

MATERIAL SAFETY DATA SHEET

An explanation of the terms used herein may be found in OSHA 29 CFR 1910.1200,
available from OSHA regional or area offices.

(Essentially similar to U.S. Department of Labor Form OSHA-20
and generally accepted in Canada for information purposes)
Do Not Duplicate This Form. Request an Original.

**I. PRODUCT IDENTIFICATION**

PRODUCT	Hydrogen		
CHEMICAL NAME	Hydrogen	SYNONYMS	Not Applicable
FORMULA	H ₂	CHEMICAL FAMILY	Not Applicable
		MOLECULAR WEIGHT	2.016
TRADE NAME	Hydrogen		

II. HAZARDOUS INGREDIENTS

For mixtures of this product request the respective component Material Safety Data Sheets.
(See Section IX.)

MATERIAL (CAS NO.)	Wt. (%)	1984-1985 ACGIH TLV-TWA (OSHA-PEL)	
Hydrogen (1333-74-0)	100	Simple asphyxiant	(None currently established)

III. PHYSICAL DATA

BOILING POINT, 760 mm. Hg	-252.77°C (-422.99°F)	FREEZING POINT	-259.2°C (-434.6°F)
SPECIFIC GRAVITY (H₂O = 1)	Gas	VAPOR PRESSURE AT 20°C.	Gas
VAPOR DENSITY (air = 1)	0.0696 @ 21°C (70°F)	SOLUBILITY IN WATER, % by wt.	Negligible
PERCENT VOLATILES BY VOLUME	100	EVAPORATION RATE (Butyl Acetate = 1)	Not Applicable
APPEARANCE AND ODOR Colorless gas at normal temperature and pressure; odorless.			

EMERGENCY PHONE NUMBER

IN CASE OF EMERGENCIES involving this material, further information is available at all times:
In the USA 1-800-UCC-HELP (1-800-822-4357) In Canada 514-645-5311
For routine information contact your local supplier

Union Carbide requests the users of this product to study this Material Safety Data Sheet (MSDS) and become aware of product hazards and safety information. To promote safe use of this product a user should (1) notify its employees, agents and contractors of the information on this MSDS and any product hazards and safety information, (2) furnish this same information to each of its customers for the product, and (3) request such customers to notify their employees and customers for the product of the same product hazards and safety information.

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IV. HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE: See Section II.

EFFECTS OF SINGLE (ACUTE) OVEREXPOSURE:

SWALLOWING — Unlikely route of exposure, this product is a gas.

SKIN ABSORPTION — No evidence of adverse effects from available information.

INHALATION — Asphyxiant. Moderate concentrations may cause headache, drowsiness, dizziness, excitation, excess salivation, vomiting, and unconsciousness.

SKIN CONTACT — No evidence of adverse effects from available information.

EYE CONTACT — No evidence of adverse effects from available information.

EFFECTS OF REPEATED (CHRONIC) OVEREXPOSURE: No evidence of adverse effects from available information.

OTHER EFFECTS OF OVEREXPOSURE: Hydrogen is an asphyxiant. Lack of oxygen can cause death.

MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE: A knowledge of the available toxicology information and of the physical and chemical properties of the material suggest that overexposure is unlikely to aggravate existing medical conditions.

SIGNIFICANT LABORATORY DATA WITH POSSIBLE RELEVANCE TO HUMAN HEALTH HAZARD EVALUATION: None currently known.

EMERGENCY AND FIRST AID PROCEDURES:

SWALLOWING — This product is a gas at normal temperature and pressure.

SKIN CONTACT — Wash with soap and water.

INHALATION — Remove to fresh air. Give oxygen if breathing is difficult. Give artificial respiration if not breathing. Call a physician immediately.

EYE CONTACT — Flush with water.

NOTES TO PHYSICIAN: *There is no specific antidote. This product is relatively inert. Treatment of overexposure should be directed at the control of symptoms and the clinical condition.*

V. FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (test method)	Flammable Gas	AUTOIGNITION TEMPERATURE	520°C (968°F)
FLAMMABLE LIMITS IN AIR, % by volume	LOWER 4%	UPPER	75%

EXTINGUISHING MEDIA: CO₂, Dry Chemicals, water spray or fog.

SPECIAL FIRE FIGHTING PROCEDURES: Evacuate all personnel from danger area. Immediately cool container with water spray from maximum distance, taking care not to extinguish flames. Remove ignition sources if without risk. If flames are accidentally extinguished, explosive re-ignition may occur. Use self-contained breathing apparatus. Stop flow of gas if without risk while continuing cooling water spray. Remove all containers from area of fire if without risk. Allow fire to burn out. On site fire brigades must comply with OSHA 29 CFR 1910.156.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Flammable gas. Flame is nearly invisible. Escaping gas may ignite "spontaneously". Hydrogen has a low ignition energy. Fireball is formed if gas cloud is ignited immediately after release.

Forms explosive mixtures with air and oxidizing agents. Container may rupture due to heat of fire. Do not extinguish flames due to possibility of explosive re-ignition. Flammable gas may spread from spill. Explosive atmospheres may linger. Before entering area, especially confined areas, check atmosphere with approved device. No part of a container should be subjected to a temperature higher than 52°C (approximately 125°F). Most containers are provided with a pressure relief device designed to vent contents when they are exposed to elevated temperature.

VI. REACTIVITY DATA

STABILITY		CONDITIONS TO AVOID: See Section IX.
UNSTABLE	STABLE	
	X	

INCOMPATIBILITY (materials to avoid): Oxidizing agents, lithium, halogens.

HAZARDOUS DECOMPOSITION PRODUCTS: None.

HAZARDOUS POLYMERIZATION		CONDITIONS TO AVOID: None currently known.
May Occur	Will not Occur	
	X	

VII. SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED:

DANGER: Forms explosive mixtures with air (see Section V).

Immediately evacuate all personnel from danger area. Use self-contained breathing apparatus where needed. Remove all sources of ignition if without risk. Reduce gas with fog or fine water spray. Shut off leak if without risk. Ventilate area of leak or move leaking container to well-ventilated area.

CAUTION: Flammable gas may spread from spill. Before entering area, especially confined areas, check atmosphere with appropriate device.

WASTE DISPOSAL METHOD: Prevent waste from contaminating surrounding environment. Keep personnel away. Discard any product, residue, disposable container or liner in an environmentally acceptable manner, in full compliance with Federal, State and local regulations.

VIII. SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (specify type): Select in accordance with OSHA 29 CFR 1910.134. Respirators shall be acceptable to MSHA and NIOSH.

VENTILATION	LOCAL EXHAUST — Explosion-proof system is acceptable.
	MECHANICAL (general) — Inadequate.
	SPECIAL — Not applicable.
	OTHER — Not applicable.

PROTECTIVE GLOVES: Preferred for cylinder handling.

EYE PROTECTION: Select in accordance with OSHA 29 CFR 1910.133.

OTHER PROTECTIVE EQUIPMENT: Metatarsal shoes for cylinder handling. Select in accordance with OSHA 29 CFR 1910.132 and 1910.133.

IX. SPECIAL PRECAUTIONS

DANGER: Flammable gas under high pressure.

Use piping and equipment adequately designed to withstand pressures to be encountered. May form explosive mixtures with air. Ground all equipment. Only use spark-proof tools and explosion-proof equipment. Keep away from heat, sparks and open flame. Store and use with adequate ventilation at all times. Use only in a closed system. Close valve when not in use and when empty. Keep away from oxidizing agents. In event of fire, cool cylinders with water spray from safe distance.

MIXTURES: When two or more gases, or liquefied gases are mixed, their hazardous properties may combine to create additional, unexpected hazards. Obtain and evaluate the safety information for each component before you produce the mixture. Consult an Industrial Hygienist or other trained person when you make your safety evaluation of the end product. Remember, gases and liquids have properties which can cause serious injury or death.

Be sure to read and understand all labels and other instructions supplied with all containers of this product.

For safety information on general handling of compressed gas cylinders, obtain a copy of pamphlet P-1, "Safe Handling of Compressed Gases in Containers" from the Compressed Gas Association, Inc., 1235 Jefferson Davis Highway, Arlington, VA 22202.

OTHER HANDLING AND STORAGE CONDITIONS: Never work on a pressurized system. If there is a leak, close the cylinder valve, blow down the system by venting to a safe place, then repair the leak.

PREVENT FIRE: Protect cylinders from direct sunlight and store in well-ventilated area. Protect containers from physical damage. Preferably, isolate from cylinders of oxygen and chlorine. Do not load together with explosives, poisons, radioactive materials and organic peroxides.

The opinions expressed herein are those of qualified experts within Union Carbide. We believe that the information contained herein is current as of the date of this Material Safety Data Sheet. Since the use of this information and these opinions and the conditions of use of the product are not within the control of Union Carbide, it is the user's obligation to determine the conditions of safe use of the product.



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