



AIR LIQUIDE

**Safety Data Sheet FOR
Phosphine $\geq 10\%$ in Hydrogen**

In an emergency, call CHEMTREC® at 800-424-9300 or collect 703-527-3887.

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

Product identification used on label

Product identifier Phosphine $\geq 10\%$ in Hydrogen MSDS ID : P001-YA (Part Nbr: P001-YA)

Details of the supplier of the safety data sheet

Air Liquide Advanced Materials
Post Office Box 5357
North Branch, New Jersey 08876-5357 USA
Voice: 908-231-9060 or 800-865-8249; Facsimile: 908-231-9063
800-424-9300 or call collect 703-527-3887.

Emergency telephone number

Other means of identification:

Protium Hydrogen phosphide, phosphoretted hydrogen, phosphorus trihydride, phosphorus hydride.

SECTION 2 Hazards identification

Classification of the chemical in accordance with paragraph (d) of §1910.1200;

GHS Hazard Symbols



GHS Classification

Flammable Gas Category 1
Gases under pressure - Compressed Gas
Acute Toxicity - Inhalation Gas Category 1
Skin Corrosion/Irritation Category 1B
Serious Eye Damage/Eye Irritation Category 1
Hazardous to the aquatic environment - Acute Category 2
Pyrophoric Gas Category 1

Signal Word

Danger

Hazard Statements

Extremely flammable gas.
Contains gas under pressure; may explode if heated.
Causes severe skin burns and eye damage.
Causes serious eye damage.
Fatal if inhaled.
Toxic to aquatic life..
Catches fire spontaneously if exposed to air

Precautionary Statements

Keep away from heat/sparks/open flames/hot surfaces. – No smoking.
Do not breathe dust/fume/gas/mist/vapours/spray.
Wash thoroughly after handling.
Use only outdoors or in a well-ventilated area.
Avoid release to the environment.
Wear protective gloves/protective clothing/eye protection/face protection.
Wear respiratory protection.

Response

IF SWALLOWED: rinse mouth. Do NOT induce vomiting.
IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Con



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	Immediately call a POISON CENTER/doctor/...
	Specific treatment is urgent (see ... on this label).
	Specific treatment (see ... on this label).
	Wash contaminated clothing before reuse.
	Leaking gas fire:
	Do not extinguish, unless leak can be stopped safely.
	Eliminate all ignition sources if safe to do so.
Storage	Store in a well-ventilated place.
	Store in a well-ventilated place. Keep container tightly closed.
	Store locked up.
	Protect from sunlight. Store in a well-ventilated place.
Disposal	Dispose of contents/container in accordance with local/regional/national/international regulation for hazardous waste
Acute Toxicity Oral	15 % of the mixture consists of ingredient(s) of unknown toxicity
Contains	
Acute Toxicity	15 % of the mixture consists of ingredient(s) of unknown toxicity
Dermal Contains	

SECTION 3 Composition/information on ingredients

Chemical Name	CAS #	%
Hydrogen	1333-74-0	87.6 - 99
Phosphine	7803-51-2	≥ 10

SECTION 4 First aid measures

Inhalation	Asphyxiation is the primary health effect via inhalation. The concentration required for asphyxiation is above the upper flammable limit. A boundary region, in the flammable range, may exist between contaminated and uncontaminated areas. Take appropriate precaution against ignition of the atmosphere in this region. This is the primary route of exposure. Remove the affected person from the gas source or contaminated area. Note: Personal Protective Equipment (PPE), including positive pressure, self contained breathing apparatus, may be required to assure the safety of the rescuer. If the affected person is not breathing spontaneously, administer rescue breathing. If medical oxygen and appropriately trained personnel are available, administer 100% oxygen to the affected person. Summon an emergency ambulance. If an ambulance is not available, contact a physician, hospital, or poison control center for instruction. Keep the affected person warm, comfortable, and at rest while awaiting professional medical care. Monitor breathing and pulse continuously.
Eyes	No detrimental effect of eye contact has been reported. Flush continuously with clean water until the professional medical assistance arrives, but for no less than thirty minutes. Continuation of flushing until patient is transferred to an ophthalmologist or emergency physician is recommended.
Skin Contact	No detrimental effect of skin contact has been reported. Treat thermal burns by flushing with cool water to assure that affected area is cool, then applying dry sterile dressings. If the patient is burned on the face, neck, head, or chest, assume that the airway may also have been burned and obtain professional medical assistance immediately. Flush with a copious stream of water while removing contaminated clothing. Continue flushing until the professional medical assistance arrives, but for no less than fifteen minutes. Assume the patient has also been exposed by inhalation and obtain professional medical assistance immediately.
Ingestion	Ingestion is not a commonly observed route of exposure to this material.
Note to Doctor	The combustion product of hydrogen and air is water. The reaction product of phosphine and moist air is phosphoric acid. Therefore, skin and eye burns should be treated as both thermal and chemical.

SECTION 5 Firefighting measures



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Flammability Summary

Extinguishing media

Fire and/or Explosion Hazards

Fire Fighting Methods and Protection

Pyrophoric

None. None.

Vapors may be ignited by heat, sparks, flames or other sources of ignition at or above the low flash point giving rise to a Class B fire. Vapors are heavier than air and may travel to a source of ignition and flash back.

Do not enter fire area without proper protection including self-contained toxic breathing apparatus and full protective equipment. Fight fire from a safe distance and a protected location due to the potential of hazardous vapors and decomposition products.

Flammable component(s) of this material may be lighter than water and burn while floating on the surface. Use water spray/fog for cooling. The only safe way to extinguish a flammable gas fire is to stop the flow of gas.

If the flow cannot be stopped, allow the entire contents of the container or cylinder to burn.

Cool the container or cylinder, and surroundings with water from a suitable distance. Extinguishing the fire without stopping the flow of material may permit the formation of ignitable or explosive mixtures with air.

These mixtures may propagate to a source of ignition.

Excessive pressure may develop in containers or cylinders exposed to fire, which may result in explosion, regardless of the its content.

Containers or cylinders with pressure relief devices (PRD's) may release their contents through such devices if the container or cylinder is exposed to fire.

Containers or cylinders without PRD's have no provision for controlled release and are therefore more likely to explode if exposed to fire.

Positive pressure, self contained breathing apparatus is required for all fire fighting involving hazardous materials.

Full structural firefighting (bunker) gear is the minimum acceptable attire.

The need for proximity, entry, and flashover protection and special protective clothing should be determined for each incident by a competent firefighting safety professional.

Hazardous Combustion Products

None Known, Phosphorus oxide, which dissolves in water to form phosphoric acid.

SECTION 6 Accidental release measures

Personal precautions, protective equipment and emergency procedures

This material is a gas at atmospheric conditions. The only means of containment is the enclosure of the space into which the material is released. If the release is not contained in an appropriate device or system, all personnel not appropriately protected (see Section 8) must evacuate the contaminated spaces. Consider evacuation of additional areas, as a precaution against the spread of the release or subsequent explosion or fire. As this material is a gas at atmospheric conditions, the only means of containment is the enclosure of the space into which the materials are released. Such containment is described in Section 7.

Clean up consists of passing the entire gas volume of the enclosure through appropriate exhaust gas treatment equipment (EGTE). Purge the enclosure with a non-reactive gas, such as nitrogen, through the EGTE until an acceptably low level of contamination remains. The primary consideration is flammability. Purge any enclosure with a non-reactive gas, such as nitrogen through the EGTE, until an acceptably low level of contamination remains. Equipment contaminated by this material must then be cleaned or decommissioned appropriately. Most, but not all, releases of phosphine into air will autoignite. As all leaks might not react, consider the formation of ignitable or explosive mixtures with air. If the release is not contained in an appropriate device or system, all personnel not appropriately protected (see Section 8) must evacuate the contaminated spaces.



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Consider evacuation of additional areas, as a precaution against the spread of the release.

SECTION 7 Handling and storage

Precautions for safe handling

Handle this material only in sealed, purged systems. The design of handling systems for hazardous materials is beyond the scope of this SDS, and should be performed by a competent, experienced professional. Consider the use of double-contained piping; diaphragm or bellows sealed, soft seat valves; backflow prevention devices; flash arrestors; and flow monitoring or limiting devices. Gas cabinets, with appropriate exhaust treatment, are recommended, as is automatic monitoring of the secondary enclosures and work areas for release.

Handle sealed gas cylinders in accordance with CGA P-1, Safe Handling of Compressed Gasses in Containers.

Some material may have accumulated behind the outlet plug. Face the outlet away from you and wear appropriate protective equipment when removing the plug to connect the container to your system.

Never introduce any substance into a gas container. If you believe your container may have been contaminated, notify Air Liquide immediately. Provide as much information as possible on the nature and quantity of contamination.

Conditions for safe storage, including any incompatibilities

Store containers in accordance with CGA P-1, Safe Handling of Compressed Gases in Cylinders, local building and fire codes, and other relevant regulations. Materials should be segregated by the hazards they comprise for storage.

Protect the containers from direct sunlight, precipitations, mechanical damage, and temperatures above 52°C (125°F).

Incompatible materials

Ship and store containers with the outlet plug and valve protective cap in place. Oxidizers, Air, Oxygen, Halogens, Nitric acid

SECTION 8 Exposure controls/personal protection

Control parameters

<u>Chemical Name</u>	<u>ACGIH TLV</u>	<u>ACGIH STEL</u>	<u>OSHA PEL</u>
Hydrogen	No TLV	No STEL	Simple Asphyxiant
Phosphine	0.3 ppm	1 ppm	0.3 ppm

Engineering Measures

Local exhaust is required. Secondary containment, with appropriate exhaust gas treatment, is strongly encouraged and required in some jurisdictions.

Monitor the work area and the secondary containment for release of the material. Automatic alerting of personnel and automatic shutdown of flow are appropriate in most applications and are required in some jurisdictions.

Purge all primary containment systems with a nonreactive gas, such as nitrogen, before introducing this material. Purge all primary containment systems with a nonreactive gas, such as nitrogen, before introducing this material. Monitor the work area and the secondary containment continuously for release



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of the material. Automatic alerting of personnel and automatic shutdown of flow are appropriate in most applications and are required in some jurisdictions.

Respiratory Protection Positive pressure, full face, air supplied breathing apparatus should be used for work within a confined space if a leak is suspected or the primary containment is to be opened, e.g., for a cylinder change. Air supplied breathing apparatus is required for response to demonstrated or suspected releases from the primary containment. Positive pressure, full face, air supplied breathing apparatus should be used for work within the secondary containment equipment if a leak is suspected or the primary containment is to be opened, e.g., for a container change.

Eye Protection When using respiratory protection as described above, use a face mask that provides splash and impact protection for the face and eyes. Wear safety glasses when handling this product. When using respiratory protection as described above, use a face mask that provides splash and impact protection for the face and eyes. For handling sealed cylinders, wear safety glasses. For handling sealed containers, wear safety glasses.

Skin Protection Wear appropriate gloves when handling sealed cylinders. Use gloves and other skin protection, as assigned by a competent safety professional, when working within the secondary enclosure with the primary enclosure compromised, e.g., cylinder changing, to protect from exposure to the material and from fire that may result from its release to the air. For response to demonstrated or suspected releases from the primary containment, the need for whole-body exposure protection should be determined by a competent safety professional.

Gloves Wear appropriate gloves when handling sealed cylinders.

SECTION 9 Physical and chemical properties

Color	Colorless
Odor	Strong garlic, decomposing fish, stale urine
Odor Threshold	No Data Available
pH	ND
Melting Point	-259 °C
Boiling Point	-253 °C
Evaporation Rate	No Data Available
Lower Flammable/Explosive Limit, % in air	4
Upper Flammable/Explosive Limit, % in air	75
Vapor Pressure	35.6 bar at 20°C
Vapor Density	0.082 g/L 1.53 g/L
Specific Gravity	0
Autoignition Temperature	Approximately 38 °C
Solubility in Water	0.0182 0.27
Octanol/Water Partition Coefficient	No Data Available
Viscosity	No Data Available
Volatiles, % by weight	0
Bulk Density	0
Molecular Formula	H2 PH3
Molecular Weight	2.02 g/mol 34 g/mol

SECTION 10 Stability and reactivity

Reactivity	No Data Available
Chemical stability	Stable under normal conditions. Hydrogen is stable. Diphosphine may also result from thermal decomposition. At elevated temperature (above 150 C),



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Possibility of hazardous reactions
Conditions to avoid

phosphine decomposes to phosphorus and hydrogen.
Oxidizers, Air, Oxygen, Halogens, Nitric acid
None known. Sources of ignition, exposure to air, Temperatures above 50 oC (122 oF) or below 0 oC (32 oF), sources of ignition, exposure to air.

Incompatible materials
Hazardous decomposition products

Oxidizers, Air, Oxygen, Halogens, Nitric acid
None Known, Phosphorus oxide, phosphorus, hydrogen, diphosphine.

SECTION 11 Toxicological information

Routes of Entry

Hydrogen is not toxic by any route. Asphyxia may result if the oxygen concentration is reduced to below 18% by displacement., The primary route of exposure is inhalation., At low concentration, At high concentrations, phosphine autoignites, creating a thermal burn risk., but reducing the toxic hazard.

Target Organs Potentiall Affected by Exposure

None known, Respiratory and cardiovascular systems. Neurological and gastrointestinal effects have also been reported, as have renal and hepatic toxicity. , as have renal and hepatic toxicity.

Chemical Interactions that Change Toxicity
Medical Conditions Aggravated by Exposure

No chemical interaction known to affect toxicity.
No data found

Immediate (Acute) Health Effects by Route of Exposure

Long-Term (Chronic) Health Effects

Carcinogenicity None of the substances have been shown to cause cancer in long term animal studies. Not a carcinogen according to NTP, IARC, or OSHA.

Reproductive and Developmental Toxicity No data available to indicate product or any components present at greater than 0.1% may cause birth defects.

Mutagenicity No data available to indicate product or any components present at greater than 0.1% is mutagenic or genotoxic.

Component Toxicology Data (NIOSH):

Chemical Name	CAS Number	Inhalation (LC50 ppm - rat)	Ingestion (LD 50 mg/kg - rat)	Absorption
Phosphine	7803-51-2	Inhalation LC50 (4h) Rat 11 ppm		

SECTION 12 Ecological information

Overview This material is not expected to be harmful to the ecology.
Mobility No data
Persistence No data
Bioaccumulation No data
Ecological Toxicity Data No data

SECTION 13 Disposal considerations

Waste Description for Spent Product This material meets the criteria for an "acute hazardous waste".
Disposal Methods Treat process and exhaust streams appropriately before release to the atmosphere.
Waste Disposal Code(s) P096, D001 (ignitability)



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SECTION 14 Transport information

UN number	UN1953
UN proper shipping name	COMPRESSED GAS, TOXIC, FLAMMABLE, N.O.S.
Technical Name	Phosphine ≥10% in Hydrogen
IATA Air Shipping Name	
Transport hazard class(es)	2.3, 2.1
Environmental hazards	Not a marine pollutant.
Toxic By Inhalation Zone:	A
Via cargo aircraft shipments, IATA requirements:	Forbidden
Via passenger aircraft shipments, IATA requirements:	Forbidden
Via Air, IATA emergency response guide nbr:	10P
North American Emergency Response Guide Nbr:	119
Via water, IMDG code:	2125-1
Via water, IMO Emergency Response Procedures (EmS Guide):	340
Via water, IMO Medical First Aid Guide (MFAG):	F-D, S-U
USDOT Special Permits Air Liquide Advanced Materials is a party to for this product:	SP-12339

**Domestic
Transportation
Labels**



**International
Transportation
Labels**



**Other
Transportation
Labels**

No "Cargo only" label required. Not a marine pollutant.

SECTION 15 Regulatory information

TSCA Status All components in this product are on the TSCA Inventory.

Chemical Name	CAS #	Regulation	% Range
Phosphine	7803-51-2		>= 10
Phosphine	7803-51-2	SARA 313	>= 10
Phosphine	7803-51-2	SARA EHS	>= 10

SECTION 16 Other information

Revision 11-06-2015

Date

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Revision Number 11

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