SAFETY DATA SHEET

M1142 - ANSI - EN

Occidental Chemical Corporation
A subsidiary of Occidental Petroleum Corporation

HYDROGEN GAS (<20 PSI)

SDS No.: M1142 **SDS Revision Date:** 20-Apr-2015

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Company Identification:	Occidental Chemical Corporation 5005 LBJ Freeway P.O. Box 809050 Dallas, TX 75380-9050 1-800-752-5151
24 Hour Emergency Telephone Number:	1-800-733-3665 or 1-972-404-3228 (USA); CHEMTREC (within USA and Canada): 1-800-424-9300; CHEMTREC (outside USA and Canada): +1 703-527-3887; CHEMTREC Contract No: CCN16186
To Request an SDS:	MSDS@oxy.com or 1-972-404-3245
Customer Service:	1-800-752-5151 or 1-972-404-3700
Product Identifier:	**HYDROGEN GAS (<20 PSI)**
Synonyms:	Hydrogen, Hydrogen gas
Product Use:	Chemical Intermediate, Fuel
Uses Advised Against:	Not for use in anaerobic chambers.

2. HAZARDS IDENTIFICATION

OSHA REGULATORY STATUS: This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

HYDROGEN GAS (<20 PSI)

SDS No.: M1142 **SDS Revision Date:** 20-Apr-2015

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EMERGENCY OVERVIEW:

Color: Colorless
Physical State: Gas
Appearance: Clear
Odor: Odorless

Signal Word: **DANGER**

MAJOR HEALTH HAZARDS: SIMPLE ASPHYXIANT. INHALATION MAY PRODUCE LOSS OF CONCIOUSNESS WITHOUT WARNING PROPERTIES.

PHYSICAL HAZARDS: EXTREMELY FLAMMABLE GAS. Forms explosive mixtures with air and oxidizing agents. Vapor may cause flash fire. Vapor/air mixtures are explosive. Burns with invisible flame.

PRECAUTIONARY STATEMENTS: Keep away from all ignition sources. If hydrogen storage containers / cylinders are exposed to excessive heat from fire or flame contact, withdraw immediately to a secure location. Do not breathe gas. Do not enter confined spaces unless adequately ventilated. Do not puncture container. Keep container tightly closed. Use only with adequate ventilation.

ADDITIONAL HAZARD INFORMATION: Good hygiene and safety practices should be used when handling and working with this material. Good hygiene practices include but are not limited to: wearing suitable gloves and/or eye protection; washing hands and affected skin immediately after handling, before breaks, and at the end of the workday; regularly cleaning work area and clothing; etc.

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GHS CLASSIFICATION:

GHS: PHYSICAL HAZARDS:	Flammable Gas - Cat. 1 Extremely Flammable Gas Under Pressure - Compressed
GHS: CARCINOGENICITY:	Not classified as a carcinogen per GHS criteria. This product is not classified as a carcinogen by NTP, IARC, or OSHA.
GHS - OSHA Hazard(s)	Simple Asphyxiant: May displace oxygen and cause rapid suffocation

UNKNOWN ACUTE TOXICITY: Listed below.

Unknown Acute Oral Toxicity:
100% of this product consists of ingredient(s) of unknown acute oral toxicity.

Unknown Acute Dermal Toxicity:
100% of this product consists of ingredient(s) of unknown acute dermal toxicity.

GHS SYMBOL: Flame, Gas cylinder

GHS SIGNAL WORD: **DANGER**

GHS HAZARD STATEMENTS:

GHS - Physical Hazard Statement(s)
Extremely flammable gas

GHS - OSHA Hazard(s)
Simple Asphyxiant: May displace oxygen and cause rapid suffocation

GHS - Precautionary Statement(s) - Prevention
Keep away from heat/sparks/open flames/hot surfaces. — No smoking

GHS - Precautionary Statement(s) - Response
Leaking gas fire: Do not extinguish, unless leak can be stopped safely
Eliminate all ignition sources if safe to do so

GHS - Precautionary Statement(s) - Storage
Store in a well-ventilated place

GHS - Precautionary Statement(s) - Disposal
There are no Precautionary Statement(s) - Disposal phrases assigned.

Hazards Not Otherwise Classified (HNOC)
None Known

See Section 11: TOXICOLOGICAL INFORMATION

3. COMPOSITION/INFORMATION ON INGREDIENTS

Synonyms: Hydrogen, Hydrogen gas

Component	Percent [%]	CAS Number
Hydrogen	100	1333-74-0

4. FIRST AID MEASURES

INHALATION: Do not attempt rescue in confined spaces without adequate protective gear and proper training. If adverse effects occur, including loss of consciousness, remove to uncontaminated area. If breathing is difficult, oxygen should be administered by qualified personnel. If respiration or pulse has stopped, have a trained person administer Basic Life Support (Cardio-Pulmonary Resuscitation and/or Automatic External Defibrillator) and CALL FOR EMERGENCY SERVICES IMMEDIATELY.

SKIN CONTACT: Not a likely route of exposure. If skin irritation occurs, get medical advice/attention.

EYE CONTACT: Not a likely route of exposure. If eye irritation persists, get medical advice/attention.

INGESTION: Not a likely route of exposure.

Most Important Symptoms/Effects (Acute and Delayed) :.

Acute Symptoms/Effects: Listed below.
Inhalation (Breathing): Simple Asphyxiation. Acute inhalation may result in loss of consciousness with no warning due to displacement of oxygen. May cause other symptoms of hypoxia depending upon the oxygen level, such as air hunger, fatigue, increased pulse.
Skin: No known effects.
Eye: No known effects.
Ingestion (Swallowing): No known effects.

Delayed Symptoms/Effects:
- No delayed / chronic effects have been identified

Interaction with Other Chemicals Which Enhance Toxicity: Any condition that reduces oxygenation.

Medical Conditions Aggravated by Exposure: Any condition aggravated by reduced oxygenation.

Protection of First-Aiders: Protect from oxygen deficient environments and explosive environments.

Notes to Physician: Treat for hypoxia and any hypoxia related conditions.

5. FIRE-FIGHTING MEASURES

Fire Hazard: Severe fire hazard. Vapor/air mixtures are explosive. Containers may rupture or explode if exposed to heat. Electrostatic discharges may be generated by flow or agitation resulting in ignition or explosion. Burns with invisible flame.

Extinguishing Media: Flood with fine water spray. Use dry chemical and carbon dioxide.

Fire Fighting: Approach fire with caution as high-temperature flame is practically invisible. Do not attempt to extinguish fire unless flow of material can be stopped first. Use water spray to keep fire-exposed containers cool. Use flooding quantities of water as fog or spray. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tanks due to fire. Keep unnecessary people away, isolate hazard area and deny entry. Wear NIOSH approved positive-pressure self-contained breathing apparatus operated in pressure demand mode. Evacuate if fire gets out of control or containers are directly exposed to fire. Let the fire burn. Avoid inhalation of material or combustion by-products. Stay upwind and keep out of low areas.

Hazardous Combustion Products:	Hydrogen oxides, Under normal fire conditions, hazardous combustion products could result from the incidental co-burning of neighboring materials
Sensitivity to Mechanical Impact:	Not sensitive.

Sensitivity to Static Discharge: Ground equipment in accordance with industry standards and best practices such as NFPA 77 [Recommended Practices on Static Electricity (2007)] and American Petroleum Institute (API) RP Recommended Practice 2003 [Protection Against Ignitions Arising out of Static, Lightning, and Stray Currents (2008)]. Electrostatic charges may build up during handling and may form ignitable vapor-air mixtures in storage containers.

Lower Flammability Level (air): 4.1%

Upper Flammability Level (air): 74.2%

Flash point: No data available

Auto-ignition Temperature: 1051 °F (566 °C)

GHS: PHYSICAL HAZARDS:
- Flammable Gas - Cat. 1 Extremely Flammable
- Gas Under Pressure - Compressed

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions:
Extremely flammable gas. Forms explosive mixtures with air and oxidizing agents. Eliminate all sources of ignition. Ventilate closed spaces before entering. Do not breathe gas. Consider the use of flame resistant and anti-static safety clothing and footwear. Wear appropriate personal protective equipment recommended in Section 8, Exposure Controls / Personal Protection, of the SDS. Handle in accordance with good industrial hygiene and safety practice.

Methods and Materials for Containment and Cleaning Up:
Keep unnecessary people away, isolate hazard area and deny entry. ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). Ventilate closed spaces before entering. Stop leak if possible without personal risk. Reduce vapors with water spray.

Environmental Precautions:
Releases should be reported, if required, to appropriate regulatory agencies.

7. HANDLING AND STORAGE

Precautions for Safe Handling:
Keep away from heat, hot surfaces, sparks, open flames, and other ignition sources. Do not smoke. Use explosion-resistant electrical equipment. Use non-sparking tools and equipment. Ground any equipment used in handling. When working around this material, consider the use of flame resistant, and anti-static safety clothing and footwear. Do not breathe gas. This material is a simple asphyxiant, which can cause harm without warning properties or other physiologic effects. Use only in well-ventilated areas. Wear personal protective equipment as described in Exposure Controls/Personal Protection (Section 8) of the SDS.

Safe Storage Conditions:
Keep away from open flames, hot surfaces and sources of ignition. Store and handle in accordance with all current regulations and standards. May be subject to storage regulations: U.S. OSHA 29 CFR 1910.106. Store in a cool, dry, ventilated area away from heat, sparks and flame. Avoid oxygen. Keep separated from incompatible substances (see below or Section 10 of the Safety Data Sheet).

Incompatibilities/ Materials to Avoid:
Air, oxidizing agents

GHS: PHYSICAL HAZARDS:
- Flammable Gas - Cat. 1 Extremely Flammable
- Gas Under Pressure - Compressed

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Regulatory Exposure Limit(s): This product does not contain any components that have regulatory occupational exposure limits (OEL's) established.

OEL: Occupational Exposure Limit; OSHA: United States Occupational Safety and Health Administration; PEL: Permissible Exposure Limit; TWA: Time Weighted Average; STEL: Short Term Exposure Limit

NON-REGULATORY EXPOSURE LIMIT(S): This product does not contain any components that have advisory (non-regulatory) occupational exposure limits (OEL's).
- *The Non-Regulatory United States Occupational Safety and Health Administration (OSHA) limits, if shown, are the Vacated 1989 PEL's (vacated by 58 FR 35338, June 30, 1993).*

- The American Conference of Governmental Industrial Hygienists (ACGIH) is a voluntary organization of professional industrial hygiene personnel in government or educational institutions in the United States. The ACGIH develops and publishes recommended occupational exposure limits each year called Threshold Limit Values (TLVs) for hundreds of chemicals, physical agents, and biological exposure indices.

ENGINEERING CONTROLS: Use closed systems. Provide local exhaust ventilation where gas may be released.

PERSONAL PROTECTIVE EQUIPMENT:

Eye Protection: Follow good hygiene practices. Wear safety glasses with side-shields.

Skin and Body Protection: As a good hygiene practice, wear appropriate protective clothing and footwear to minimize skin contact. Consider using flame resistant, anti-static safety clothing and footwear.

Hand Protection: As a good hygiene practice, wear appropriate chemical resistant gloves. Consult a glove supplier for assistance in selecting an appropriate chemical resistant glove.

Respiratory Protection: No personal respiratory protective equipment normally required. Use a NIOSH approved air-supplied respirator where presence of this product may decrease the oxygen level to concentrations less than 19.5%. A respiratory protection program that meets 29 CFR 1910.134 must be followed whenever workplace conditions warrant use of a respirator.

HYGIENE MEASURES: Handle in accordance with good industrial hygiene and safety practices. Good hygiene practices include but are not limited to: wearing suitable gloves and/or eye protection; washing hands and affected skin immediately after handling, before breaks, and at the end of the workday; regularly cleaning work area and clothing; etc.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Gas
Appearance:	Clear
Color:	Colorless
Odor:	Odorless
Molecular Formula:	H2
Boiling Point/Range:	-422.9 °F (-252.7 °C)
Freezing Point/Range:	-434.6 °F (-259.2 °C).
Melting Point/Range:	Not applicable
Vapor Pressure:	Gas at atmospheric pressure
Vapor Density (air=1):	0.069
Relative Density/Specific Gravity (water=1):	No data available
Water Solubility:	0.019% by volume @ 21 °C
pH:	Not applicable
Volatility:	100% by volume
Evaporation Rate (ether=1):	Not applicable
Partition Coefficient (n-octanol/water):	Not applicable
Flash point:	No data available
Flammability (solid, gas):	Highly flammable, 4 - 75 vol. %
Lower Flammability Level (air):	4.1%
Upper Flammability Level (air):	74.2%
Auto-ignition Temperature:	1051 °F (566 °C)
Viscosity:	No data available

10. STABILITY AND REACTIVITY

Reactivity: Not reactive under normal temperatures and pressures.

Chemical Stability: Stable at normal temperatures and pressures.

Possibility of Hazardous Reactions:
Can form explosive mixtures with air. May react violently with oxidizing agents. Containers may rupture or explode if exposed to heat.

Conditions to Avoid:
(e.g., static discharge, shock, or vibration) -. Keep away from heat, sparks, open flames, hot surfaces, and other sources of ignition.

Incompatibilities/ Materials to Avoid:
Air. oxidizing agents.

Hazardous Decomposition Products: Under normal conditions of storage and use, hazardous decomposition products should not be produced

Hazardous Polymerization: Will not occur.

11. TOXICOLOGICAL INFORMATION

TOXICITY DATA:

PRODUCT TOXICITY DATA: HYDROGEN GAS (< 20 PSI)

COMPONENT TOXICITY DATA:
Note: The component toxicity data is populated by the LOLI database and may differ from the product toxicity data given.

Component	LD50 Oral:	LD50 Dermal:	LC50 Inhalation:
Hydrogen 1333-74-0	-----	-----	15000 ppm (1 hr-Rat)

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POTENTIAL HEALTH EFFECTS:

Eye contact: Not a likely route of exposure.

Skin contact: Not a likely route of exposure.

Inhalation: Simple Asphyxiant. May produce loss of consciousness without warning properties.

Ingestion: Not a likely route of exposure.

SIGNS AND SYMPTOMS OF EXPOSURE:
Inhalation (Breathing): Simple Asphyxiation. Acute inhalation may result in loss of consciousness with no warning due to displacement of oxygen. May cause other symptoms of hypoxia depending upon the oxygen level, such as air hunger, fatigue, increased pulse.
Skin: No known effects.
Eye: No known effects.
Ingestion (Swallowing): No known effects.

TOXICITY:
This material is a simple asphyxiant, which can cause harm without warning properties or other physiologic effects. Its major hazard is from its flammable and explosive character.

Interaction with Other Chemicals Which Enhance Toxicity: Any condition that reduces oxygenation.

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GHS HEALTH HAZARDS:

Skin Absorbent / Dermal Route? No.

GHS: CARCINOGENICITY:
Not classified as a carcinogen per GHS criteria. This product is not classified as a carcinogen by NTP, IARC, or OSHA.

12. ECOLOGICAL INFORMATION

ECOTOXICITY DATA:

Aquatic Toxicity:
This material is believed to be practically non-toxic to aquatic life.

FATE AND TRANSPORT:

BIODEGRADATION: This material is inorganic and not subject to biodegradation.

PERSISTENCE: This material is believed not to persist in the environment.

BIOCONCENTRATION: This material will not bioaccumulate.

ADDITIONAL ECOLOGICAL INFORMATION: No ecological damage caused by this product.

13. DISPOSAL CONSIDERATIONS

Waste from material:
Use or reuse if possible. May be subject to disposal regulations. Dispose in accordance with all applicable regulations.

Container Management:
Dispose of container in accordance with applicable local, regional, national, and/or international regulations.

14. TRANSPORT INFORMATION

LAND TRANSPORT

U.S. DOT 49 CFR 172.101:

UN NUMBER: UN1049
PROPER SHIPPING NAME: Hydrogen, compressed
HAZARD CLASS/ DIVISION: 2.1
LABELING REQUIREMENTS: 2.1

CANADIAN TRANSPORTATION OF DANGEROUS GOODS:

UN NUMBER: UN1049
SHIPPING NAME: Hydrogen, compressed
CLASS OR DIVISION: 2.1
LABELING REQUIREMENTS: 2.1

15. REGULATORY INFORMATION

U.S. REGULATIONS

OSHA REGULATORY STATUS:
This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200)

CERCLA SECTIONS 102a/103 HAZARDOUS SUBSTANCES (40 CFR 302.4):
Not regulated.

SARA EHS Chemical (40 CFR 355.30)
Not regulated

EPCRA SECTIONS 311/312 HAZARD CATEGORIES (40 CFR 370.10):
Fire Hazard, Sudden Release of Pressure

EPCRA SECTION 313 (40 CFR 372.65):
Not regulated.

OSHA PROCESS SAFETY (PSM) (29 CFR 1910.119):
The PSM standard may apply to processes which involve a flammable liquid or gas in a quantity of 10,000 pounds (4535.9 kg) or more.

NATIONAL INVENTORY STATUS

U.S. INVENTORY STATUS: Toxic Substance Control Act (TSCA): All components are listed or exempt.

TSCA 12(b): This product is not subject to export notification.

Canadian Chemical Inventory: All components of this product are listed on either the DSL or the NDSL.

STATE REGULATIONS

Component	California Proposition 65 Cancer WARNING:	California Proposition 65 CRT List - Male reproductive toxin:	California Proposition 65 CRT List - Female reproductive toxin:	Massachusetts Right to Know Hazardous Substance List	New Jersey Right to Know Hazardous Substance List	New Jersey Special Health Hazards Substance List
Hydrogen 1333-74-0	Not Listed	Not Listed	Not Listed	Listed	1010	flammable - fourth degree

Component	New Jersey - Environmental Hazardous Substance List	Pennsylvania Right to Know Hazardous Substance List	Pennsylvania Right to Know Special Hazardous Substances	Pennsylvania Right to Know Environmental Hazard List	Rhode Island Right to Know Hazardous Substance List
Hydrogen 1333-74-0	Listed	Listed	Not Listed	Not Listed	Listed

CANADIAN REGULATIONS

• This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the SDS contains all the information required by the Controlled Products Regulations

WHMIS - Classifications of Substances:

• B1 - Flammable Gas

16. OTHER INFORMATION

Prepared by: OxyChem Corporate HESS - Product Stewardship

Rev. Date: 20-Apr-2015

HMIS: (SCALE 0-4) (Rated using National Paint & Coatings Association HMIS: Rating Instructions, 2nd Edition)

Health Rating: 0 **Flammability Rating:** 4 **Reactivity Rating:** 0

NFPA 704 - Hazard Identification Ratings (SCALE 0-4)

Health Rating: 0 **Flammability:** 4 **Reactivity Rating:** 0

HYDROGEN GAS (<20 PSI)

SDS No.: M1142 **SDS Revision Date:** 20-Apr-2015

Reason for Revision:
• Three year review
• Updated the (M)SDS header
• Updated 24 Hour Emergency Telephone Number: SEE SECTION 1
• Product Identifier has been added or updated: SEE SECTION 1
• Updated Uses Advised Against information: SEE SECTION 1
• Added OSHA Status: SEE SECTION 2
• Emergency Overview was revised: SEE SECTION 2
• Added GHS Information: SEE SECTION 2
• Updated First Aid Measures: SEE SECTION 4
• Modified Fire Fighting Measure Recommendations: SEE SECTION 5
• Revised Accidental Release Measures: SEE SECTION 6
• Revised Handling and Storage Recommendations: SEE SECTION 7
• Revised Exposure Controls/Personal Protection information: SEE SECTION 8
• Updated Physical and Chemical Properties. SEE SECTION 9
• Stability and Reactivity recommendations: SEE SECTION 10
• Toxicological Information has been revised: SEE SECTION 11
• Updated Disposal Considerations. SEE SECTION 13
• Regulatory Information Changes: SEE SECTION 15
• Revised Preparer Information: SEE SECTION 16
• Added SDS Revision Date: SEE SECTION 16
• Added/Updated Revision Log: SEE SECTION 16
• Added "End of Safety Data Sheet" phrase

IMPORTANT:
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OSHA Standard 29 CFR 1910.1200 requires that information be provided to employees regarding the hazards of chemicals by means of a hazard communication program including labeling, safety data sheets, training and access to written records. We request that you, and it is your legal duty to, make all information in this Safety Data Sheet available to your employees

End of Safety Data Sheet