SAFETY DATA SHEET

This document supersedes the MSDS revision 02 dated 17th June, 2021

Requirements	Description
1. IDENTIFICATION AND COMPANY NAME	Product details: HYDROGEN Supplier Name: National Industrial Gas Plants Address: Salwa Industrial Area Street 45, Gate 75 - Doha Qatar P.O. Box: 1391 Telephone: : Head Office + 974 4468-9083, Sales: 4442-8844, Plant: 4450-00-08 Fax : Head Office +974 4458-3333, Sales: 4450-00-33, Plant: 4460-35-32 E-mail: nigp@qatar.net.qa , sales45@nigpqatar.com Emergency HOT LINE Tel.: + 974-7776-6277 Web Site: https://www.almanaholding.com.qa
2. HAZARD IDENTIFICATION	Hazard pictograms:  GHS01 – explosive GHS04 – gases under pressure Signal word : Danger Hazard statements: H220– Extremely flammable gas. : H280-Containsgas under pressure: may explode if heated. Hazard Class and Category Code Regulation EC 1272/2008 (CLP) • R Phrase(s) : R12 : Extremely flammable • Physical hazards: Flammable gases-Category 1-Danger-(CLP: Flam. Gas1) - H220 : Gases under pressure – compressed – Warning – (CLP: Flam. Gas 1) – H220 • Classification EC 67/548 or EC 1999/45: Not classified as dangerous substance/mixture. Precautionary statements: -Prevention: P210- Keep away from heat, sparks, open flames or hot surfaces. No smoking. -Response : P377-Leaking gas fire: Do not extinguish, unless leak can be stopped safely. Emergency Overview: • Hydrogen is a flammable, colorless, odorless, compressed gas packaged in cylinders at high pressure. It poses an immediate fire and explosive hazard when concentrations exceed 4%. It is much lighter than air and burns with an invisible flame. High concentrations that will cause suffocation are within the flammable range and must not be entered. • In high concentrations may cause asphyxiation. • Eliminate all ignition sources if safe to do. Storage: • Store in well-ventilated place.

Requirements	Description
	• Take precautionary measures against static discharges.
3. COMPOSITION / INGREDIENT IDENTIFICATION	Substance/Preparation : Substance UN Number : 1049 Components: This product is hazardous. Chemical Formula : H_2 Substance Name : Hydrogen Contents : 100% CAS No. : 1333-74-0 EC No. : 215-605-7 Does not contain other components or impurities which will influence the classification of the product.
4. FIRST AID MEASURES	Inhalation: • In high concentrations may cause asphyxiation. Symptoms may include loss of mobility/consciousness. Victim may not be aware of asphyxiation. • Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped. - Skin contact: Adverse effects not expected from this product. - Eye contact: Adverse effects not expected from this product. - Ingestion: Ingestion is not considered a potential route of exposure.
5. FIRE-FIGHTING MEASURES	Flammable Class: • Extremely Flammable. • Flammable limits: Lower- 4% Upper- 74% Specific Hazards: • Exposure to fire may cause containers to rupture/explode. Extinguishing Media: • All known extinguishants can be used. • Do not extinguish until hydrogen source is shut off. Specific Methods: • If possible stop flow of product. • Coordinate fire measure to the surrounding fire. Cool endangered containers with water spray jet from a protected position. • Do not empty contaminated fire water into drains. • Move away from the container and cool with water from protected position. • Do not extinguish a leaking gas flame unless absolutely necessary. • Spontaneous/explosive re-ignition may occur. Extinguish any other fire. Explosion Hazards: • Burns with a pale blue, nearly invisible flame. Hydrogen is easily ignited with low-ignition energy, including static electricity. Hydrogen is lighter than air and can accumulate in the upper sections of enclosed spaces. Special Protective Equipment For Fire Fighters: • Fire fighters should wear appropriate protective equipment and self- contained breathing apparatus. • In confined space use self-contained breathing apparatus.
6. ACCIDENTAL RELEASE MEASURES	Personal Precautions : • Evacuate area • Ensure adequate air ventilation • Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe. • Consider the risk of explosive atmospheres. • Eliminate ignition sources. Environmental Precautions: Try to stop release.

Requirements	Description
	Clean up methods: Ventilate area.
7. STORAGE AND HANDLING	Precautions for safe Handling: Safe use of the product • Use only properly specified equipment which is suitable for this product, its supply pressure and temperature. Contact your gas supplier if in doubt. • Only experienced and properly instructed persons should handle gases under pressure. The product must be handled in accordance with good industrial hygiene and safety procedures. • Do not smoke while handling product. • Ensure the complete gas system was (or is regularly) checked for leaks before use. Safe handling of the gas receptacle • Refer to supplier's container handling instructions. • Do not allow back feed into the container. • Protect cylinders from physical damage; do not drag, roll, slide or drop. • When moving cylinders, even for short distances, use a cart (trolley, hand truck, etc.) designed to transport cylinders. • Leave valve protection caps in place until the container has been secured against either a wall or bench or placed in a container stand and is ready for use. • If user experiences any difficulty operating cylinder valve discontinue use and contact supplier. • Never attempt to repair or modify container valves or safety relief devices. • Damaged valves should be reported immediately to the supplier. • Keep container valve outlets clean and free from contaminates particularly oil and water. • Replace valve outlet caps or plugs and container caps where supplied as soon as container is disconnected from equipment. • Close container valve after each use and when empty, even if still connected to equipment. • Never attempt to transfer gases from one cylinder/container to another. • Never use direct flame or electrical heating devices to raise the pressure of a container. • Do not remove or deface labels provided by the supplier for the identification of the cylinder contents. • Take precautionary measure against static discharge. • Suck back of water into the container must be prevented • Purge air from system before introducing gas. • Keep away from ignition sources (including static discharges) • Use only properly specified equipment which is suitable for this product, its supply pressure and temperature. Contact your gas supplier if in doubt. Storage: • Keep away from combustible materials. • Keep container below 50°C in a well-ventilated area. • Observe all regulations and local requirements regarding storage of containers. • Containers should not be stored in conditions likely to encourage corrosion. • Containers should be stored in the vertical position and properly secured to prevent toppling. • Stored containers should be periodically checked for general condition and leakage. • Container valve guards or caps should be in place. • Store containers in location free from fire risk and away from sources of heat and ignition. • Segregate from oxidant gases and other oxidants in store. • Refer to supplier's container handling instructions.
8. EXPOSURE CONTROLS/ PERSONAL PROTECTION	Appropriate engineering controls • Systems under pressure should be regularly checked for leakages. • Provide adequate general and local exhaust ventilation. • Consider work permit system e.g. for maintenance activities.

Requirements	Description
	Individual protection measures e.g. personal protective equipment • A risk assessment should be conducted and documented in each work area to assess the risks related to the use of the product and to select the PPE that matches the relevant risk. The following recommendations should be considered. • Wear safety glasses with side shields. • Wear leather safety gloves and safety shoes when handling cylinders. Personal Protection: • Ensure adequate ventilation • Personal protective equipment for the body should be selected based on the task being performed. • Do not smoke while handling product. • Safety shoes are recommended when handling cylinders. Environmental exposure controls • Refer to local regulations for restriction of emissions to the atmosphere.
9. PHYSICAL AND CHEMICAL PROPERTIES	Information on basic physical and chemical properties Appearance Physical state at 20℃ /101.3kPa : Gas Colour : Colourless Odour : None Odour threshold : Odour threshold is subjective and in adequate to warn for over exposure. pH value : Not applicable for gas-mixtures. Molar mass [g/mol] : Not applicable for gases and gas-mixtures. Melting point [℃] : -259 (-434.5°F) Boiling point [℃] : -253 (-423.0°F) Critical temperature[℃] : -240 (-399.9°F) Flash point [℃] : Not applicable Evaporation rate (ether=1) : Not applicable Flammability range[vol% in air] : 4 to 75 Vapour pressure[20℃] : Not applicable. Relative density, gas (air=1) : 0.07 Relative density, liquid (water=1) : 0.07 Solubility in water [mg/l] : 1.6 Partition co efficient n-octanol / water : Not applicable for gas-mixtures. Auto-ignition temperature [℃] : 560 Viscosity at 20℃ [mPa.s] : Not applicable. Explosive Properties : Not applicable. Molecular weight : 2 Dew Point °F [℃] : - 90 (-67.8) Specific Volume of gas : 11.99 m^3/kg @ 70°F (21 ^{O}C) Other information Other data : Burns with an invisible flame
10. STABILITY AND REACTIVITY	Reactivity: • No reactivity hazard other than the effects described in sub-sections below. • Can from explosive mixture with air. • May react violently with oxidants. Chemical stability • Stable under normal conditions. Conditions to avoid: • Avoid sparks, flames and other sources of ignition. • Hydrogen diffuses rapidly and may leak from a system gas tight for other gases. Use non-spark tools. • No smoking.

Requirements	Description
	Incompatible materials: • Strong oxidizing agents. • Can form explosive mixture with air. Hazardous decomposition products • Under normal conditions of storage and use, hazardous decomposition products should not be produced.
11. TOXICOLOGICAL INFORMATION	Toxicology Information: No known toxicological effects from this product.
12.ECOLOGICAL INFORMATION	Ecological Effects Information: No known ecological effects from this product.
13. DISPOSAL CONSIDERATIONS	General: • Do not discharge into areas where there is a risk of forming an explosive mixture with air. Waste gases should be flared through a suitable burner with flashback arrestor. • Do not discharge in any place where accumulation could be dangerous. • Contact supplier if guidance is required. Waste treatment methods: • May be vented to atmosphere in a well ventilated place. • Refer to the code of practice of EIGA (Doc. 30/10 "Disposal of Gases, downloadable at http://www.eiga.org) for more guidance on suitable disposal methods.
14. TRANSPORT INFORMATION	UN number: UN 1049 HS Code : 2804100 Labeling  : 2.1 : Flammable gas <u>Land transport</u> UN proper shipping name : HYDROGEN, COMPRESSED Hazard class(es) : 2 Classification code : 1 F Packing Instruction(s) : P200 Tunnel Restriction: B/D Tank carriage: Passage forbidden through tunnels of category B, C, D. HAZCHEM – Emergency Action Code: 2SE 2 = Fine water spray. S = Risk of violent reaction or explosion. Recommended personal protective equipment: Full fire kit and breathing apparatus. Appropriate measures: dilute. E = There may be a public safety hazard outside the immediate area of the incident, and that the <u>following actions should be considered:</u> 1. People should be warned to stay indoors with all doors and window closed, preferably in rooms upstairs and facing away from the incident. Ignition sources should be eliminated and any ventilation stopped. 2. Effects may speed beyond the immediate vicinity, all non-essential personnel should be instructed to move at least 250 meters away from the incident. 3. Police and fire bridge incident commanders should consult each other and with a product expert, or with a source of product expertise. 4. The possible need for subsequent evacuation should be considered, but it should be remembered that in most cases it will be safer to remain in a building than to evacuation <u>Sea transport</u> Proper shipping name : Hydrogen, Compressed Hazard class(es) : 2.1 Emergency Schedule (EmS) - Fire : F-D

Requirements	Description
	Emergency Schedule (EmS) - Spillage : S-U Packing Instruction(s) : P200 <u>Air transport</u> Proper shipping name : Hydrogen, Compressed Hazard class(es) : 2.1 Passenger and Cargo Air craft: Do not load in passenger Aircraft. Packing instruction – Passenger and Cargo Aircraft : 200 <u>Special precautions for user / information</u> • 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. • Compliance with applicable regulations.
15. REGULATORY INFORMATION	<u>Safety, health and environmental regulations/legislation specific for the substance or mixture</u> • EU Legislation / Seveso directive 96/82/EC : Not covered • National legislation: Ensure all national/local regulations are observed. • Chemical safety Assessment: A CSA does not need to be carried out for this product. Classification: • Not listed as an extremely hazardous substance. • Not listed as a toxic chemical. • Not listed as a regulated substance.
16. OTHER INFORMATION	OTHER INFORMATION: • Revised safety data sheet in accordance with commission regulation (EU) No 453/2010. • Ensure all national/local regulations are observed. • Receptacle under pressure. • Ensure operators understand the flammability hazard. • Asphyxiant in high concentrations. • Keep container in well-ventilated place. • Do not breathe the gas. • The hazard of asphyxiation is often over looked and must be stressed during operator training. • Classification in accordance with calculation methods of regulation (EC) 1272/2008CLP / (EC) 1999/45DPD. • This Safety Data Sheet has been established in accordance with the applicable European Union legislation. <u>HAZARDRATINGS:</u> NFPARATINGS: HMISRATINGS: HEALTH: 0 HEALTH: 0 FLAMMABILITY: 4 FLAMMABILITY: 4 REACTIVITY: 0 REACTIVITY: 0 This information is based on our present knowledge. However, this shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

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