1.0 Chemical Identity		
1.1	Product Name	Hydrogen
	Synonyms	Hydrogen
	CAS No	1333-74-0
	Formula	H_2
1.2	Recommended Use and Restrictions	
	Use of substance	Industrial use. Use as directed.
1.3	Company Information	
		Name: Al Kout Industrial Projects , Kuwait **Plant:** Salt & Chlorine Plant, Shuaiba, Kuwait **Company's Post Box No.:** 10277, Shuaiba-65453, Kuwait **Tel No.:** 00-(965)-22283726 Intercom: 3726, 3725 **Fax No.:** 00-(965)- 22284043 **Company's Emergency Phone No:** 00-(965)-, 23261029, 97216020, 99794511
1.4	Emergency Telephone Number	00-(965)-, 23261029, 97216020

2.0 Hazards Identification

2.1 Classification of the Substance or Mixture

GHS US Classification

Flame Gas1 H220
Compressed Gas H280

2.2 Label Elements

GHS US Labeling

Hazard Pictograms (GHS – US) :

Single Word (GHS-US) : Danger

Hazard Statements (GHS-US) : H220 - **EXTREMELY FLAMMABLE GAS**
H280 - CONTAINS GAS UNDER PRESSURE; MAY EXPLODE IF HEATED
OSHA-H01 - MAY DISPLACE OXYGEN AND CAUSE RAPID SUFFOCATION
CGA-HG04 - MAY FORM EXPLOSIVE MIXTURES WITH AIR
CGA-HG08 - BURNS WITH INVISIBLE FLAME

Precautionary Statements (GHS – US) : P202 - Do not handle until all safety precautions have been read and understood
P210 - Keep away from Heat, Open flames, Sparks, Hot surfaces. - No smoking
P271+P403 - Use and store only outdoors or in a well-ventilated place
P377 - Leaking gas fire: Do not extinguish, unless leak can be stopped safely
P381 - Eliminate all ignition sources if safe to do so
CGA-PG05 - Use a back flow preventive device in the piping
CGA-PG10 - Use only with equipment rated for cylinder pressure
CGA-PG12 - Do not open valve until connected to equipment prepared for use
CGA-PG06 - Close valve after each use and when empty
CGA-PG02 –
Protect from sunlight when ambient temperature exceeds 52°C (125°F)

2.3 Other Hazards

No additional information available

2.4 Unknown acute toxicity (GHS US)

Not Applicable

3.0 Composition/ Information on ingredients

3.1 Substances

Name : Hydrogen, Compressed
CAS No : 1333-74-0
EINECS number : 215-605-7
Finished Product Specification : Hydrogen-Gr-4

Chemical Analysis

No	Component	Unit of measurement	Value
	Hydrogen	Vol %	≥ 99.99
	Oxygen	Vol %	≤ 0.007
	Moisture as H_2O	Vol %	≤0.003

4.0 First Aid Measures

4.1. Description of first aid measures

Inhalation	In high concentrations may cause asphyxiation. Symptoms may include loss of mobility/consciousness. Victim may not be aware of asphyxiation. In low concentrations may cause narcotic effects. Symptoms may include dizziness, headache, nausea and lack of co-ordination. Remove victim to uncontaminated area wearing self-contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing has stopped.
Skin / Eye contact	In case of cold burns, flush copiously with water and obtain medic attention.
Ingestion	Ingestion is not considered a potential route of exposure

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

No additional information available

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

None.

5.0 Fire Fighting Measures

5.1. Extinguishing media

Suitable extinguishing media	Carbon dioxide, dry chemical powder, water spray, fog.

5.2. Special hazards arising from the substance or mixture

Fire hazard	EXTREMELY FLAMMABLE GAS. The hydrogen flame is nearly invisible Hydrogen has a low ignition energy; escaping hydrogen gas may ignite spontaneously. A fireball forms if the gas cloud ignites immediately after release. Hydrogen forms explosive mixtures with air and oxidizing agents.
Explosion hazard	EXTREMELY FLAMMABLE GAS. Forms explosive mixtures with air and oxidizing agents.
Reactivity	No reactivity hazard other than the effects described below.

5.3. Advice for firefighters

Firefighting instructions	If venting or leaking gas catches fire, do not extinguish flames. Flammable vapors may spread from leak, creating an explosive reignition hazard. Vapor can be ignited by pilot lights, other flames, smoking, sparks, heaters, electric equipment, static discharge, or other ignition sources at locations distant fror product handling point. Explosive atmospheres may linger. Before entering a area, especially a confined area, check the atmosphere with an appropriate device Evacuate all personnel from the danger area. Use self-contained breathing apparatus (SCBA) and protective clothing. Immediately cool containers with water from maximum distance. Stop flow of gas if safe to do so, while continuing cooling water spray. Remove ignition sources if safe to do so. Remove containers from area of fire if safe to do so. On-site fire brigades must comply with OSHA 29 CFR 1910.156 and applicable standards under 2 CFR 1910 Subpart L—Fire Protection.
Protection during firefighting	Compressed gas: asphyxiant. Suffocation hazard by lack of oxygen.
Special protective equipment for fire fighters	Standard protective clothing and equipment (Self Contained Breathing Apparatus) for fire fighters.
Specific methods	Use fire control measures appropriate for the surrounding fire. Exposure to fire and heat radiation may cause gas containers to rupture. Cool endangered containers with water spray jet from a protected position. Prevent water used in emergency cases from entering sewers and drainage systems Stop flow of product if safe to do so Use water spray or fog to knock down fire fumes if possible.

6.0 Accidental Release Measures

6.1. Personal precautions, protective equipment and emergency procedures

General measures	DANGER: EXTREMELY FLAMMABLE GAS. Forms explosive mixtures with air and oxidizing agents. See section 5. Evacuate personnel to a safe area. Appropriate self-contained breathing apparatus may be required. Approach suspected leak area wi caution. Remove all sources of ignition. if safe to do so. Reduce gas with fog or fine water spray. Stop flow of product if safe to do so. Ventilate area or move container to well-ventilated area. Flammable gas may spread from leak. Before entering the area, especially a confined area, check the atmosphere with an appropriate device.
6.2. Environmental precautions	Prevent waste from contaminating the surrounding environment. Prevent soil and water pollution. Dispose of contents/container in accordance with local/regional/national/international regulations. Contact supplier for any special requirements.

6.3. Methods and material for containment and cleaning up

No additional information available

6.4. Reference to other sections

See also sections 8 and 13.

7.0 Handling and Storage

7.1. Precautions for safe handling

Precautions for safe handling	Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. N smoking. Use only non-sparking tools. Use only explosion-proof equipment Wear leather safety gloves and safety shoes when handling cylinders. Protect cylinde

	from physical damage; do not drag, roll, slide or drop. While moving cylinder, alway keep in place removable valve cover. Never attempt to lift a cylinder by its cap; the c is intended solely to protect the valve. When moving cylinders, even for short distances, use a cart (trolley, hand truck, etc.) designed to transport cylinders. Never insert an object (e.g, wrench, screwdriver, pry bar) into cap openings; doing so may damage the valve and cause a leak. Use an adjustable strap wrench to remove over-tight or rusted caps. Slowly open the valve. If the valve is hard to open, discontinue u and contact your supplier. Close the container valve after each use; keep closed even when empty. Never apply flame or localized heat directly to any part of the container High temperatures may damage the container and could cause the pressure relief device to fail prematurely, venting the container contents. For other precautions in using this product, see section 16.
7.2. Conditions for safe storage, including any incompatibilities	
Storage conditions	Store only where temperature will not exceed 125°F (52°C). Post “No Smoking/No Open Flames” signs in storage and use areas. There must be no sources of ignition. Separate packages and protect against potential fire and/or explosion damage followi appropriate codes and requirements (e.g., NFPA 30, NFPA 55, NFPA 70, and/or NFPA 221 in the U.S.) or according to requirements determined by the Authority Having Jurisdiction (AHJ). Always secure containers upright to keep them from falli or being knocked over. Install valve protection cap, if provided, firmly in place by hand when the container is not in use. Store full and empty containers separately. Use first-in, first-out inventory system to prevent storing full containers for long periods. For other precautions in using this product, see section 16 OTHER PRECAUTIONS FOR HANDLING, STORAGE, AND USE: When handlin product under pressure, use piping and equipment adequately designed to withstand t pressures to be encountered. Never work on a pressurized system. Use a back flow preventive device in the piping. Gases can cause rapid suffocation because of oxygen deficiency; store and use with adequate ventilation. If a leak occurs, close the contain valve and blow down the system in a safe and environmentally correct manner in compliance with all international, federal/national, state/provincial, and local laws; then repair the leak. Never place a container where it may become part of an electrica circuit.

8.0 Exposure Controls/Personal Protection	
8.1. Control parameters	
Hydrogen, compressed (1333-74-0)	
ACGIH	Not established
USA OSHA	Not established
Hydrogen (1333-74-0)	
ACGIH	Remark (ACGIH) Simple asphyxiant
USA OSHA	Not established
8.2. Exposure controls	
Appropriate engineering controls	Use an explosion-proof local exhaust system. Local exhaust and general ventilation must be adequate to meet exposure standards. MECHANICAL (GENERAL): Inadequate - Use only in a closed system. Use explosion proof equipment and lighting.
Eye protection	Wear safety glasses with side shields
Respiratory protection	An air-supplied respirator must be used while working with this product in confined spaces. The respiratory protection used must conform with OSHA rules as specified in 29 CFR 1910.134. Select per OSHA 29 CFR 1910.134 an

	ANSI Z88.2.
Thermal hazard protection	None necessary
Other information	Consider the use of flame resistant anti-static safety clothing. Wear safety shoes while handling containers.

9.0 Physical and Chemical Properties

9.1. Information on basic physical and chemical properties

Physical state	Gas
Appearance	Colorless gas.
Molecular mass Color	2 g/mol Colorless.
Odor	Odorless.
Odor threshold	No data available
pH	Not applicable.
Relative evaporation rate (butyl acetate=1)	No data available
Relative evaporation rate (ether=1)	Not applicable.
Melting point	-259.2 °C (-434.56°F)
Freezing point	No data available
Boiling point	-252.9 °C (-422.97°F)
Flash point	No data available
Critical temperature	-239.9 °C (-399.82°F)
Auto-ignition temperature	566 °C (1051°F)
Decomposition temperature	No data available
Flammability (solid, gas)	No data available
Vapor pressure	Not applicable.
Relative vapor density at 20 °C	No data available
Relative density	No data available
Density	0.089 g/l (0.0056 lb/ft3) (at STP = 0°C and 1atm)

Relative gas density	0.07
Solubility	Water: 1.6 mg/l
Log Pow	Not applicable.
Log Kow	Not applicable.
Viscosity, kinematic	Not applicable.
Viscosity, dynamic	Not applicable.
Explosive properties	Not applicable.
Oxidizing properties	None.
Explosion limits	4 - 77 vol %
9.2. Other information	
Gas group	Compressed gas
Additional information	BURNS WITH INVISIBLE FLAME

10.0 Stability and Reactivity

10.1. Reactivity

No reactivity hazard other than the effects described below.

10.2. Chemical stability

Stable under normal conditions.

10.3. Possibility of hazardous reactions

Can form explosive mixture with air. May react violently with oxidants.

10.4. Conditions to avoid

Keep away from heat/sparks/open flames/hot surfaces. – No smoking.

10.5. Incompatible materials

Oxidizing agents. Lithium. Halogens.

10.6. Hazardous decomposition products

Under normal conditions of storage and use, hazardous decomposition products should not be produced.

11.0 Toxicological Information

11.1. Information on toxicological effects

Acute toxicity	Not classified
Hydrogen, compressed (1333-74-0)	
LC50 inhalation rat (ppm)	> 15000 ppm/1h
Hydrogen (1333-74-0)	
LC50 inhalation rat (ppm)	> 15000 ppm/1h

Skin corrosion/irritation	:	Not classified pH: Not applicable.
Serious eye damage/irritation	:	Not classified pH: Not applicable.
Respiratory or skin sensitizati	:	Not classified
Germ cell mutagenicity	:	Not classified
Carcinogenicity	:	Not classified

12.0 Ecological Information	
12.1. Toxicity	
Ecology - general	No ecological damage caused by this product.
12.2. Persistence and degradability	
Hydrogen, compressed (1333-74-0)	
Persistence and degradability	No ecological damage caused by this product.
Hydrogen (1333-74-0)	
Persistence and degradability	No ecological damage caused by this product.
12.3. Bioaccumulative potential	
Hydrogen, compressed (1333-74-0)	
BCF fish 1	(no bioaccumulation expected)
Log Pow	Not applicable
Log Kow	Not applicable.
Bioaccumulative potential	No ecological damage caused by this product.
Hydrogen (1333-74-0)	
BCF fish 1	(no bioaccumulation expected)
Log Pow	Not applicable.
Log Kow	Not applicable.
Bioaccumulative potential	No ecological damage caused by this product.
12.4. Mobility in soil	
Hydrogen, compressed (1333-74-0)	
Mobility in soil	No data available.
Ecology - soil	No ecological damage caused by this product.
Hydrogen (1333-74-0)	
Mobility in soil	No data available.
Ecology - soil	No ecological damage caused by this product.
12.5. Other adverse effects	

Effect on ozone layer	None
Effect on the global warming	No known effects from this product

13.0 Disposal Considerations

13.1. Waste treatment methods

Waste disposal recommendatio	Dispose of contents/container in accordance with local/regional/national/international regulations. Contact supplier for any special requirements.

14.0 Transport Information

14.1	UN No	1049
14.2	IMCO Class	2.1 
14.3	ADR/RID classification code	1F
14.4	Packaging	In carbon steel cylinders.
14.5	DOT Special Provisions (49 CFR 172.102)	N89 - When steel UN pressure receptacles are used, only those bearing the “H” mark are authorized
Additional information		
Emergency Response Guide (ERG) Number		115 (UN1049)
Other information		No supplementary information available.
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.
Transport by sea		
UN-No. (IMDG)		1049
Proper Shipping Name (IMDG)		HYDROGEN, COMPRESSED
Class (IMDG)		2 - Gases
MFAG-No		115
Air transport		
UN-No. (IATA)		1049
Proper Shipping Name (IATA)		Hydrogen, compressed

Class (IATA)	2
Civil Aeronautics Law	Gases under pressure/Gases flammable under pressure

15.0 Regulatory Information

15.1	Kuwait EPA(Environmental Public Authority)

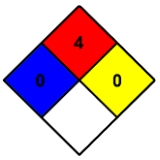
16.0 Other Information

Other information	When you mix two or more chemicals, you can 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 evaluate the end product. Before using any plastics, confirm their compatibility with this product Praxair asks users of this product to study this SDS and become aware of the product hazards and safety information. To promote safe use of this product, a user should (1) notify employees, agents, and contractors of the information in this SDS and of any other known product hazards and safety information, (2) furnish this information to each purchaser of the product, and (3) ask each purchaser to notify its employees and customers of the product hazards and safety information The opinions expressed herein are those of qualified experts within Praxair, Inc. We believe that the information contained herein is current as of the date of this Safety Data Sheet. Since the use of this information and the conditions of use are not within the control of Praxair, Inc, it is the user's obligation to determine the conditions of safe use of the product

NFPA health hazard : 0 - Exposure under fire conditions would offer no hazard beyond that of ordinary combustible materials.

NFPA fire hazard : 4 - Will rapidly or completely vaporize at normal pressure and temperature, or is readily dispersed in air and will burn readily.

NFPA reactivity : 0 - Material that in themselves are normally stable, even under fire conditions.



Hazard Rating

Health : 0 Minimal Hazard - No significant risk to health

Flammability : 4 Severe Hazard

Physical : 3 Serious Hazard

This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product.