

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

#### 1.1. Product identifier

Product form : Mixture  
 Product name : Diborane (0.0001% - 0.19%) in Hydrogen  
 Product code : SG-2002-00402

#### 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) :



GHS02

GHS04

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	99.81 - 99.9999	Flam. Gas 1, H220 Compressed gas, H280
Diborane	(CAS No) 19287-45-7	0.0001 - 0.19	Pyr. Gas, H250 Liquefied gas, H280 Acute Tox. 1 (Inhalation:gas), H330 Skin Irrit. 2, H315 Eye Irrit. 2B, H320 STOT SE 2, H371

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

Diborane (0.0001% - 0.19%) in Hydrogen		
ACGIH	Not applicable	
OSHA	Not applicable	
Hydrogen (1333-74-0)		
ACGIH	Not applicable	
OSHA	Not applicable	
Diborane (19287-45-7)		
ACGIH	ACGIH TWA (ppm)	0.1 ppm
OSHA	OSHA PEL (TWA) (mg/m <sup>3</sup> )	0.1 mg/m <sup>3</sup>
OSHA	OSHA PEL (TWA) (ppm)	0.1 ppm

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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.
Color	: Colorless
Odor	: No data available
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	: No data available
Relative evaporation rate (butyl acetate=1)	: No data available
Flammability (solid, gas)	: See Section 2.1 and 2.2
Explosion limits	: No data available
Explosive properties	: Without adequate ventilation formation of explosive mixtures may be possible.
Oxidizing properties	: None.
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	: Lighter 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

No additional information available

## 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 mixture with air.

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### 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

Likely routes of exposure : Inhalation  
Acute toxicity : Not classified

Hydrogen (1333-74-0)	
LC50 inhalation rat (ppm)	820000 ppm/4h

Diborane (19287-45-7)	
LC50 inhalation rat (ppm)	40 ppm/4h
ATE US (gases)	40.000 ppmV/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

Hydrogen (1333-74-0)	
Persistence and degradability	No ecological damage caused by this product.

Diborane (19287-45-7)	
Persistence and degradability	Not applicable for inorganic gases.

### 12.3. Bioaccumulative potential

Hydrogen (1333-74-0)	
BCF fish 1	(no bioaccumulation expected)
Log Pow	Not applicable for inorganic gases.
Bioaccumulative potential	No ecological damage caused by this product.

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Diborane (19287-45-7)	
Log Pow	Not applicable for inorganic gases.
Bioaccumulative potential	No data available.

### 12.4. Mobility in soil

Hydrogen (1333-74-0)	
Ecology - soil	No ecological damage caused by this product.

Diborane (19287-45-7)	
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	: 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 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

### Department of Transportation (DOT)

In accordance with DOT	
Transport document description	: NA1911 Diborane mixtures (Diborane, Hydrogen), 2.1
UN-No.(DOT)	: NA1911
Proper Shipping Name (DOT)	: Diborane mixtures
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 Packaging Non Bulk (49 CFR 173.xxx)	: 302
DOT Packaging Bulk (49 CFR 173.xxx)	: 245
DOT Symbols	: D - Proper shipping name for domestic use only, or to and from Canada
DOT Special Provisions (49 CFR 172.102)	: 5 - If this material meets the definition for a material poisonous by inhalation (see 171.8 of this subchapter), a shipping name must be selected which identifies the inhalation hazard, in Division 2.3 or Division 6.1, as appropriate.
DOT Packaging Exceptions (49 CFR 173.xxx)	: None
DOT Quantity Limitations Passenger aircraft/rail (49 CFR 173.27)	: Forbidden
DOT Quantity Limitations Cargo aircraft only (49 CFR 175.75)	: Forbidden
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", 57 - Stow "separated from" chlorine

### Additional information

Other information	: No supplementary information available.
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### ADR

Transport document description : UN 1954 COMPRESSED GAS, FLAMMABLE, N.O.S., 2.1, (B/D)  
Class (ADR) : 2 - Gases  
Hazard identification number (Kemler No.) : 23  
Classification code (ADR) : 1F  
Hazard labels (ADR) : 2.1 - Flammable gases



Orange plates :



Tunnel restriction code (ADR) : B/D  
Limited quantities (ADR) : 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

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

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

#### Diborane (19287-45-7)

Listed on the United States TSCA (Toxic Substances Control Act) inventory  
Listed on the United States SARA Section 302

SARA Section 302 Threshold Planning Quantity (TPQ)	100
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### 15.2. International regulations

#### CANADA

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

Listed on the Canadian DSL (Domestic Substances List)

WHMIS Classification	Class A - Compressed Gas Class B Division 1 - Flammable Gas
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#### Diborane (19287-45-7)

Listed on the Canadian DSL (Domestic Substances List)

### EU-Regulations

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

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

#### Diborane (19287-45-7)

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

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

Not classified

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

No additional information available

### National regulations

#### 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)

#### Diborane (19287-45-7)

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 Japanese ISHL (Industrial Safety and Health Law)  
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)  
Japanese Poisonous and Deleterious Substances Control Law  
Japanese Pollutant Release and Transfer Register Law (PRTR Law)  
Listed on the Canadian IDL (Ingredient Disclosure List)

### 15.3. US State regulations

#### 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

#### Diborane (19287-45-7)

U.S. - Massachusetts - Right To Know List  
U.S. - New Jersey - Right to Know Hazardous Substance List  
U.S. - Pennsylvania - RTK (Right to Know) - Environmental Hazard 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. 1 (Inhalation:gas)	Acute toxicity (inhalation:gas) Category 1
Compressed gas	Gases under pressure Compressed gas
Eye Irrit. 2B	Serious eye damage/eye irritation Category 2B
Flam. Gas 1	Flammable gases Category 1
Liquefied gas	Gases under pressure Liquefied gas
Pyr. Gas	Pyrophoric Gas
Skin Irrit. 2	Skin corrosion/irritation Category 2
STOT SE 2	Specific target organ toxicity (single exposure) Category 2
H220	Extremely flammable gas
H250	Catches fire spontaneously if exposed to air
H280	Contains gas under pressure; may explode if heated
H315	Causes skin irritation
H320	Causes eye irritation
H330	Fatal if inhaled
H371	May cause damage to organs

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