

Hydrogen
Material Safety
Data Sheet

BOGGS GASES

620 Main Street
 Titusville, FL 32796
 Phone: (321) 267-4110
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EMERGENCY PHONE #: Chemtrec: 1-800-424-9300		Created: January 01, 2003 Revised: January 01, 2007	
MANUFACTURER'S NAME: BOGGS GASES 620 Main Street Titusville, FL 32796-3488 Ph: (321) 267-4110 FAX: (321) 267-7171		TRADE NAME AND SYNONYMS: Hydrogen, or Liquid Hydrogen (in cryogenic liquid state)	CHEMICAL NAME AND SYNONYMS: Hydrogen
		FORMULA H2 MW: 2.016	CHEMICAL FAMILY: Flammable Gas CAS #1333-74-0

HEALTH HAZARD DATA

EXPOSURE LIMITS: Hydrogen is classified as a simple asphyxiant and has no threshold limit value (TLV). Hydrogen is not listed as a carcinogen by OSHA.
SYMPTOMS IF INGESTED, CONTACTED WITH SKIN, OR VAPOR INHALED: Hydrogen is nontoxic and classified as a simple asphyxiant. Symptoms of anoxia occur only when gas concentrations are within the flammable range and the mixture has not ignited. DO NOT ENTER AREAS WITHIN THE FLAMMABLE RANGE DUE TO THE IMMEDIATE FIRE AND EXPLOSION HAZARD. Contact of skin with liquid hydrogen or cold gas vapors can cause cryogenic (extreme low temperature) burns and freeze tissues.
TOXICOLOGICAL PROPERTIES: Hydrogen is nontoxic and classified as a simple asphyxiant, but is extremely flammable. The amount of hydrogen gas necessary to reduce oxygen concentrations below life support levels is well within the flammable range. Do not enter areas containing flammable mixtures due to the immediate fire and explosion hazard.
RECOMMENDED FIRST AID TREATMENT Persons suffering from lack of oxygen should be moved to areas with normal atmospheres. SELF-CONTAINED BREATHING APPARATUS MAY BE REQUIRED TO PREVENT ASPHYXIATION OF RESCUE WORKERS. Assisted respiration and supplemental oxygen should be given if the victim is not breathing. If cryogenic liquid or cold boil-off gas contacts a worker's skin or eyes, frozen tissues should be flooded or soaked with tepid water (105-115F; 41-46C). DO NOT USE HOT WATER. Cryogenic burns which result in blistering or deeper tissue freezing should be seen promptly by a physician.

FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method Used) N/A (gas at normal temperature)	AUTO IGNITION TEMP 932 F (500 C)	FLAMMABLE LIMITS In air @ 1 atm	LEL 4.00%	UEL 74%
EXTINGUISHING MEDIA Carbon dioxide, dry chemical, Halon			ELECTRICAL CLASSIFICATION GROUP Class 1, Group B	
SPECIAL FIRE FIGHTING PROCEDURES Stop gas flow and fight fire conventionally. Use water spray to keep cylinders or other containers cool if exposed to fire. Keep personnel well away since containers can rupture violently when exposed to fire. For additional information, see CGA Safety Bulletin SB-4.				

UNUSUAL FIRE AND EXPLOSION HAZARDS Hydrogen can burn with almost an invisible flame of low thermal radiation. People have unknowingly walked into hydrogen flames. Easily ignited; minimum ignition energy is low (0.2J) and flammable range is wide. Flame propagates at rapid rate. Potential explosion hazard from reignition if fire is extinguished without shutting off hydrogen source. Hydrogen gas is buoyant and can accumulate in the upper sections of enclosed spaces.

PHYSICAL DATA

BOILING POINT (F) @ 1 atm -423.0F (-252.8C)	FREEZING POINT (F) @ 1 atm -434.5F (-259.2C)	
VAPOR PRESSURE (psia) N/A	SOLUBILITY IN WATER @ 68F (20C), 1 atm 1.82% by volume	VAPOR DENSITY (lb/cu ft) @ 68F (20C), 1 atm 0.005229
SPECIFIC GRAVITY (AIR=1) @ 68F (20C), 1 atm 0.0696	LIQUID DENSITY (lb/cu ft) @ boiling point, 1 atm 4.432	SPECIFIC GRAVITY (H2O=1) @ boiling point, 1 atm 0.0710
APPEARANCE AND ODOR Both liquid and gaseous hydrogen are colorless and odorless.		

REACTIVITY DATA

STABILITY	UNSTABLE		CONDITIONS TO AVOID Sources of ignition, sparks, flames, hot objects
	STABLE	X	
INCOMPATIBILITY (Materials to avoid) Oxidizing materials. Some steels are susceptible to hydrogen attack or embrittlement at high temperature and pressure.			
HAZARDOUS DECOMPOSITION PRODUCTS None			
HAZARDOUS POLYMERIZATION	MAY OCCUR		CONDITIONS TO AVOID
	WILL NOT OCCUR	X	None

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SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

Ventilate area to prevent flammable mixture from forming. Remove sources of ignition, heat, sparks, etc. Avoid entering area of flammable atmosphere. Carefully remove cylinders with slow leaks to a remote outdoor location. Contact Boggs Gases for assistance.

WASTE DISPOSAL METHOD

Do not attempt to dispose of residual gaseous Hydrogen in cylinders. Return to Boggs Gases for disposal with positive residual pressure. Tightly close cylinder valves and secure valve cap. Do not dispose of liquid hydrogen - contact Boggs Gases for assistance.

SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (Specify type)

VENTILATION

Natural or mechanical where gas is present

LOCAL EXHAUST

MECHANICAL (General)

SPECIAL

Mechanical ventilation for enclosed storage areas must meet National Electric Code requirements for Class 1, Group B.

PROTECTIVE GLOVES

Ordinary leather work gloves are recommended for cylinder handling. Loose fitting gloves of impermeable material are recommended for use with liquid hydrogen.

EYE PROTECTION

Safety glasses are recommended when handling cylinders. Use safety glasses or goggles when handling liquid.

OTHER PROTECTIVE EQUIPMENT

SPECIAL PRECAUTIONS*

SPECIAL LABELING INFORMATION

DOT Shipping Name: Hydrogen
DOT Hazard Class: Flammable Gas
DOT Shipping Label: Flammable Gas
I.D. Number: UN 1049 (Hydrogen or Hydrogen, Compressed); UN 1966 (Liquid Hydrogen)

SPECIAL HANDLING RECOMMENDATIONS

Hydrogen shipments must be in accordance with Department of Transportation (DOT) regulations using the DOT "FLAMMABLE GAS" label. Consult DOT regulations for details on the shipping of hazardous materials.

SPECIAL STORAGE RECOMMENDATIONS

Use only in well ventilated areas. Hydrogen gas cylinders contain gas at high pressure and should be handled with care. Use a pressure reducing regulator set at less than 15 psig. Always keep Hydrogen cylinders upright and secure cylinders when in use. Never expose and Hydrogen cylinder to heat. Always open and close Hydrogen valves slowly. Return cylinders to Boggs Gases with positive pressure and cylinder valve closed. Avoid dragging, rolling, or sliding cylinders, even for a short distance. Use a suitable handtruck. For additional handling recommendations on compressed gas cylinders, consult Compressed Gas Association Pamphlet P-1. is not in use. Avoid exposure to areas where salt or other corrosive chemicals are present. See Compressed Gas Association Pamphlet P-1 for additional storage recommendations.

SPECIAL PACKAGING RECOMMENDATIONS

Gaseous hydrogen containers meet DOT specifications or ASME codes. Liquid hydrogen is stored in vacuum-insulated containers meeting DOT specifications or ASME codes.

OTHER RECOMMENDATIONS OR PRECAUTIONS

Liquid hydrogen in exposed piping can actually cause air to condense and liquefy. The nitrogen in this liquid can evaporate more rapidly, leaving and oxygen enriched liquid behind. Utilize oxygen-compatible insulating materials and minimize exposed piping surface areas. Use only metals and materials compatible with extremely low temperatures. Avoid use of carbon steel and other materials which become brittle at low temperatures. Compressed gas cylinders should not be refilled except by qualified producers of compressed gases. The atmosphere in areas in which hydrogen gas may be vented and collect should be tested with a flammable gas analyzer.

* Various Government agencies (i.e., Department of Transportation, Occupational Safety and Health Administration, Food and Drug Administration and others) may have specific regulations concerning the transportation handling, storage or use of this product which will not be reflected in this data sheet. The customer should review these regulations to ensure that s/he is in full compliance.