

**GAS MIXTURE (B2H6 2%/H2)****226005**

Country : DE / Language : EN

**SECTION 1: Identification of the substance/mixture and of the company/undertaking****1.1. Product identifier**

Trade name : GAS MIXTURE (B2H6 2%/H2)

SDS no : 226005

**1.2. Relevant identified uses of the substance or mixture and uses advised against**Relevant identified uses : Industrial and professional. Perform risk assessment prior to use.  
Use for manufacture of electronic/photovoltaic components.

Uses advised against : Contact supplier for more information on uses.

Uses advised against : Consumer use.

**1.3. Details of the supplier of the safety data sheet****Company identification****Supplier**AIR LIQUIDE Deutschland GmbH  
Luise-Rainer-Straße 5  
40235 Düsseldorf - GERMANY  
T +49 (0)211 6699-0 - F +49 (0)211 6699-222  
[info@airliquide.de](mailto:info@airliquide.de)**Manufacturer**AIR LIQUIDE Deutschland GmbH  
Luise-Rainer-Straße 5  
40235 Düsseldorf - GERMANY  
T +49 (0)211 6699-0 - F +49 (0)211 6699-222  
[info@airliquide.de](mailto:info@airliquide.de)

E-Mail address (competent person) : info.SDB@airliquide.de

**1.4. Emergency telephone number**Emergency telephone number : +49 (0)2151 398668  
Availability  
( 24 / 7 )**SECTION 2: Hazards identification****2.1. Classification of the substance or mixture****Classification according to Regulation (EC) No. 1272/2008 [CLP]**

Physical hazards	Flammable gases, Category 1	H220
	Gases under pressure : Compressed gas	H280
Health hazards	Acute toxicity (inhalation:gas) Category 3	H331

**2.2. Label elements****Labelling according to Regulation (EC) No. 1272/2008 [CLP]**

Hazard pictograms (CLP) :



GHS02



GHS04



GHS06

Signal word (CLP) : Danger

Hazard statements (CLP) : H220 - Extremely flammable gas..  
H280 - Contains gas under pressure; may explode if heated..  
H331 - Toxic if inhaled..

Precautionary statements (CLP)

- Prevention : P260 - Do not breathe gas, vapours.  
P280 - Wear protective gloves, protective clothing, eye protection, face protection..  
P210 - Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking..
- Response : P377 - Leaking gas fire: Do not extinguish, unless leak can be stopped safely..  
P304+P340+P315 - IF INHALED : Remove person to fresh air and keep comfortable for breathing. Get immediate medical advice / attention.
- Storage : P403 - Store in a well-ventilated place..

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**2.3. Other hazards**

: May ignite spontaneously in contact with air.

**SECTION 3: Composition/information on ingredients****3.1. Substances** : Not applicable.**3.2. Mixtures**

Name	Product identifier	Composition [V-%]:	Classification according to Regulation (EC) No. 1272/2008 [CLP]
Hydrogen	(CAS-No.) 1333-74-0 (EC-No.) 215-605-7 (EC Index-No.) 001-001-00-9 (REACH-no) *1	98	Flam. Gas 1, H220 Press. Gas (Comp.), H280
Diborane	(CAS-No.) 19287-45-7 (EC-No.) 242-940-6 (EC Index-No.) (REACH-no) *2	2	Flam. Gas 1, H220 Press. Gas (Liq.), H280 Acute Tox. 1 (Inhalation:gas), H330

Full text of H-statements: see section 16

*Contains no other components or impurities which will influence the classification of the product.*

\*1: Listed in Annex IV / V REACH, exempted from registration.

\*2: Registration deadline not expired.

\*3: Registration not required: Substance manufactured or imported &lt; 1t/y.

**SECTION 4: First aid measures****4.1. Description of first aid measures**

- Inhalation : Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped.
- Skin contact : Adverse effects not expected from this product.
- Eye contact : Adverse effects not expected from this product.
- Ingestion : Ingestion is not considered a potential route of exposure.

**4.2. Most important symptoms and effects, both acute and delayed**

: Refer to section 11.

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

: Obtain medical assistance.

**SECTION 5: Firefighting measures****5.1. Extinguishing media**

- Suitable extinguishing media : Shutting off the source of the gas is the preferred method of control.
- Unsuitable extinguishing media : Carbon dioxide.  
Do not use water jet to extinguish.

**5.2. Special hazards arising from the substance or mixture**

- Specific hazards : Exposure to fire may cause containers to rupture/explode.  
Escaping gas cannot be extinguished.
- Hazardous combustion products : Diborane.

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**5.3. Advice for firefighters**

## Specific methods

: Use fire control measures appropriate for the surrounding fire. Exposure to fire and heat radiation may cause gas receptacles to rupture. Cool endangered receptacles with water spray jet from a protected position. Prevent water used in emergency cases from entering sewers and drainage systems.

If possible, stop flow of product.

Use water spray or fog to knock down fire fumes if possible.

Do not extinguish a leaking gas flame unless absolutely necessary. Spontaneous/explosive re-ignition may occur. Extinguish any other fire.

Move containers away from the fire area if this can be done without risk.

## Special protective equipment for fire fighters

: Wear gas tight chemically protective clothing in combination with self contained breathing apparatus.

Standard EN 943-2: Protective clothing against liquid and gaseous chemicals, aerosols and solid particles. Gas-tight chemical protective suits for emergency teams.

Standard EN 137 - Self-contained open-circuit compressed air breathing apparatus with full face mask.

**SECTION 6: Accidental release measures****6.1. Personal precautions, protective equipment and emergency procedures**

: Try to stop release.

Evacuate area.

Monitor concentration of released product.

Consider the risk of potentially explosive atmospheres.

Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe.

Eliminate ignition sources.

Ensure adequate air ventilation.

Act in accordance with local emergency plan.

Stay upwind.

**6.2. Environmental precautions**

: Try to stop release.

**6.3. Methods and material for containment and cleaning up**

: Ventilate area.

**6.4. Reference to other sections**

: See also sections 8 and 13.

**SECTION 7: Handling and storage****7.1. Precautions for safe handling**

## Safe use of the product

: Gas cabinets, rooms or indoor areas where product is stored or used shall be protected by an automatic sprinkler system.

The product must be handled in accordance with good industrial hygiene and safety procedures.

Only experienced and properly instructed persons should handle gases under pressure.

Consider pressure relief device(s) in gas installations.

Ensure the complete gas system was (or is regularly) checked for leaks before use.

Do not smoke while handling product.

Avoid exposure, obtain special instructions before use.

Use only properly specified equipment which is suitable for this product, its supply pressure and temperature. Contact your gas supplier if in doubt.

Installation of a cross purge assembly between the cylinder and the regulator is recommended.

Avoid suck back of water, acid and alkalis.

Assess the risk of potentially explosive atmospheres and the need for explosion-proof equipment.

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Purge air from system before introducing gas.  
 Take precautionary measures against static discharge.  
 Keep away from ignition sources (including static discharges).  
 Consider the use of only non-sparking tools.  
 Do not breathe gas.  
 Avoid release of product into atmosphere.  
 Ensure equipment is adequately earthed.

**Safe handling of the gas receptacle**

: Refer to supplier's container handling instructions.  
 Do not allow backfeed into the container.  
 Protect cylinders from physical damage; do not drag, roll, slide or drop.  
 When moving cylinders, even for short distances, use a cart (trolley, hand truck, etc.) designed to transport cylinders.  
 Leave valve protection caps in place until the container has been secured against either a wall or bench or placed in a container stand and is ready for use.  
 If user experiences any difficulty operating cylinder valve discontinue use and contact supplier.  
 Never attempt to repair or modify container valves or safety relief devices.  
 Damaged valves should be reported immediately to the supplier.  
 Keep container valve outlets clean and free from contaminants particularly oil and water.  
 Replace valve outlet caps or plugs and container caps where supplied as soon as container is disconnected from equipment.  
 Close container valve after each use and when empty, even if still connected to equipment.  
 Never attempt to transfer gases from one cylinder/container to another.  
 Never use direct flame or electrical heating devices to raise the pressure of a container.  
 Do not remove or deface labels provided by the supplier for the identification of the cylinder contents.  
 Suck back of water into the container must be prevented.  
 Open valve slowly to avoid pressure shock.

**7.2. Conditions for safe storage, including any incompatibilities**

: Observe all regulations and local requirements regarding storage of containers.  
 Containers should not be stored in conditions likely to encourage corrosion.  
 Container valve guards or caps should be in place.  
 Containers should be stored in the vertical position and properly secured to prevent them from falling over.  
 Stored containers should be periodically checked for general condition and leakage.  
 Keep container below 50°C in a well ventilated place.  
 Store containers in location free from fire risk and away from sources of heat and ignition.  
 Keep away from combustible materials.  
 Segregate from oxidant gases and other oxidants in store.  
 All electrical equipment in the storage areas should be compatible with the risk of a potentially explosive atmosphere.

**7.3. Specific end use(s)**

: None.

## SECTION 8: Exposure controls/personal protection

**8.1. Control parameters**
**Diborane (19287-45-7)**

OEL : Occupational Exposure Limits

Germany	TWA (DE) OEL 8h [mg/m <sup>3</sup> ] TRGS 900	0.1 mg/m <sup>3</sup> not yet legally binding (DFG)
	TWA (DE) OEL 8h [ppm] TRGS 900	0.1 ppm not yet legally binding (DFG)

DNEL (Derived-No Effect Level) : No data available.

PNEC (Predicted No-Effect Concentration) : No data available.

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### 8.2. Exposure controls

#### 8.2.1. Appropriate engineering controls

- : Provide adequate general and local exhaust ventilation.
- Product to be handled in a closed system.
- Systems under pressure should be regularly checked for leakages.
- Ensure exposure is below occupational exposure limits (where available).
- Gas detectors should be used when toxic gases may be released.
- Consider the use of a work permit system e.g. for maintenance activities.

#### 8.2.2. Individual protection measures, e.g. personal protective equipment

- : A risk assessment should be conducted and documented in each work area to assess the risks related to the use of the product and to select the PPE that matches the relevant risk. The following recommendations should be considered:  
PPE compliant to the recommended EN/ISO standards should be selected.
- Eye/face protection
  - : Wear safety glasses with side shields.
  - Standard EN 166 - Personal eye-protection - specifications.
- Skin protection
  - Hand protection
    - : Wear working gloves when handling gas containers.
    - Standard EN 388 - Protective gloves against mechanical risk.
  - Other
    - : Consider the use of flame resistant anti-static safety clothing.
    - Standard EN ISO 14116 - Limited flame spread materials.
    - Standard EN ISO 1149-5 - Protective clothing: Electrostatic properties.
    - Wear safety shoes while handling containers.
    - Standard EN ISO 20345 - Personal protective equipment - Safety footwear.
- Respiratory protection
  - : Gas filters may be used if all surrounding conditions e.g. type and concentration of the contaminant(s) and duration of use are known.
  - Use gas filters with full face mask, where exposure limits may be exceeded for a short-term period, e.g. connecting or disconnecting containers.
  - Consult respiratory device supplier's product information for the selection of the appropriate device.
  - Gas filters do not protect against oxygen deficiency.
  - Standard EN 14387 - Gas filter(s), combined filter(s) and full face mask - EN 136.
  - Keep self contained breathing apparatus readily available for emergency use.
  - Self contained breathing apparatus is recommended, where unknown exposure may be expected, e.g. during maintenance activities on installation systems.
  - Standard EN 137 - Self-contained open-circuit compressed air breathing apparatus with full face mask.
- Thermal hazards
  - : None in addition to the above sections.

#### 8.2.3. Environmental exposure controls

- : Refer to local regulations for restriction of emissions to the atmosphere. See section 13 for specific methods for waste gas treatment.

## SECTION 9: Physical and chemical properties

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

#### Appearance

- Physical state at 20°C / 101.3kPa : Gas.
- Colour : Mixture contains one or more component(s) which have the following colour(s):  
Colourless.
- Odour : Mixture contains one or more component(s) which have the following odour(s):  
Pungent.
- Odour threshold : Odour threshold is subjective and inadequate to warn of overexposure.
- Melting point : Not applicable for gas mixtures.
- Boiling point : Not applicable for gas mixtures.
- Flash point : Not applicable for gases and gas mixtures.
- Flammability range : Flammability range not available.

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Relative vapour density at 20 °C	: Not applicable.
Evaporation rate (ether=1)	: Not applicable for gases and gas mixtures.
Vapour pressure [20°C]	: Not applicable.
Vapour pressure [50°C]	: Not applicable.
Relative density, gas (air=1)	: Lighter or similar to air.
Solubility in water	: Solubility in water of component(s) of the mixture : • Hydrogen: 1.6 mg/l • Diborane: No reliable data available.
pH value	: Not applicable for gases and gas mixtures.
Partition coefficient n-octanol/water [log Kow]	: Not applicable for gas mixtures.
Decomposition point [°C]	: Not applicable.
Auto-ignition temperature	: Not known.
Viscosity [20°C]	: No reliable data available.
Explosive Properties	: Not applicable.
Oxidising Properties	: Not applicable.

### 9.2. Other information

Molar mass	: Not applicable for gas mixtures.
Other data	: None.

## SECTION 10: Stability and reactivity

### 10.1. Reactivity

: No reactivity hazard other than the effects described in sub-sections below.

### 10.2. Chemical stability

: Stable under normal conditions.

### 10.3. Possibility of hazardous reactions

: None.

### 10.4. Conditions to avoid

 : None under recommended storage and handling conditions (see section 7).  
Avoid moisture in installation systems.

### 10.5. Incompatible materials

: For additional information on compatibility refer to ISO 11114.

### 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** : Toxic if inhaled.

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

LC50 inhalation rat (ppm)	40 ppm/4h
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**Skin corrosion/irritation** : No known effects from this product.

**Serious eye damage/irritation** : No known effects from this product.

**Respiratory or skin sensitisation** : No known effects from this product.

**Germ cell mutagenicity** : No known effects from this product.

**Carcinogenicity** : No known effects from this product.

**Reproductive toxicity** :

Toxic for reproduction : Fertility : No known effects from this product.

Toxic for reproduction : unborn child : No known effects from this product.

**STOT-single exposure** : No known effects from this product.

**STOT-repeated exposure** : No known effects from this product.

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Aspiration hazard : Not applicable for gases and gas mixtures.

**SECTION 12: Ecological information****12.1. Toxicity**

Assessment : No ecological damage caused by this product.

EC50 48h - Daphnia magna [mg/l] : No data available.

EC50 72h - Algae [mg/l] : No data available.

LC50 96 h - Fish [mg/l] : No data available.

**12.2. Persistence and degradability**

Assessment : No data available.

**12.3. Bioaccumulative potential**

Assessment : No data available.

**12.4. Mobility in soil**Assessment : Because of its high volatility, the product is unlikely to cause ground or water pollution.  
Partition into soil is unlikely.**12.5. Results of PBT and vPvB assessment**

Assessment : No data available.

**12.6. Other adverse effects**

Other adverse effects : No known effects from this product.

Effect on the ozone layer : None.

Effect on global warming : Contains greenhouse gas(es).

**SECTION 13: Disposal considerations****13.1. Waste treatment methods**

Contact supplier if guidance is required.

Do not discharge into areas where there is a risk of forming an explosive mixture with air.  
Waste gas should be flared through a suitable burner with flash back arrestor.

Must not be discharged to atmosphere.

Ensure that the emission levels from local regulations or operating permits are not exceeded.

Refer to the EIGA code of practice Doc.30 "Disposal of Gases", downloadable at <http://www.eiga.org> for more guidance on suitable disposal methods.

Return unused product in original cylinder to supplier.

List of hazardous waste codes (from Commission Decision 2001/118/EC) : 16 05 04 \*: Gases in pressure containers (including halons) containing dangerous substances.

**13.2. Additional information**

: External treatment and disposal of waste should comply with applicable local and/or national regulations.

**SECTION 14: Transport information****14.1. UN number**

UN-No. : 1953

**14.2. UN proper shipping name**

Transport by road/rail (ADR/RID) : COMPRESSED GAS, TOXIC, FLAMMABLE, N.O.S. (Diborane, Hydrogen)

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**Transport by air (ICAO-TI / IATA-DGR)**

: Compressed gas, toxic, flammable, n.o.s. (Diborane, Hydrogen)

**Transport by sea (IMDG)**

: COMPRESSED GAS, TOXIC, FLAMMABLE, N.O.S. (Diborane, Hydrogen)

**14.3. Transport hazard class(es)**
**Labelling**


2.3 : Toxic gases.

2.1 : Flammable gases.

**Transport by road/rail (ADR/RID)**

Class

: 2.

Classification code

: 1TF.

Hazard identification number

: 263.

Tunnel Restriction

: B/D - Tank carriage : Passage forbidden through tunnels of category B, C, D and E. Other carriage : Passage forbidden through tunnels of category D and E.

**Transport by air (ICAO-TI / IATA-DGR)**

Class / Div. (Sub. risk(s))

: 2.3 (2.1)

**Transport by sea (IMDG)**

Class / Div. (Sub. risk(s))

: 2.3 (2.1)

Emergency Schedule (EmS) - Fire

: F-D.

Emergency Schedule (EmS) - Spillage

: S-U.

**14.4. Packing group**

Transport by road/rail (ADR/RID)

: Not established.

Transport by air (ICAO-TI / IATA-DGR)

: Not established.

Transport by sea (IMDG)

: Not established.

**14.5. Environmental hazards**

Transport by road/rail (ADR/RID)

: None.

Transport by air (ICAO-TI / IATA-DGR)

: None.

Transport by sea (IMDG)

: None.

**14.6. Special precautions for user**
**Packing Instruction(s)**

Transport by road/rail (ADR/RID)

: P200.

Transport by air (ICAO-TI / IATA-DGR)

Passenger and Cargo Aircraft

: Forbidden.

Cargo Aircraft only

: Forbidden.

Transport by sea (IMDG)

: P200.

Special transport precautions

: Avoid transport on vehicles where the load space is not separated from the driver's compartment.

Ensure vehicle driver is aware of the potential hazards of the load and knows what to do in the event of an accident or an emergency.

Before transporting product containers:

- Ensure there is adequate ventilation.
- Ensure that containers are firmly secured.
- Ensure cylinder valve is closed and not leaking.
- Ensure valve outlet cap nut or plug (where provided) is correctly fitted.
- Ensure valve protection device (where provided) is correctly fitted.



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**14.7. Transport in bulk according to Annex II of Marpol and the IBC Code**

: Not applicable.

**SECTION 15: Regulatory information****15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture****EU-Regulations**

Restrictions on use : None.  
Seveso Directive : 2012/18/EU (Seveso III) : Covered.

**National regulations**

National legislation : Ensure all national/local regulations are observed.

**Germany**

Water hazard class (WGK) : Water hazard class (WGK) 2, significant hazard to waters (Classification according to VwVwS, Annex 4)

Other information, restrictions and prohibition regulations : [German regulations] BetriebssicherheitsV mit TRBSen insbesondere TRBS 3145 / TRGS 725 Ortsbewegliche Druckgasbehälter", TRBS 2141, BGR Regel 500 Teil 2.33: "Umgang mit Gasen", GefahrstoffV mit Technischen Regeln Gefährliche Stoffe TRGS insbesondere TRGS 407 "Tätigkeiten mit Gasen - Gefährdungsbeurteilung", TRGS 400, 500, 510, 900."  
BGR 104, TRBS 2152.

**15.2. Chemical safety assessment**

A CSA does not need to be carried out for this product.

**SECTION 16: Other information**

Indication of changes : Revised safety data sheet in accordance with commission regulation (EU) No 453/2010.

Abbreviations and acronyms : ATE - Acute Toxicity Estimate  
CLP - Classification Labelling Packaging Regulation; Regulation (EC) No 1272/2008  
REACH - Registration, Evaluation, Authorisation and Restriction of Chemicals Regulation (EC) No 1907/2006  
EINECS - European Inventory of Existing Commercial Chemical Substances  
CAS# - Chemical Abstract Service number  
PPE - Personal Protection Equipment  
LC50 - Lethal Concentration to 50 % of a test population  
RMM - Risk Management Measures  
PBT - Persistent, Bioaccumulative and Toxic  
vPvB - Very Persistent and Very Bioaccumulative  
STOT- SE : Specific Target Organ Toxicity - Single Exposure  
CSA - Chemical Safety Assessment  
EN - European Standard  
UN - United Nations  
ADR - European Agreement concerning the International Carriage of Dangerous Goods by Road  
IATA - International Air Transport Association  
IMDG code - International Maritime Dangerous Goods  
RID - Regulations concerning the International Carriage of Dangerous Goods by Rail  
WGK - Water Hazard Class

Training advice : Ensure operators understand the flammability hazard.  
Users of breathing apparatus must be trained.  
Ensure operators understand the toxicity hazard.

Further information : Classification using data from databases maintained by the European Industrial Gases Association (EIGA).  
Classification in accordance with the calculation methods of Regulation (EC) 1272/2008 CLP.

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Full text of H- and EUH-statements

Acute Tox. 1 (Inhalation:gas)	Acute toxicity (inhalation:gas) Category 1
Acute Tox. 3 (Inhalation:gas)	Acute toxicity (inhalation:gas) Category 3
Flam. Gas 1	Flammable gases, Category 1
Press. Gas (Comp.)	Gases under pressure : Compressed gas
Press. Gas (Liq.)	Gases under pressure : Liquefied gas
H220	Extremely flammable gas.
H280	Contains gas under pressure; may explode if heated.
H330	Fatal if inhaled.
H331	Toxic if inhaled.

## DISCLAIMER OF LIABILITY

: Before using this product in any new process or experiment, a thorough material compatibility and safety study should be carried out.

Details given in this document are believed to be correct at the time of going to press.

Whilst proper care has been taken in the preparation of this document, no liability for injury or damage resulting from its use can be accepted.