

## MATERIAL SAFETY DATA SHEET HYDROGEN

(Please ensure that this MSDS is received by appropriate person)

Date: October 2019

Version: 04

Ref.: MS094

### 1 PRODUCT AND COMPANY IDENTIFICATION

<b>Product Name</b>	Hydrogen
<b>Chemical Formula</b>	H <sub>2</sub>
<b>Trade Names</b>	Hydrogen, compressed (Tec) Hydrogen-process (N4.8) Hydrogen, instrument grade (N5.0) Hydrogen, ultra High purity (N5.0)
<b>Colour coding</b>	All above grades have signal red (A.11) bodies. The process, instrument and ultra high purity grades have relevant decals affixed centrally to bodies of cylinders.
<b>Valve</b>	Hydrogen, compressed has a 3 SH-brass 5/8 inch BSP left-hand female valve. All of the other grades have neriki-brass 5/8 inch BSP left hand female valves fitted.
<b>Company Identification</b>	African Oxygen Limited 23 Webber Street Johannesburg, 2001 Tel No: (04) 757171 Fax No: (04) 755780
<b>EMERGENCY NUMBER</b>	<b>0800 3222230</b> (24 hours)

### 2 COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name	Hydrogen
CAS No.	133-74-0
UN No.	1049
ERG No.	115
Hazard Warning	2 A Flammable Gas

### 3 HAZARDS IDENTIFICATION

#### Main Hazards

All cylinders are transportable gas container. Hydrogen is highly flammable and is the lightest gas known. It burns in air with an intensely hot, almost invisible flame. The flammability limits in the air are between 4.0 -75.0% by volume and flammable explosive gas-air mixtures may be formed.

#### Adverse Health Effects

Hydrogen is non-toxic but could act as a simple asphyxiant under confine space.

#### Chemical Hazards

Hydrogen is relatively inert under standard condition. However it becomes highly reactive under excessive temperature and pressure. Ignition of hydrogen in air can occur with very small energy sources such as heat static electricity or sparks.

#### Biological Hazards

Hydrogen has a smallest density compare to the other element known and disperses very rapidly into the atmosphere. Hydrogen has unknown biological hazards.

#### Vapour Inhalation

Hydrogen is a simple asphyxiant, but disperses rapidly into the atmosphere.

### 4 FIRST AID MEASURES

#### Eye/Skin Contact

No known effect.

Prompt medical attention is mandatory in all cases of overexposure to hydrogen. Rescue personnel should be equipped with self-contained breathing apparatus. Conscious persons should be assisted to an uncontaminated area and inhale fresh air. Quick removal from the contaminated area is most important. Unconscious persons should be removed to an uncontaminated area, and given mouth- to-mouth resuscitation and supplemental oxygen. The patient should be kept still and warm.

#### Label Elements

Hazard Pictograms



Signal Word: Danger

#### Precautionary Statements:

**P210:** Keep away from heat/ sparks/open flames/ hot surface.

No Smoking

**P377:** leaking gas fire: Do not extinguish, unless leak can be stopped safely.

**P381:** Eliminate all ignition sources if safe to do so.

**P403:** Store in a well-ventilated place.

#### Hazard Statements:

**H220:** Extremely flammable gas.

### 5 FIRE FIGHTING MEASURES

#### Extinguishing Media

Use fog-water spray, (in the absence of fog equipment a fine spray of water may be use to fight hydrogen flame).

#### Specific Hazards

Do not extinguish the fire unless the leakage can be stopped immediately. Hydrogen is highly flammable. May form explosive gas mixture with air. Hydrogen can act as a simple asphyxiant "by reducing the oxygen concentration in the air below a level where it support life". Beware of auto-ignition if leak rate is high. The flame of burning hydrogen is very difficult to see in daylight.

#### Emergency Actions

If possible shut off ignition source of excess hydrogen. Evacuate the area. Post warnings signs to prevent persons from approaching with lit cigarettes or open flames. Use water to keep all cylinders cool. Remove cylinders from the vicinity of the fire if possible. Remove all cylinders with signs of overheating to a safe area. Keep the cylinder cool by spraying with water at a safe distance. CONTACT THE

NEAREST AFROX BRANCH.

#### Protective Clothing

Self-contained breathing apparatus, safety gloves and shoes/boots should be worn when handling containers.

#### Environmental Precautions

As the gas is lighter than air, ensure that hydrogen gas is not trapped in confine space. Otherwise this could lead to the formation of a highly explosive gas-air mixture. Ventilate all confined area using forced draught if necessary. Ensure that all electrically powered equipment are flameproof.

### 6 ACCIDENTAL RELEASE MEASURES

#### Personal Precautions

As hydrogen is a simple asphyxiant, care should be taken when entering confined areas where leaks have occurred. Do not enter any potentially hazardous area with any source of ignition such as lit cigarette or non-flame proof equipment including matches and powered equipment.

#### Environmental Precautions

Hydrogen does not pose a hazard to the environment. Explosive gas-air mixture could be formed when leaks occur, so eliminate all forms of ignition.

#### Small Spills

Small leaks should be extinguished by shutting off the source of supply, e.g. closing the cylinder valve or tightening the gland nut. If unable to stop the small leaks, the cylinder should be moved to an open well ventilated area, away from any source of ignition.

#### Large Spills

Stop the source if it can be done without risk. Eliminate all sources of ignition and static discharges. Restrict access to the affected area until completion of the clean-up procedure. Post relevant warning signs. Wear adequate protective clothing when working near the source of leak. Ventilate the area using forced-draught if necessary. Ensure that all electrical powered equipment are flameproof.

### 7 HANDLING AND STORAGE

Do not store hydrogen cylinder with oxygen or other oxidant cylinders. Do not allow cylinder to slide or come into contact with sharp edge objects. Hydrogen cylinders may be stacked horizontally provided that they are firmly secured at each end to avoid rolling. Ensure equipment is adequately earthed. Conspicuous signs should be posted in the storage area forbidding smoking or use of naked flame. Use a first in-first out inventory system to prevent full cylinders from being stored for excessive period of time. Compliance with all relevant legislation is essential. Keep out of reach of children.

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### 8 EXPOSURE CONTROLS/PERSONAL PROTECTION

**Occupational Exposure Hazards** Unknown effect

**Engineering Control Measures**

Engineering control measures are preferred to reduce exposures. General methods include mechanical ventilation, process or personal enclosure &

**Personal Protection**

Use self-contained breathing apparatus when fighting large fire.

**Eyes**

Use safety glasses when working with cylinders.

**Hands**

Use suitable protective gloves when working with cylinder.

**Skin**

Unknown effect

### 9 PHYSICAL AND CHEMICAL PROPERTIES

**PHYSICAL DATA**

Chemical Symbol	H <sub>2</sub>
Molecular weight	2.016 g/mol
Specific volume @ 20°C & 101,325 kPa	11976 ml/g
Auto ignition temperature	570°C
Relative density (air=1) @ 1 atm	0.08989 g/ml
Flammable limits in air (by volume)	4.0-75.0%
Colour	Unknown
Taste	Unknown
Odour	Unknown

### 10 STABILITY AND REACTIVITY

**Conditions to avoid**

Overheating of cylinders. Keep sparks & flames away from cylinders and under no circumstances allow a torch flame to come into contact with any part of the cylinder. Never test leaks with flame. Use a soapy water when testing for leaks. Never use cylinders as rollers or supports or for any other purpose other than the storing of hydrogen.

**Incompatible Materials**

Hydrogen is non-corrosive and may be contained in ambient temperature by most common metals used in installations design to have sufficient strength for the working pressure involved.

**Hazardous Decomposition Products**

No hazardous compounds are formed when hydrogen/air mixture burn.

### 11 TOXICOLOGICAL INFORMATION

Acute Toxicity	No known effect
Skin & eye contact	No known effect
Chronic Toxicity	No known effect
Carcinogenicity	No known effect
Mutagenicity	No known effect
Reproductive Hazards	No known effect

(For further information see Section 3. Adverse Health effects)

### 12 ECOLOGICAL INFORMATION

As hydrogen is lighter than air it will disperse rapidly in open areas. It does not pose a hazard to the ecology.

control of process conditions. Administrative control and personal protective equipment may also be required. Use a suitable flameproof ventilation system separate from other exhaust ventilation systems. Exhaust directly to outside environment. Supply sufficient replacement air to make up for air removed by exhaust system.

### 13 DISPOSAL CONSIDERATIONS

**Disposal Methods**

Small amounts may be blown to the atmosphere under controlled conditions. No source of ignition should be in the vicinity. Large amounts should only be handled by the gas supplier.

**Disposal of Packaging**

The disposal of cylinders must only be handled by the gas supplier.

### 14 TRANSPORT INFORMATION

**ROAD TRANSPORTATION**

UN No	1049
Class	2A Flammable
Subsidiary Risk	2.1 Flammable
ERG No	115
Hazchem warning	2A Flammable Gas

**SEA TRANSPORTATION**

IMDG	1049
Class	
Packaging group	
Label	Flammable Gas
<b>AIR TRANSPORTATION</b>	
ICAO/IATA Code	1049
Class	2.1 Flammable
Packaging group	
Packaging instructions	
- Cargo	200
- Passenger	Forbidden
Maximum quantity allowed	
- Cargo	500kg
- Passenger	Forbidden

### 15 REGULATORY INFORMATION

EEC Hazard class Flammable Gas  
National legislation OHSact and Regulations 85 of 1993.  
Reference SANS 10234 and its supplement.

### 16 OTHER INFORMATION

**Bibliography**

Compressed Gas Association, Arlington, Virginia  
Handbook of Compressed Gases – 3<sup>rd</sup> Edition  
Matheson. Matheson Gas Data Book – 6<sup>th</sup> Edition  
SABS 0265 - Labelling of Dangerous Substances

### 17 EXCLUSION OF LIABILITY

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