

**HYDROGEN - HYDROGEN, TECHNICAL
MATERIAL SAFETY DATA SHEET**

FSC: 6830

NIIN: (to be supplied by manufacturer)

Manufacturer's CAGE: (to be supplied by manufacturer)

Part No. Indicator: A

Part Number/Trade Name: HYDROGEN

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General Information
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Item Name: HYDROGEN, TECHNICAL

Company's Name: (to be supplied by manufacturer)

Company's Street: (to be supplied by manufacturer)

Company's City: (to be supplied by manufacturer)

Company's State: (to be supplied by manufacturer)

Company's Country: (to be supplied by manufacturer)

Company's Zip Code: (to be supplied by manufacturer)

Company's Emer Ph # (to be supplied by manufacturer)

Company's Info Ph #: (to be supplied by manufacturer)

Record No. For Safety Entry: 001

Tot Safety Entries This Stk#: 003

Status: SM

Date MSDS Prepared: (to be supplied by manufacturer)

Safety Data Review Date: (to be supplied by manufacturer)

Supply Item Manager: (to be supplied by manufacturer)

MSDS Serial Number: (to be supplied by manufacturer)

Specification Number: (to be supplied by manufacturer)

Spec Type, Grade, Class: TYPE I

Hazard Characteristic Code: G2

Unit of Issue: CF

Unit of Issue Container Qty: (to be supplied by manufacturer)

Type of Container: CYLINDER

Net Unit Weight: UNKNOWN

NRC/State License Number: NONE

Net Propellant Weight-Ammo: NONE

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Ingredients/Identity Information
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Proprietary: NO

Ingredient: HYDROGEN

Ingredient Sequence Number: 01

#: 100

NIOSH (RTECS) Number: MW8900000

CAS Number: 1333-74-0

OSHA PEL: NOT ESTABLISHED

ACGIH TLV: NOT ESTABLISHED

Other Recommended Limit: NONE RECOMMENDED

Physical/Chemical Characteristics

Appearance And Odor: COLORLES GAS AT NORMAL TEMPERATURE AND PRESSURE;
ODORLESS

Boiling Point: -422F,-252C

Melting Point: -434F,-259C

Vapor Pressure (MM Hg/70 F): GAS

Vapor Density (Air = 1): 0.696

Specific Gravity: GAS

Decomposition Temperature: UNKNOWN

Evaporation Rate and Ref: N/A

Solubility in Water: NEGLIGIBLE

Viscosity: UNKNOWN

Corrosion Rate (IPY): UNKNOWN

Autoignition Temperature: 968F

Fire and Explosion Hazard Data

Flash Point: FLAMMABLE GAS

Lower Explosive Limit: 4

Upper Explosive Limit: 75

Extinguishing Media: CO2, DRY CHEMICALS, WATER SPRAY OR FOG

Special Fire Fighting Proc: EVACUATE AREA. COOL CONTAINER W/WATER SPRAY
(MAX DISTANCE). DO NOT EXTINGUISH FLAMES, ALLOW TO BURN OUT! USE SCBA. STOP GAS
FLOW & REMOVE CONTAINERS IF W/O RISK

Unusual Fire And Expl Hazrds: FLAME NEARLY INVISIBLE. FORMS EXPOLISIVE
MIXTURES W/AIR & OXIDIZERS. KEEP CONTAINERS BELOW 125F. ESCAPING GAS MAY IGNITE
SPONTANEOUSLY, HAS LOW IGNITION ENERGY.

Reactivity Data

Stability: YES

Cond to Avoid (Stability): FOLLOW COMPRESSED GAS ASSN INSTRUCTIONS IN
PAMPHLET "SAFE HANDLING OF COMPRESSED GAS IN CONTAINERS".

Materials to Avoid: OXIDIZING AGENTS, LITHIUM, HALOGENS

Hazardous Decomp Products: NONE

Hazardous Poly Occur: NO

Conditions to Avoid (Poly): WILL NOT OCCUR.

Health Hazard Data

LD50-LC50 Mixture: LD50 (ORAL RAT) IS UNKNOWN

Route of Entry - Inhalation: YES

Route of Entry - Skin: NO

Route of Entry - Ingestion: NO

Health Haz Acute And Chronic: INGESTED:UNLIKELY ROUTE OF EXPOSURE. SKIN:NO
EVIDENCE OF ADVERSE EFFECTS. INHALED:SIMPLE ASPHYXIANT. MODERATE
CONCENTRATIONS. MAY CAUSE HEADACHE, DROWSINESS, EXCITATION, EXCESS
SALIVATION, VOMITING & UNCONSCIOUSNESS. EYE:NO EVIDENCE OF ADVERSE EFFECTS.

Carcinogenicity - NTP: NO

Carcinogenicity - IARC: NO

Carcinogenicity - OSHA: NO

Explanation Carcinogenicity: MFR LISTED NO INFORMATION ABOUT THE

CARCINOGENICITY OF THIS MATERIAL. HMIS DOES NOT EXPECT IT TO BE CARCINOGENIC.

Signs/Symptoms Of Overexp: INGESTED:UNLIKELY ROUTE OF EXPOSURE. SKIN:NO EVIDENCE OF ADVERSE EFFECTS. INHALED:SIMPLE ASPHYXIAN. HEADACHE, NO EVIDENCE OF ADVERSE EFFECTS.

Med Cond Aggravated By Exp: A KNOWLEDGE OF THE AVAILABLE TOXICOLOGY INFORMATION AND OF THE PHYSICAL & CHEMICAL PROPERTIES OF THE MATERIAL SUGGEST THAT OVEREXPOSURE IS UNLIKELY TO AGGRAVATE EXISTING MEDICAL CONDITIONS.

Emergency/First Aid Proc: INGESTED:PRODUCT IS A GAS AT NORMAL TEMPERATURE & PRESSURE. SKIN:WASH WITH SOAP & WATER. INHALED:REMOVE TO FRESH AIR. GIVE OXYGEN IF BREATHING IS DIFFICULT, ARTIFICIAL RESPIRATION IF NOT BREATHING. GET IMMEDIATE MEDICAL ATTENTION. EYE:FLUSH W/WATER. NOTE TO PHYSICIAN:THERE IS NO SPECIFIC ANTIDOTE. PRODUCT IS RELATIVELY INERT. TREATMENT SHOULD CONTROL SYMPTOMS AND CLINICAL CONDITION.

Precautions for Safe Handling and Use

Steps if Matl Released/Spill: DANGER! FORMS EXPLOSIVE MIXTURES W/AIR! EVACUATE AREA. USE SCBA. REMOVE SOURCES OF IGNITION IF W/O RISK. STOP LEAK IF W/O RISK. VENTILATE AREA OR MOVE CONTAINER TO WELL-VENTILATED AREA IF W/O RISK. CHECK ATMOSPHERE FOR EXPLOSIVENESS BEFORE ENTERING.

Neutralizing Agent: NO INFORMATION GIVEN BY MFR ON MSDS.

Waste Disposal Method: PREVENT WASTE FROM CONTAMINATING SURROUNDING ENVIRONMENT. DISCARD ANY PRODUCT, RESIDUE, DISPOSABLE CONTAINER OR LINER IN AN ENVIRONMENTALLY ACCEPTABLE MANNER IN FULL COMPLIANCE FEDERAL, STATE & LOCAL REGULATIONS.

Precautions-Handling/Storing: FOLLOW COMPRESSED GAS ASSN INSTRUCTIONS IN PAMPHLET "SAFE HANDLING OF COMPRESSED GAS IN CONTAINERS". NEVER WORK ON A PRESSURIZED SYSTEM.

Other Precautions: PROTECT CYLINDERS FROM DIRECT SUNLIGHT & STORE IN A WELL VENTILATED AREA. PROTECT FROM PHYSICAL DAMAGE. ISOLATE CYLINDERS FROM OXYGEN & CHLORINE. DO NOT LOAD WITH EXPLOSIVES, POISONS, RADIOACTIVE MATERIALS & ORGANIC PEROXIDES.

Control Measures

Respiratory Protection: NONE REQUIRED UNDER NORMAL USE. HOWEVER AIR SUPPLIED RESPIRATORS ARE REQUIRED WHILE WORKING IN CONFINED SPACES WITH THIS PRODUCT. THE RESPIRATORY PROTECTION USE MUST CONFORM WITH OSHA RULES IN 29 CFR1910.134.

Ventilation: USE EXPLOSION PROOF GENERAL/LOCAL EXHAUST SUFFICIENT TO CONTROL WORKER EXPOSURE.

Protective Gloves: PREFERRED FOR CYLINDER HANDLING

Eye Protection: SELECT PER OSHA 29CFR1910.133

Other Protective Equipment: METATARSAL SHOES FOR CYLINDER HANDLING. SELECT PER OSHA 29CFR1910.132 & 1910.133.

Work Hygienic Practices: MFR: ? HMIS:USE GOOD INDUSTRIAL HYGIENE PRACTICE. AVOID UNNECESSARY EXPOSURE. WASH THOROUGHLY BEFORE EATING OR DRINKING

Suppl. Safety & Health Data: NONE

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Transportation Data
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Trans Data Review Date: 94365
DOT PSN Code: HLR
DOT Proper Shipping Name: HYDROGEN, COMPRESSED
DOT Class: 2.1
DOT ID Number: UN1049
DOT Label: FLAMMABLE GAS
IMO PSN Code: IGH
IMO Proper Shipping Name: HYDROGEN, COMPRESSED
IMO Regulations Page Number: 2148
IMO UN Number: 1049
IMO UN Class: 2(2.1)
IMO Subsidiary Risk Label: -
IATA PSN Code: NSD
IATA UN ID Number: 1049
IATA Proper Shipping Name: HYDROGEN, COMPRESSED
IATA UN Class: 2.1
IATA Label: FLAMMABLE GAS
AFI PSN Code: NSD
AFI Symbols: 0
AFI Prop. Shipping Name: HYDROGEN, COMPRESSED
AFI Class: 2.1
AFI ID Number: UN1049
AFI Label: FLAMMABLE GAS
AFI Basic Pac Ref: 6-6,6-10

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Disposal Data
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Label Data
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Label Required: YES
Technical Review Date: 31DEC94
MFR Label Number: NONE
Label Status: F
Common Name: HYDROGEN
Signal Word: DANGER!
Acute Health Hazard-Slight: X
Contact Hazard-Slight: X
Fire Hazard-Severe: X
Reactivity Hazard-None: X
Special Hazard Precautions: ****TARGET ORGANS:RESPIRATORY SYSTEM****
INGESTED:UNLIKELY ROUTE OF EXPOSURE. SKIN:NO EVIDENCE OF ADVERSE EFFECTS.
INHALED:SIMPLE ASPHYXIANT. MODERATE CONCENTRATIONS MAY CAUSE HEADACHE,
DROWSINESS,EXCITATION,EXCESS SALVATION,VOMITING & UNCONSCIOUSNESS.
EYE:NO EVIDENCE OF ADVERSE EFFECTS.
FOLLOW COMPRESSED GAS ASSN INSTRUCTIONS IN DANGER! FORMS EXPLOSIVE MIXTURES
W/AIR! EVACUATE AREA,USE SCBA. REMOVE SOURCES OF IGNITION & STOP LEAK IF W/O
RISK. VENTILATE AREA OR MOVE CONTAINER TO WELL VENTILATED AREA IF W/O RISK.
CHECK ATMOSPHERE FOR EXPLOSIVENESS ENTERING AREA.
Protect Eye: Y
Protect Skin: Y
Label Name: (to be supplied by manufacturer)
Label Street: (to be supplied by manufacturer)
Label City: (to be supplied by manufacturer)
Label State: (to be supplied by manufacturer)
Label Zip Code: (to be supplied by manufacturer)

Label Country: (to be supplied by manufacturer)
Label Emergency Number: (to be supplied by manufacturer)

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**LIQUID HYDROGEN - CRYOGENIC LIQUID
MATERIAL SAFETY DATA SHEET**

FSC: 9135
NIIN: (to be supplied by manufacturer)
Manufacturer's CAGE: (to be supplied by manufacturer)
Part No. Indicator: A
Part Number/Trade Name: LIQUID HYDROGEN

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General Information

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Item Name: CRYOGENIC LIQUID
Company's Name: (to be supplied by manufacturer)
Company's Street: (to be supplied by manufacturer)
Company's City: (to be supplied by manufacturer)
Company's State: (to be supplied by manufacturer)
Company's Country: (to be supplied by manufacturer)
Company's Zip Code: (to be supplied by manufacturer)
Company's Emerg Ph #: (to be supplied by manufacturer)
Company's Info Ph #: (to be supplied by manufacturer)
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 002
Status: SE
Date MSDS Prepared: (to be supplied by manufacturer)
Safety Data Review Date: (to be supplied by manufacturer)
Preparer's Company: (to be supplied by manufacturer)
Preparer's St or P. O. Box: (to be supplied by manufacturer)
Preparer's City: (to be supplied by manufacturer)
Preparer's State: (to be supplied by manufacturer)
Preparer's Zip Code: (to be supplied by manufacturer)
MSDS Serial Number: (to be supplied by manufacturer)

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Ingredients/Identity Information

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Proprietary: NO
Ingredient: HYDROGEN
Ingredient Sequence Number: 01
%: 100
NIOSH (RTECS) Number: MW8900000
CAS Number: 1333-74-0
ACGIH TLV: SIMPLE ASPHYXIAN

Physical/Chemical Characteristics

Appearance And Odor: COLORLESS, ODORLESS CRYOGENIC LIQUID.

Boiling Point: -422.99F

Melting Point: -434.6F

Vapor Density (Air=1): 0.0696

Specific Gravity: 0.07

Evaporation Rate And Ref: (BU AC =1): >3

Solubility In Water: NEGLIGIBLE

% Volatiles By Volume: 100

Autoignition Temperature: 968F

Fire and Explosion Hazard Data

Flash Point: FLAMMABLE GAS

Lower Explosive Limit: 4

Upper Explosive Limit: 75

Extinguishing Media: CO2, DRY CHEMICAL, WATER SPRAY/FOG.

Special Fire Fighting Proc: EVACUATE AREA. IMMEDIATELY COOL CONTAINERS

W/WATER SPRAY FROM MAXIMUM DISTANCE W/O EXTINGUISHING FLAMES. REMOVE ALL IGNITION SOURCES SAFELY. WEAR SCBA WHERE NEEDED.

SAFELY STOP LEAK WHILE COOLING W/WATER SPRAY. SAFELY REMOVE ALL CONTAINERS FROM AREA. ALLOW FIRE TO BURN OUT.

Unusual Fire And Expl Hazrds: MAY FORM EXPLOSIVE MIXTURES W/AIR &

OXIDIZING AGENTS. LIQUID WILL SOLIDIFY AIR & CREATE EXPLOSION HAZARD.

CONTAINER MAY RUPTURE DUE TO HEAT OF FIRE. FLAME ALMOST INVISIBLE. FIREBALL IS FORMED IF GAS CLOUD IS IGNITED. EXPLOSIVE ATMOSPHERES MAY LINGER.

Reactivity Data

Stability: YES

Cond to Avoid (Stability): HEAT, FIRE & OTHER IGNITION SOURCES.

Materials to Avoid: OXYGEN, OXIDIZING AGENTS, AIR, LITHIUM, HALOGENS.

Hazardous Decomp Products: NONE

Hazardous Poly Occur: NO

Health Hazard Data

Route of Entry - Inhalation: YES

Route of Entry - Skin: NO

Route of Entry - Ingestion: YES

Health Haz Acute And Chronic: INGESTION: CONTACT W/LIQUID MAY CAUSE

FROSTBITE OF LIPS & MOUTH. EYES/SKIN: LIQUID CONTACT MAY CAUSE FROSTBITE.

INHALATION: ASPHYXANT. CAN CAUSE RAPID SUFFOCATION/DEATH DUE TO OXYGEN DEFICIENCY.

Carcinogenicity - NTP: NO

Carcinogenicity - IARC: NO

Carcinogenicity - OSHA: NO

Explanation Carcinogenicity: NONE

Signs/Symptoms of Overexp: HEADACHE, DROWSINESS, DIZZINESS, EXCITATION,

EXCESS SALIVATION, VOMITING, UNCONSCIOUSNESS.

Emergency/First Aid Proc: SKIN: IMMEDIATELY WARM FROSTBITE AREA W/WARM WATER. DON'T EXCEED 105F. INHALATION: REMOVE TO FRESH AIR. GIVE CPR/OXYGEN IF NEEDED.

EYES: IMMEDIATELY FLUSH W/WATER FOR 15 MIN.

OBTAIN MEDICAL ATTENTION IN ALL CASES. NOTE TO PHYSICIAN: NO SPECIFIC ANTIDOTE. PRODUCT IS RELATIVELY INERT. TREATMENT OF OVEREXPOSURE SHOULD BE DIRECTED AT CONTROL OF SYMPTOMS & CLINICAL CONDITION.

Precautions for Safe Handling and Use

Steps if Matl Released/Spill: IMMEDIATELY EVACUATE AREA. WEAR SCBA WHERE NEEDED. REMOVE IGNITION SOURCES. REDUCE VAPORS W/FOG/FINE WATER SPRAY. BEFORE ENTERING AREA, CHECK ATMOSPHERE W/APPROPRIATE DEVICE. VENTILATE AREA/MOVE LEAKING CONTAINER TO WELL-VENTILATED AREA SAFELY.

Waste Disposal Method: PREVENT WASTE FROM CONTAMINATING SURROUNDING ENVIRONMENT. DISCARD ANY PRODUCT/RESIDUE/DISPOSABLE CONTAINER/LINER IN AN ENVIRONMENTALLY ACCEPTABLE MANNER IAW/FEDERAL, STATE & LOCAL REGULATIONS. SAFELY SHUT OFF LEAK.

Precautions-Handling/Storing: STORE & USE W/ADEQUATE VENTILATION AT ALL TIMES. USE ONLY IN CLOSED SYSTEM. CLOSE VALVE WHEN NOT IN USE/WHEN EMPTY. KEEP AWAY FROM OXIDIZING AGENTS.

Other Precautions: DON'T GET LIQUID IN EYES, ON SKIN/CLOTHING. USE PIPING & EQUIPMENT DESIGNED TO WITHSTAND PRESSURES/TEMPS TO BE ENCOUNTERED. ONLY USE SPARK/EXPLOSION PROOF EQUIPMENT. GROUND ALL EQUIPMENT. NEVER WORK ON A PRESSURIZED SYSTEM.

Control Measures

Respiratory Protection: NONE REQUIRED UNDER NORMAL USE. WEAR AIR SUPPLIED RESPIRATOR WHILE WORKING IN CONFINED AREAS W/THIS PRODUCT.

Ventilation: EXPLOSION PROOF LOCAL EXHAUST SYSTEM W/SUFFICIENT AIR FLOW VELOCITY RECOMMENDED. GENERAL EXHAUST MAY BE ACCEPTABLE.

Protective Gloves: LOOSE FITTING CRYOGENIC

Eye Protection: SAFETY GLASSES & FULL FACE SHIELD

Other Protective Equipment: METATARSAL SHOES FOR CYLINDER HANDLING, CUFFLESS TROUSERS OUTSIDE SHOES, HIGH TOP SHOES ARE PREFERRED.

Work Hygienic Practices: REMOVE/LAUNDER CONTAMINATED CLOTHING BEFORE REUSE.

Suppl. Safety & Health Data: NONE

Transportation Data

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Disposal Data
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Label Data
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Label Required: YES

Label Status: G

Common Name: LIQUID HYDROGEN

Special Hazard Precautions: INGESTION: CONTACT W/LIQUID MAY CAUSE FROSTBITE OF LIPS & MOUTH. EYES/SKIN: LIQUID CONTACT MAY CAUSE FROSTBITE. INHALATION: ASPHYXIANT. CAN CAUSE RAPID SUFFOCATION/DEATH DUE TO OXYGEN DEFICIENCY. HEADACHE, DROWSINESS, DIZZINESS, EXCITATION, EXCESS SALIVATION, VOMITING, UNCONSCIOUSNESS.

Label Name: (to be supplied by manufacturer)

Label Street: (to be supplied by manufacturer)

Label City: (to be supplied by manufacturer)

Label State: (to be supplied by manufacturer)

Label Zip Code: (to be supplied by manufacturer)

Label Country: (to be supplied by manufacturer)

Label Emergency Number: (to be supplied by manufacturer)
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