping Name (IATA) : COMPRESSED GAS, FLAMMABLE, N.O.S.

Class (IATA) : 2

## SECTION 15: Regulatory information

### 15.1. US Federal regulations

#### Carbon monoxide (630-08-0)

Listed on the United States TSCA (Toxic Substances Control Act) inventory

#### Hydrogen (1333-74-0)

Listed on the United States TSCA (Toxic Substances Control Act) inventory

### 15.2. International regulations

#### CANADA

#### Carbon monoxide (630-08-0)

Listed on the Canadian DSL (Domestic Substances List)

|                      |  |
|----------------------|--|
| WHMIS Classification | Class A - Compressed Gas<br>Class B Division 1 - Flammable Gas<br>Class D Division 1 Subdivision A - Very toxic material causing immediate and serious toxic effects<br>Class D Division 2 Subdivision A - Very toxic material causing other toxic effects |
|----------------------|--|

#### Hydrogen (1333-74-0)

Listed on the Canadian DSL (Domestic Substances List)

|                      |  |
|----------------------|--|
| WHMIS Classification | Class A - Compressed Gas<br>Class B Division 1 - Flammable Gas |
|----------------------|--|

#### EU-Regulations

#### Carbon monoxide (630-08-0)

Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)

#### Hydrogen (1333-74-0)

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 [DDP]

#### 15.2.2. National regulations

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### Carbon monoxide (630-08-0)

Listed on the AICS (Australian Inventory of Chemical Substances)  
Listed on IECSC (Inventory of Existing Chemical Substances Produced or Imported in China)  
Listed on the Japanese ENCS (Existing & New Chemical Substances) inventory  
Listed on the Korean ECL (Existing Chemicals List)  
Listed on NZIoC (New Zealand Inventory of Chemicals)  
Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances)  
Listed on the Canadian IDL (Ingredient Disclosure List)

### Hydrogen (1333-74-0)

Listed on the AICS (Australian Inventory of Chemical Substances)  
Listed on IECSC (Inventory of Existing Chemical Substances Produced or Imported in China)  
Listed on the Korean ECL (Existing Chemicals List)  
Listed on NZIoC (New Zealand Inventory of Chemicals)  
Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances)

## 15.3. US State regulations

### Carbon monoxide (630-08-0)

|   |   |   |   |                                   |
|---|---|---|---|-----------------------------------|
| U.S. - California - Proposition 65 - Carcinogens List | U.S. - California - Proposition 65 - Developmental Toxicity | U.S. - California - Proposition 65 - Reproductive Toxicity - Female | U.S. - California - Proposition 65 - Reproductive Toxicity - Male | No significance risk level (NSRL) |
| No  | Yes   | No  | No  |                                   |

### Carbon monoxide (630-08-0)

U.S. - Massachusetts - Right To Know List  
U.S. - New Jersey - Right to Know Hazardous Substance List  
U.S. - Pennsylvania - RTK (Right to Know) - Environmental Hazard List  
U.S. - Pennsylvania - RTK (Right to Know) List

### Hydrogen (1333-74-0)

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:

|                               |  |
|-------------------------------|--|
| Acute Tox. 3 (Inhalation:gas) | Acute toxicity (inhalation:gas) Category 3                     |
| Compressed gas                | Gases under pressure Compressed gas                            |
| Flam. Gas 1                   | Flammable gases Category 1                                     |
| Repr. 1A                      | Reproductive toxicity Category 1A                              |
| STOT RE 1                     | Specific target organ toxicity (repeated exposure) Category 1  |
| H220                          | Extremely flammable gas  |
| H280                          | Contains gas under pressure; may explode if heated             |
| H331                          | Toxic if inhaled   |
| H360                          | May damage fertility or the unborn child                       |
| H372                          | Causes damage to organs through prolonged or repeated exposure |

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.*