

Safety Data Sheet



Section 1: Identification of the Substance/Mixture and of the Company/Undertaking

1.1 Product identifier

Product Name | Flammable Gas Mixture Containing Phosphine (<0.4%) and Hydrogen (Balance)

Product Code | 60011

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

Relevant identified use(s) | For use in manufacture of electronic devices.

1.3 Details of the supplier of the safety data sheet

Manufacturer | Air Liquide
2700 Post Oak Blvd.
Houston, TX 77056
United States
www.us.airliquide.com
sds@airliquide.com

Telephone (Technical) | 713-896-2896

Telephone (Technical) | 800-819-1704

1.4 Emergency telephone number

Manufacturer | 800-424-9300 - CHEMTREC

Manufacturer | +1 703-527-3887 - Outside United States

Section 2: Hazards Identification

EU/EEC

According to Regulation (EC) No 1272/2008 (CLP)/REACH 1907/2006 [amended by 453/2010]

According to EU Directive 67/548/EEC (DSD) or 1999/45/EC (DPD)

2.1 Classification of the substance or mixture

CLP | Flammable Gases 1 - H220
Compressed Gas - H280
Acute Toxicity Inhalation 4 - H332

DSD/DPD | Extremely Flammable (F+)
Toxic (T)
R12, R23

2.2 Label Elements

CLP

DANGER



Hazard statements | H220 - Extremely flammable gas
H280 - Contains gas under pressure; may explode if heated
H332 - Harmful if inhaled

Precautionary statements

Prevention | P210 - Keep away from heat, sparks, open flames and/or hot surfaces. - No smoking.
P261 - Avoid breathing dust, fume, gas, mist, vapours and/or spray.
P271 - Use only outdoors or in a well-ventilated area.

Response | P312 - Call a POISON CENTER or doctor/physician if you feel unwell.
P377 - Leaking gas fire: Do not extinguish, unless leak can be stopped safely.
P381 - Eliminate all ignition sources if safe to do so.
P304+P340 - IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.

Storage/Disposal | P403 - Store in a well-ventilated place.

DSD/DPD



Risk phrases | R12 - Extremely flammable.
R23 - Toxic by inhalation.

Safety phrases | S9 - Keep container in a well ventilated place
S16 - Keep away from sources of ignition - No Smoking.
S37 - Wear suitable gloves.
S45 - In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

2.3 Other Hazards

CLP | According to Regulation (EC) No. 1272/2008 (CLP) this material is considered hazardous.

DSD/DPD | According to European Directive 1999/45/EC this preparation is considered dangerous.

United States (US)

According to OSHA 29 CFR 1910.1200 HCS

2.1 Classification of the substance or mixture

OSHA HCS 2012 | Flammable Gases 1 - H220
Compressed Gas - H280
Acute Toxicity Inhalation 4 - H332

2.2 Label elements

OSHA HCS 2012

DANGER



Hazard statements | Extremely flammable gas - H220
Contains gas under pressure; may explode if heated - H280
Harmful if inhaled - H332

Precautionary statements

Prevention | Keep away from heat, sparks, open flames and/or hot surfaces. - No smoking. - P210
Avoid breathing gas. - P261
Use only outdoors or in a well-ventilated area. - P271

Response | Leaking gas fire: Do not extinguish, unless leak can be stopped safely. - P377
Eliminate all ignition sources if safe to do so. - P381
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for

breathing. - P304+P340

Call a POISON CENTER or doctor/physician if you feel unwell. - P312

Storage/Disposal | Store in a well-ventilated place. - P403

2.3 Other hazards

OSHA HCS 2012

| Under United States Regulations (29 CFR 1910.1200 - Hazard Communication Standard), this product is considered hazardous.

Canada

According to WHMIS

2.1 Classification of the substance or mixture

WHMIS

| Compressed Gas - A
Flammable Gases - B1

2.2 Label elements

WHMIS

| Compressed Gas - A
Flammable Gases - B1

2.3 Other hazards

WHMIS

| In Canada, the product mentioned above is considered hazardous under the Workplace Hazardous Materials Information System (WHMIS).

2.4 Other information

NFPA



Section 3 - Composition/Information on Ingredients

3.1 Substances

| Material does not meet the criteria of a substance in accordance with Regulation (EC) No 1272/2008.

3.2 Mixtures

Composition					
Chemical Name	Identifiers	%	LD50/LC50	Classifications According to Regulation/Directive	Comments
				EU DSD/DPD: Annex I - F+; R12; R17; T+; R26; C; R34; N; R50	

Phosphine	CAS:7803-51-2 EC Number:232-260-8	< 0.4%	Inhalation-Rat LC50 • 11 ppm 4 Hour(s)	EU CLP: Annex VI - Flam. Gas 1, H220; Press. Gas - Liq. H280; Acute Tox. 1, H330; Skin Corr. 1B, H314; Aquatic Acute 1, H400 OSHA HCS 2012: Flam Gas 1, Press Gas - Liq., Eye Irrit 2A, Skin Irrit 2, Acute Tox 1; STOT SE 1(Liver); STOT RE 1 (Liver, kidney and Blood-Anemia); Pyrophoric gas	NDA
Hydrogen	CAS:1333-74-0 EC Number:215-605-7	> 99.6%	NDA	EU DSD/DPD: Annex I - F+; R12 EU CLP: Annex VI - Flam. Gas 1, H220; Press. Gas - Comp., H280 OSHA HCS 2012: Flam. Gas 1, Press. Gas - Comp.	Balance

See Section 16 for full text of H-statements and R-phrases.

Section 4 - First Aid Measures

4.1 Description of first aid measures

- Inhalation** | IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Administer oxygen if breathing is difficult. Give artificial respiration if victim is not breathing. If signs/symptoms continue, get medical attention.
- Skin** | Although exposure is unlikely, in case of contact immediately flush skin with running water. If skin irritation develops get medical advice/attention.
- Eye** | First aid is not expected to be necessary if material is used under ordinary conditions and as recommended. If eye irritation persists: Get medical advice/attention.
- 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 - Toxicological Information.

4.3 Indication of any immediate medical attention and special treatment needed

- Notes to Physician** | All treatments should be based on observed signs and symptoms of distress in the patient. Consideration should be given to the possibility that overexposure to materials other than this product may have occurred.

4.4 Other information

- | Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves. RESCUERS SHOULD NOT ATTEMPT TO RETRIEVE VICTIMS OF EXPOSURE TO GASES WITHOUT ADEQUATE PERSONAL PROTECTIVE EQUIPMENT. At a minimum, Self-Contained Breathing Apparatus must be worn. Victim(s) who experience any adverse effect after over-exposure to this gas mixture must be taken for medical attention. Rescuers should be taken for medical attention if necessary. Take a copy of the label and the MSDS to physician or other health professional with victim(s).

Section 5 - Firefighting Measures

5.1 Extinguishing media

- Suitable Extinguishing Media** | SMALL FIRES: Dry chemical or CO2.
LARGE FIRES: Water spray or fog.

- Unsuitable Extinguishing Media** | No data available

5.2 Special hazards arising from the substance or mixture

- Unusual Fire and Explosion Hazards** | EXTREMELY FLAMMABLE
Will form explosive mixtures with air.
Vapors may travel to source of ignition and flash back.
Cylinders exposed to fire may vent and release flammable gas through pressure relief devices.

Containers may explode when heated.
Ruptured cylinders may rocket.

Hazardous Combustion Products

| No data available

5.3 Advice for firefighters

| Structural firefighters' protective clothing provides limited protection in fire situations ONLY; it is not effective in spill situations where direct contact with the substance is possible.

Wear positive pressure self-contained breathing apparatus (SCBA).

DO NOT EXTINGUISH A LEAKING GAS FIRE UNLESS LEAK CAN BE STOPPED

Move containers from fire area if you can do it without risk.

FIRE: If tank, rail car or tank truck is involved in a fire, ISOLATE for 1600 meters (1 mile) in all directions; also, consider initial evacuation for 1600 meters (1 mile) in all directions.

FIRE INVOLVING TANKS: ALWAYS stay away from tanks engulfed in fire.

FIRE INVOLVING TANKS: Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.

FIRE INVOLVING TANKS: Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.

FIRE INVOLVING TANKS: Cool containers with flooding quantities of water until well after fire is out.

FIRE INVOLVING TANKS: Do not direct water at source of leak or safety devices; icing may occur.

FIRE INVOLVING TANKS: For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.

Section 6 - Accidental Release Measures

6.1 Personal precautions, protective equipment and emergency procedures

Personal Precautions

| Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Do not touch or walk through spilled material. Ventilate the area before entry.

Emergency Procedures

| ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). As an immediate precautionary measure, isolate spill or leak area for at least 100 meters (330 feet) in all directions. Stop leak if you can do it without risk. Keep unauthorized personnel away. Keep out of low areas. Stay upwind. LARGE SPILL: Consider initial downwind evacuation for at least 800 meters (1/2 mile)

6.2 Environmental precautions

| Prevent spreading of vapors through sewers, ventilation systems and confined areas.

6.3 Methods and material for containment and cleaning up

Containment/Clean-up Measures

| All equipment used when handling the product must be grounded.

Stop leak if you can do it without risk.

If possible, turn leaking containers so that gas escapes rather than liquid.

Use water spray to reduce vapors; do not put water directly on leak, spill area or inside container.

Do not direct water at spill or source of leak.

Isolate area until gas has dispersed.

6.4 Reference to other sections

| Refer to Section 8 - Exposure Controls/Personal Protection and Section 13 - Disposal Considerations.

Section 7 - Handling and Storage

7.1 Precautions for safe handling

Handling

| Keep away from heat and ignition sources – No Smoking. Take precautionary measures against static charges. All equipment used when handling the product must be grounded. Use only non-sparking tools. Use only with adequate ventilation.

Ventilate closed spaces before entering. Wear appropriate personal protective equipment, avoid direct contact. Avoid breathing gas. Be aware of any signs of dizziness or fatigue, especially if work is done in a poorly ventilated area; exposures to fatal concentrations of this gas mixture could occur without any significant warning symptoms, due to olfactory fatigue or oxygen deficiency. Cylinders should be firmly secured to prevent falling or being knocked-over. Use explosion-proof - electrical, ventilating and/or lighting equipment. Do not attempt to repair, adjust, or in any other way modify cylinders. If there is a malfunction or another type of operational problem, contact nearest distributor immediately. Empty containers retain product residue and can be hazardous. Do not cut, weld, puncture or incinerate container.

7.2 Conditions for safe storage, including any incompatibilities

Storage | Cylinders should be stored in dry, well-ventilated areas away from sources of heat, ignition and direct sunlight. Do not allow area where cylinders are stored to exceed 52C (125F). Cylinders must be protected from the environment, and preferably kept at room temperature approximately 21C (70F). Protect cylinders against physical damage. Cylinders should be firmly secured to prevent falling or being knocked-over. Store locked up.

7.3 Specific end use(s)

| Refer to Section 1.2 - Relevant identified uses.

Section 8 - Exposure Controls/Personal Protection

8.1 Control parameters

Exposure Limits/Guidelines						
	Result	ACGIH	Canada Ontario	Canada Quebec	China	China Highly Toxic Goods
Phosphine (7803-51-2)	Ceilings	Not established	Not established	Not established	0.3 mg/m ³ Ceiling [MAC]	0.3 mg/m ³ Ceiling
	STELs	1 ppm STEL	1 ppm STEL	1 ppm STEV; 1.4 mg/m ³ STEV	Not established	Not established
	TWAs	0.3 ppm TWA	0.3 ppm TWA	0.3 ppm TWAEV; 0.42 mg/m ³ TWAEV	Not established	Not established
Exposure Limits/Guidelines (Con't.)						
	Result	Europe	France	Germany DFG	Germany TRGS	Ireland
Phosphine (7803-51-2)	STELs	0.2 ppm STEL; 0.28 mg/m ³ STEL	0.2 ppm STEL [VLCT] (indicative limit); 0.28 mg/m ³ STEL [VLCT] (indicative limit)	Not established	Not established	0.2 ppm STEL; 0.28 mg/m ³ STEL
	TWAs	0.1 ppm TWA; 0.14 mg/m ³ TWA	0.1 ppm TWA [VME]; 0.14 mg/m ³ TWA [VME]	Not established	0.1 ppm TWA AGW (The risk of damage to the embryo or fetus can be excluded when AGW and BGW values are observed, exposure factor 2); 0.14 mg/m ³ TWA AGW (The risk of damage to the embryo or fetus can be excluded when AGW and BGW values are observed, exposure factor 2)	0.1 ppm TWA; 0.14 mg/m ³ TWA

	Ceilings	Not established	Not established	0.2 ppm Peak; 0.28 mg/m3 Peak	Not established	Not established
	MAKs	Not established	Not established	0.1 ppm TWA MAK; 0.14 mg/m3 TWA MAK	Not established	Not established
Exposure Limits/Guidelines (Con't.)						
	Result	Israel	Italy	NIOSH	OSHA	Portugal
Phosphine (7803-51-2)	STELs	1 ppm STEL	0.2 ppm STEL; 0.28 mg/m3 STEL	1 ppm STEL; 1 mg/m3 STEL	Not established	1 ppm STEL [VLE-CD]
	TWAs	0.3 ppm TWA	0.1 ppm TWA; 0.14 mg/m3 TWA	0.3 ppm TWA; 0.4 mg/m3 TWA	0.3 ppm TWA; 0.4 mg/m3 TWA	0.3 ppm TWA [VLE-MP]
Exposure Limits/Guidelines (Con't.)						
	Result	Spain		Sweden		
Phosphine (7803-51-2)	STELs	0.2 ppm STEL [VLA-EC]; 0.28 mg/m3 STEL [VLA-EC]		1 ppm STV; 1.4 mg/m3 STV		
	TWAs	0.1 ppm TWA [VLA-ED] (indicative limit value); 0.14 mg/m3 TWA [VLA-ED] (indicative limit value)		0.3 ppm LLV; 0.4 mg/m3 LLV		

Exposure Control Notations

Portugal

- Hydrogen (1333-74-0): **Simple Asphyxiants:** (Simple Asphyxiant)

Ireland

- Hydrogen (1333-74-0): **Simple Asphyxiants:** (Asphyxiant)

Spain

- Hydrogen (1333-74-0): **Simple Asphyxiants:** (simple asphyxiant)

Germany DFG

- Phosphine (7803-51-2): **Pregnancy:** (no risk to embryo/fetus if exposure limits adhered to)

8.2 Exposure controls

Engineering Measures/Controls

- Good general ventilation should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. Use explosion-proof - electrical, ventilating and/or lighting equipment.

Personal Protective Equipment

Respiratory

- In case of insufficient ventilation, wear suitable respiratory equipment.

Eye/Face

- Wear safety glasses.

Skin/Body

- Wear leather gloves when handling cylinders.

Environmental Exposure Controls

- Follow best practice for site management and disposal of waste. Controls should be engineered to prevent release to the environment, including procedures to prevent spills, atmospheric release and release to waterways.

Key to abbreviations

ACGIH = American Conference of Governmental Industrial Hygiene

TWA = Time-Weighted Averages are based on 8h/day, 40h/week exposures

LLV = Limit Level Value is the exposure limit for 8-hour work day

MAK = Maximale Arbeitsplatz Konzentration is the maximum permissible concentration

NIOSH = National Institute of Occupational Safety and Health

OSHA = Occupational Safety and Health Administration

STEL = Short Term Exposure Limits are based on 15-minute exposures

STEV = Short Term Exposure Value

Section 9 - Physical and Chemical Properties

9.1 Information on Physical and Chemical Properties

Material Description			
Physical Form	Gas	Appearance/Description	Colorless gas with a fishy odor.
Color	Colorless	Odor	Fishy odor.
Odor Threshold	Data lacking		
General Properties			
Boiling Point	-252.8 C(-423.04 F) Hydrogen	Melting Point	-259 C(-434.2 F) Hydrogen
Decomposition Temperature	Data lacking	pH	Data lacking
Specific Gravity/Relative Density	Data lacking	Density	1.312 kg/m ³ Hydrogen
Water Solubility	0.0214 % @ 0 C(32 F) Hydrogen	Viscosity	Data lacking
Explosive Properties	Data lacking	Oxidizing Properties:	Data lacking
Volatility			
Vapor Pressure	Data lacking	Vapor Density	0.0696 Air=1 Hydrogen
Evaporation Rate	Data lacking		
Flammability			
Flash Point	Data lacking	UEL	Data lacking
LEL	Data lacking	Autoignition	560 C(1040 F) Hydrogen
Flammability (solid, gas)	Flammable gas.		
Environmental			
Octanol/Water Partition coefficient	Data lacking		

9.2 Other Information

- No additional physical and chemical parameters noted.

Section 10: Stability and Reactivity

10.1 Reactivity

- No dangerous reaction known under conditions of normal use.

10.2 Chemical stability

- Stable under normal temperatures and pressures.

10.3 Possibility of hazardous reactions

- Hazardous polymerization will not occur.

10.4 Conditions to avoid

- Excess heat, sparks, open flame.

10.5 Incompatible materials

- Phosphine combines violently with halogens and oxidizers such as oxygen, chlorine, fluorine and nitric oxide. Phosphine reacts with mercury(II) nitrate to form an explosive product. In air, Phosphine will ignite or react violently; also with boron trichloride, aqueous halogen solutions, iodine, metal nitrates and oxidants. Hydrogen is incompatible with strong oxidizers (i.e. chlorine, bromine, pentafluoride, oxygen, oxygen difluoride, and nitrogen trifluoride).

10.6 Hazardous decomposition products

- Decomposition products of this gas mixture would include oxygen, phosphorous oxides and phosphoric acid.

Section 11 - Toxicological Information

11.1 Information on toxicological effects

Components		
Phosphine (< 0.4%)	7803-51-2	Acute Toxicity: Inhalation-Rat LC50 • 11 ppm 4 Hour(s); <i>Lungs, Thorax, or Respiration</i> : Dyspnea

GHS Properties	Classification
Acute toxicity	EU/CLP • Acute Toxicity - Inhalation 4 OSHA HCS 2012 • Acute Toxicity - Inhalation 4
Aspiration Hazard	EU/CLP • Classification criteria not met OSHA HCS 2012 • Classification criteria not met
Carcinogenicity	EU/CLP • Classification criteria not met OSHA HCS 2012 • Classification criteria not met
Germ Cell Mutagenicity	EU/CLP • Classification criteria not met OSHA HCS 2012 • Classification criteria not met
Skin corrosion/Irritation	EU/CLP • Classification criteria not met OSHA HCS 2012 • Classification criteria not met
Skin sensitization	EU/CLP • Classification criteria not met OSHA HCS 2012 • Classification criteria not met
STOT-RE	EU/CLP • Classification criteria not met OSHA HCS 2012 • Classification criteria not met
STOT-SE	EU/CLP • Classification criteria not met OSHA HCS 2012 • Classification criteria not met
Toxicity for Reproduction	EU/CLP • Classification criteria not met OSHA HCS 2012 • Classification criteria not met
Respiratory sensitization	EU/CLP • Classification criteria not met OSHA HCS 2012 • Classification criteria not met
Serious eye damage/Irritation	EU/CLP • Classification criteria not met OSHA HCS 2012 • Classification criteria not met

Potential Health Effects

Inhalation

Acute (Immediate)

- Harmful if inhaled. If this material is released in a small, poorly ventilated area (i.e. an enclosed or confined space), an oxygen-deficient environment may occur. Individuals breathing such an atmosphere may experience symptoms which include headaches, ringing in ears, dizziness, drowsiness, unconsciousness, nausea, vomiting, and depression of all the senses. Under some circumstances of over-exposure, death may occur. The following effects associated with decreased levels of oxygen: increase in breathing and pulse rate, emotional upset, abnormal fatigue, nausea, vomiting, collapse, loss of consciousness, convulsive movements, respiratory collapse and death.

Chronic (Delayed)

- No data available

Skin

Acute (Immediate) | Under normal conditions of use, no health effects are expected.

Chronic (Delayed) | No data available

Eye

Acute (Immediate) | Under normal conditions of use, no health effects are expected.

Chronic (Delayed) | No data available

Ingestion

Acute (Immediate) | Ingestion is not anticipated to be a likely route of exposure to this product.

Chronic (Delayed) | No data available

Key to abbreviations

LC = Lethal Concentration

Section 12 - Ecological Information

12.1 Toxicity

| Material data lacking.

12.2 Persistence and degradability

| Material data lacking.

12.3 Bioaccumulative potential

| Material data lacking.

12.4 Mobility in Soil

| Material data lacking.

12.5 Results of PBT and vPvB assessment

| No PBT and vPvB assessment has been conducted.

12.6 Other adverse effects

| No studies have been found.

Section 13 - Disposal Considerations

13.1 Waste treatment methods

Product waste | Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

Packaging waste | Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

Section 14 - Transport Information

	14.1 UN number	14.2 UN proper shipping name	14.3 Transport hazard class(es)	14.4 Packing group	14.5 Environmental hazards
DOT	UN1954	Compressed gas, flammable n.o.s. (Phosphine, Hydrogen)	2.1	NDA	NDA
TDG	UN1954	COMPRESSED GAS, FLAMMABLE, N.O.S. (Phosphine, Hydrogen)	2.1	NDA	NDA

IMO/IMDG	UN1954	COMPRESSED GAS, FLAMMABLE, N.O.S. (Phosphine, Hydrogen)	2.1	NDA	NDA
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14.6 Special precautions for user | Cylinders should be transported in a secure position, in a well-ventilated vehicle. The transportation of compressed gas cylinders in automobiles or in closed-body vehicles can present serious safety hazards. If transporting these cylinders in vehicles, ensure these cylinders are not exposed to extremely high temperatures (as may occur in an enclosed vehicle on a hot day). Additionally, the vehicle should be well-ventilated during transportation.

14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code | Not relevant.

Section 15 - Regulatory Information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

SARA Hazard Classifications | Acute, Fire, Pressure(Sudden Release of)

State Right To Know				
Component	CAS	MA	NJ	PA
Hydrogen	1333-74-0	Yes	Yes	Yes
Phosphine	7803-51-2	Yes	Yes	Yes

Inventory						
Component	CAS	Canada DSL	Canada NDSL	China	EU EINECS	EU ELNICS
Hydrogen	1333-74-0	Yes	No	Yes	Yes	No
Phosphine	7803-51-2	Yes	No	Yes	Yes	No

Inventory (Con't.)		
Component	CAS	TSCA
Hydrogen	1333-74-0	Yes
Phosphine	7803-51-2	Yes

Canada

Labor

Canada - WHMIS - Classifications of Substances

• Phosphine	7803-51-2	A, B1, D1A
• Hydrogen	1333-74-0	A, B1

Canada - WHMIS - Ingredient Disclosure List

• Phosphine	7803-51-2	1 %
• Hydrogen	1333-74-0	Not Listed

Environment

Canada - CEPA - Priority Substances List

• Phosphine	7803-51-2	Not Listed
• Hydrogen	1333-74-0	Not Listed

China

Environment**China - Ozone Depleting Substances - First Schedule**

• Phosphine	7803-51-2	Not Listed
• Hydrogen	1333-74-0	Not Listed

China - Ozone Depleting Substances - Second Schedule

• Phosphine	7803-51-2	Not Listed
• Hydrogen	1333-74-0	Not Listed

China - Ozone Depleting Substances - Third Schedule

• Phosphine	7803-51-2	Not Listed
• Hydrogen	1333-74-0	Not Listed

Other**China - Annex I & II - Controlled Chemicals Lists**

• Phosphine	7803-51-2	Not Listed
• Hydrogen	1333-74-0	Not Listed

China - Dangerous Goods List

• Phosphine	7803-51-2	
• Hydrogen	1333-74-0	(compressed or refrigerated liquid)

China - Export Control List - Part I Chemicals

• Phosphine	7803-51-2	Not Listed
• Hydrogen	1333-74-0	Not Listed

Europe**Other****EU - CLP (1272/2008) - Annex VI - Table 3.2 - Classification**

• Phosphine	7803-51-2	F+; R12 R17 T+; R26 C; R34 N; R50
• Hydrogen	1333-74-0	F+; R12

EU - CLP (1272/2008) - Annex VI - Table 3.2 - Concentration Limits

• Phosphine	7803-51-2	Not Listed
• Hydrogen	1333-74-0	Not Listed

EU - CLP (1272/2008) - Annex VI - Table 3.2 - Labelling

• Phosphine	7803-51-2	F+ T+ N R:12-17-26-34-50 S: (1/2)-28-36/37-45-61-63
• Hydrogen	1333-74-0	F+ R:12 S:(2)-9-16-33

EU - CLP (1272/2008) - Annex VI - Table 3.2 - Notes - Substances and Preparations

• Phosphine	7803-51-2	Not Listed
• Hydrogen	1333-74-0	Not Listed

EU - CLP (1272/2008) - Annex VI - Table 3.2 - Safety Phrases

• Phosphine	7803-51-2	S:(1/2)-28-36/37-45-61-63
• Hydrogen	1333-74-0	S:(2)-9-16-33

Germany**Environment****Germany - TA Luft - Types and Classes**

• Phosphine	7803-51-2	inorganic gas Substance: 5.2.4, Class I
• Hydrogen	1333-74-0	Not Listed
Germany - Water Classification (VwVwS) - Annex 1		
• Phosphine	7803-51-2	Not Listed
• Hydrogen	1333-74-0	ID Number 741, not considered hazardous to water
Germany - Water Classification (VwVwS) - Annex 2 - Water Hazard Classes		
• Phosphine	7803-51-2	ID Number 277, hazard class 2 - hazard to waters
• Hydrogen	1333-74-0	Not Listed
Germany - Water Classification (VwVwS) - Annex 3		
• Phosphine	7803-51-2	Not Listed
• Hydrogen	1333-74-0	Not Listed

Other**Germany - Specifically Regulated Chemicals in TRGS**

• Phosphine	7803-51-2	Not Listed
• Hydrogen	1333-74-0	Not Listed

Portugal**Other****Portugal - Prohibited Substances**

• Phosphine	7803-51-2	Not Listed
• Hydrogen	1333-74-0	Not Listed

United Kingdom**Environment****United Kingdom - Pollution Inventory - Schedule 1 - Thresholds for Releases to Air**

• Phosphine	7803-51-2	Not Listed
• Hydrogen	1333-74-0	Not Listed

Other**United Kingdom - Workplace Exposure Limits (WELs) - Substances in Review**

• Phosphine	7803-51-2	Not Listed
• Hydrogen	1333-74-0	Not Listed

United Kingdom - List of Dangerous Substances in Water

• Phosphine	7803-51-2	Not Listed
• Hydrogen	1333-74-0	Not Listed

United States**Labor****U.S. - OSHA - Process Safety Management - Highly Hazardous Chemicals**

• Phosphine	7803-51-2	100 lb TQ
• Hydrogen	1333-74-0	Not Listed

U.S. - OSHA - Specifically Regulated Chemicals

• Phosphine	7803-51-2	Not Listed
• Hydrogen	1333-74-0	Not Listed

Environment**U.S. - CAA (Clean Air Act) - 1990 Hazardous Air Pollutants**

• Phosphine	7803-51-2	
• Hydrogen	1333-74-0	Not Listed

U.S. - CERCLA/SARA - Hazardous Substances and their Reportable Quantities

• Phosphine	7803-51-2	100 lb final RQ; 45.4 kg final RQ
• Hydrogen	1333-74-0	Not Listed

U.S. - CERCLA/SARA - Radionuclides and Their Reportable Quantities

• Phosphine	7803-51-2	Not Listed
• Hydrogen	1333-74-0	Not Listed

U.S. - CERCLA/SARA - Section 302 Extremely Hazardous Substances EPCRA RQs

• Phosphine	7803-51-2	100 lb EPCRA RQ
• Hydrogen	1333-74-0	Not Listed

U.S. - CERCLA/SARA - Section 302 Extremely Hazardous Substances TPQs

• Phosphine	7803-51-2	500 lb TPQ
• Hydrogen	1333-74-0	Not Listed

U.S. - CERCLA/SARA - Section 313 - Emission Reporting

• Phosphine	7803-51-2	1.0 % de minimis concentration
• Hydrogen	1333-74-0	Not Listed

U.S. - CERCLA/SARA - Section 313 - PBT Chemical Listing

• Phosphine	7803-51-2	Not Listed
• Hydrogen	1333-74-0	Not Listed

U.S. - RCRA (Resource Conservation & Recovery Act) - Hazardous Constituents - Appendix VIII to 40 CFR 261

• Phosphine	7803-51-2	waste number P096
• Hydrogen	1333-74-0	Not Listed

U.S. - RCRA (Resource Conservation & Recovery Act) - P Series Wastes - Acutely Toxic Wastes

• Phosphine	7803-51-2	waste number P096
• Hydrogen	1333-74-0	Not Listed

United States - California**Environment****U.S. - California - Proposition 65 - Carcinogens List**

• Phosphine	7803-51-2	Not Listed
• Hydrogen	1333-74-0	Not Listed

U.S. - California - Proposition 65 - Developmental Toxicity

• Phosphine	7803-51-2	Not Listed
• Hydrogen	1333-74-0	Not Listed

U.S. - California - Proposition 65 - Maximum Allowable Dose Levels (MADL)

• Phosphine	7803-51-2	Not Listed
• Hydrogen	1333-74-0	Not Listed

U.S. - California - Proposition 65 - No Significant Risk Levels (NSRL)

• Phosphine	7803-51-2	Not Listed
• Hydrogen	1333-74-0	Not Listed

U.S. - California - Proposition 65 - Reproductive Toxicity - Female

• Phosphine	7803-51-2	Not Listed
• Hydrogen	1333-74-0	Not Listed

U.S. - California - Proposition 65 - Reproductive Toxicity - Male

• Phosphine	7803-51-2	Not Listed
• Hydrogen	1333-74-0	Not Listed

United States - Pennsylvania**Labor****U.S. - Pennsylvania - RTK (Right to Know) - Environmental Hazard List**

• Phosphine	7803-51-2	
• Hydrogen	1333-74-0	Not Listed

U.S. - Pennsylvania - RTK (Right to Know) - Special Hazardous Substances

• Phosphine	7803-51-2	Not Listed
• Hydrogen	1333-74-0	Not Listed

15.2 Chemical Safety Assessment

| No Chemical Safety Assessment has been carried out.

Section 16 - Other Information**Relevant Phrases (code & full text)**

| H314 - Causes severe skin burns and eye damage.
 | H330 - Fatal if inhaled
 | H400 - Very toxic to aquatic life
 | R17 - Spontaneously flammable in air.
 | R26 - Very toxic by inhalation.
 | R34 - Causes burns.
 | R50 - Very toxic to aquatic organisms.

Last Revision Date

| 08/December/2014

Preparation Date

| 08/December/2014

Disclaimer/Statement of Liability

| To the best of Air Liquide'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 gas mixture 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.

Key to abbreviations

NDA = No Data Available