Material Name: Hydrogen in Argon/Helium/Nitrogen or Air Gas Mixture

Section 1 - PRODUCT AND COMPANY IDENTIFICATION

Material Name
Hydrogen in Argon/Helium/Nitrogen or Air Gas Mixture

Product Description
Classification determined in accordance with Compressed Gas Association standards.

Product Use
Industrial and Specialty Gas Applications

Restrictions on Use
None known

Details of the supplier of the safety data sheet
MATHESON TRI-GAS, INC.
150 Allen Road, Suite 302
Basking Ridge, NJ 07920
General Information: 1-800-416-2505
Emergency #: 1-800-424-9300 (CHEMTREC)
Outside the US: 703-527-3887 (Call collect)

Section 2 - HAZARDS IDENTIFICATION

Classification in accordance with paragraph (d) of 29 CFR 1910.1200.
Gases Under Pressure - Compressed gas
Simple Asphyxiant

GHS Label Elements
Symbol(s)

Signal Word
Warning

Hazard Statement(s)
Contains gas under pressure; may explode if heated.
May displace oxygen and cause rapid suffocation.

Precautionary Statement(s)
Prevention
None needed according to classification criteria.
Response
None needed according to classification criteria.

Storage
Protect from sunlight. Store in a well-ventilated place.

Disposal
Dispose of contents/container in accordance with local/regional/national/international regulations.

Other Hazards
Rapid release of compressed gas may cause frostbite.
Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>CAS</th>
<th>Component Name</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1333-74-0</td>
<td>Hydrogen</td>
<td>--</td>
</tr>
<tr>
<td>7727-37-9</td>
<td>Nitrogen</td>
<td>≥94.3</td>
</tr>
<tr>
<td>7440-59-7</td>
<td>Helium</td>
<td>≥96.1</td>
</tr>
<tr>
<td>7440-37-1</td>
<td>Argon</td>
<td>≥97.1</td>
</tr>
<tr>
<td>132259-10-0</td>
<td>Air</td>
<td>≥99</td>
</tr>
</tbody>
</table>

≤1% Hydrogen in Air; ≤2.9% Hydrogen in Argon; ≤3.9% Hydrogen in Helium; ≤5.7% Hydrogen in Nitrogen

Section 4 - FIRST AID MEASURES

Inhalation
If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention.

Skin
If frostbite or freezing occur, immediately flush with plenty of lukewarm water (105-115°F; 41-46°C). DO NOT USE HOT WATER. If warm water is not available, gently wrap affected parts in blankets. Get immediate medical attention.

Eyes
Flush eyes with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Then get immediate medical attention.

Ingestion
If swallowed, get medical attention.

Most Important Symptoms/Effects

Acute
Frostbite, suffocation

Delayed
No information on significant adverse effects.

Note to Physicians
For inhalation, consider oxygen.

Section 5 - FIRE FIGHTING MEASURES

Extinguishing Media
Suitable Extinguishing Media
regular dry chemical, carbon dioxide

Unsuitable Extinguishing Media
None known

Special Hazards Arising from the Chemical
Negligible fire hazard. Containers may rupture or explode if exposed to heat.

Hazardous Combustion Products
oxides of nitrogen, miscellaneous decomposition products

Fire Fighting Measures
Move container from fire area if it can be done without risk. Cool containers with water spray until well after the fire is out. Stay away from the ends of tanks. Withdraw immediately in case of rising sound from venting safety device
Section 6 - ACCIDENTAL RELEASE MEASURES

Personal Precautions, Protective Equipment and Emergency Procedures
Wear personal protective clothing and equipment, see Section 8.

Methods and Materials for Containment and Cleaning Up
Stop leak if possible without personal risk. Keep unnecessary people away, isolate hazard area and deny entry. Stay upwind and keep out of low areas. Do not touch or walk through spilled material. If possible, turn leaking containers so that gas escapes rather than liquid. Do not direct water at spill or source of leak. Allow substance to evaporate. Ventilate closed spaces before entering.

Environmental Precautions
Avoid release to the environment.

Section 7 - HANDLING AND STORAGE

Precautions for Safe Handling
Avoid breathing gas. Wash hands thoroughly after handling. Do not eat, drink or smoke when using this product.

Conditions for Safe Storage, Including any Incompatibilities
Protect from sunlight. Store in a well-ventilated place.

Further information on storage conditions: Store and handle in accordance with all current regulations and standards. Store in original container and in a dry area where temperatures do not exceed 52°C (125°F) for 24 hours. Cylinders should be stored upright (with valve protection cap in place). Subject to storage regulations: U.S. OSHA 29 CFR 1910.101. Keep separated from incompatible substances.

Incompatible Materials
metals, oxidizing materials, metal oxides, combustible materials, halogens, metal salts, halocarbons

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

Component Exposure Limits

<table>
<thead>
<tr>
<th>Component</th>
<th>Exposure Limit</th>
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<tbody>
<tr>
<td>Hydrogen</td>
<td>1333-74-0</td>
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<tr>
<td>ACGIH:</td>
<td>(See Appendix F: Minimal Oxygen Content, explosion hazard )</td>
</tr>
<tr>
<td>Nitrogen</td>
<td>7727-37-9</td>
</tr>
<tr>
<td>ACGIH:</td>
<td>(See Appendix F: Minimal Oxygen Content )</td>
</tr>
<tr>
<td>Helium</td>
<td>7440-59-7</td>
</tr>
<tr>
<td>ACGIH:</td>
<td>(See Appendix F: Minimal Oxygen Content )</td>
</tr>
<tr>
<td>Argon</td>
<td>7440-37-1</td>
</tr>
<tr>
<td>ACGIH:</td>
<td>(See Appendix F: Minimal Oxygen Content )</td>
</tr>
</tbody>
</table>

ACGIH - Threshold Limit Values - Biological Exposure Indices (BEI)
There are no biological limit values for any of this product's components.
Engineering Controls
Provide local exhaust ventilation system. Ensure compliance with applicable exposure limits.

Individual Protection Measures, such as Personal Protective Equipment

Eye/face protection
For the gas: Eye protection not required, but recommended. For the liquid: Wear splash resistant safety goggles. Contact lenses should not be worn. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

Skin Protection
For the gas: Protective clothing is not required, but recommended. For the liquid: Wear appropriate protective, cold insulating clothing.

Respiratory Protection
Under conditions of frequent use or heavy exposure, respiratory protection may be needed. Respiratory protection is ranked in order from minimum to maximum. Consider warning properties before use. For Unknown Concentrations or Immediately Dangerous to Life or Health - Any supplied-air respirator with a full facepiece that is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive-pressure mode. Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode.

Glove Recommendations
For the gas: Protective gloves are not required, but recommended. For the liquid: Wear insulated gloves.

### Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

<table>
<thead>
<tr>
<th>Appearance</th>
<th>colorless gas</th>
<th>Physical State</th>
<th>gas</th>
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<tbody>
<tr>
<td>Odor</td>
<td>Not available</td>
<td>Color</td>
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<tr>
<td>Odor Threshold</td>
<td>Not available</td>
<td>pH</td>
<td>Not available</td>
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<tr>
<td>Melting Point</td>
<td>Not available</td>
<td>Boiling Point</td>
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<tr>
<td>Boiling Point Range</td>
<td>Not available</td>
<td>Freezing point</td>
<td>Not available</td>
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<tr>
<td>Evaporation Rate</td>
<td>Not available</td>
<td>Flammability (solid, gas)</td>
<td>Not Flammable</td>
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<tr>
<td>Autoignition Temperature</td>
<td>Not available</td>
<td>Flash Point</td>
<td>Not available</td>
</tr>
<tr>
<td>Lower Explosive Limit</td>
<td>Not available</td>
<td>Decomposition temperature</td>
<td>Not available</td>
</tr>
<tr>
<td>Upper Explosive Limit</td>
<td>Not available</td>
<td>Vapor Pressure</td>
<td>Not available</td>
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<tr>
<td>Vapor Density (air=1)</td>
<td>Not available</td>
<td>Specific Gravity (water=1)</td>
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<tr>
<td>Water Solubility</td>
<td>Not available</td>
<td>Partition coefficient: n-octanol/water</td>
<td>Not available</td>
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<tr>
<td>Viscosity</td>
<td>Not available</td>
<td>Kinematic viscosity</td>
<td>Not available</td>
</tr>
<tr>
<td>Solubility (Other)</td>
<td>Not available</td>
<td>Density</td>
<td>Not available</td>
</tr>
<tr>
<td>Physical Form</td>
<td>Compressed gas</td>
<td>Molecular Weight</td>
<td>Not available</td>
</tr>
</tbody>
</table>

Other Information
Section 10 - STABILITY AND REACTIVITY

Reactivity
No reactivity hazard is expected.

Chemical Stability
Stable at normal temperatures and pressure.

Possibility of Hazardous Reactions
Will not polymerize.

Conditions to Avoid
Protect from physical damage and heat. Containers may rupture or explode if exposed to heat.

Incompatible Materials
metals, oxidizing materials, metal oxides, combustible materials, halogens, metal salts, halocarbons

Hazardous decomposition products
oxides of nitrogen, miscellaneous decomposition products

Section 11 - TOXICOLOGICAL INFORMATION

Information on Likely Routes of Exposure

Inhalation
Nausea, vomiting, difficulty breathing, headache, drowsiness, dizziness, tingling sensation, loss of coordination, convulsions, coma

Skin Contact
Frostbite

Eye Contact
Frostbite, irritation

Ingestion
Ingestion of a gas is unlikely.

Acute and Chronic Toxicity

Component Analysis - LD50/LC50
The components of this material have been reviewed in various sources and the following selected endpoints are published:

Hydrogen (1333-74-0)
Inhalation LC50 Rat >15000 ppm 1 h

Product Toxicity Data

Acute Toxicity Estimate
No data available.

Immediate Effects
Frostbite, suffocation

Delayed Effects
No information on significant adverse effects.

Irritation/Corrosivity Data
No information on significant adverse effects.

Respiratory Sensitization
No information available for the product.

Dermal Sensitization
No information available for the product.

Component Carcinogenicity
None of this product's components are listed by ACGIH, IARC, NTP, DFG or OSHA.

Germ Cell Mutagenicity
No information available for the product.
Safety Data Sheet

Material Name: Hydrogen in Argon/Helium/Nitrogen or Air Gas Mixture
SDS ID: 00244778

Tumorigenic Data
No information available for the product.

Reproductive Toxicity
No information available for the product.

Specific Target Organ Toxicity - Single Exposure
No target organs identified.

Specific Target Organ Toxicity - Repeated Exposure
No target organs identified.

Aspiration hazard
No information available for the product.

Medical Conditions Aggravated by Exposure
No data available.

Section 12 - ECOLOGICAL INFORMATION

Component Analysis - Aquatic Toxicity
No LOILI ecotoxicity data are available for this product’s components.

Persistence and Degradability
No information available for the product.

Bioaccumulative Potential
No information available for the product.

Mobility
No information available for the product.

Section 13 - DISPOSAL CONSIDERATIONS

Disposal Methods
Dispose in accordance with all applicable regulations.

Component Waste Numbers
The U.S. EPA has not published waste numbers for this product’s components.

Section 14 - TRANSPORT INFORMATION

US DOT Information:
Shipping Name: COMPRESSED GAS, N.O.S. , (Contains: highest concentration component, , second highest concentration component)
Hazard Class: 2.2
UN/NA #: UN1956
Required Label(s): 2.2

IMDG Information:
Shipping Name: COMPRESSED GAS, N.O.S. , (Contains: highest concentration component, , second highest concentration component)
Hazard Class: 2.2
UN#: UN1956
Required Label(s): 2.2

International Bulk Chemical Code
This material does not contain any chemicals required by the IBC Code to be identified as dangerous chemicals in bulk.

Section 15 - REGULATORY INFORMATION

U.S. Federal Regulations
Safety Data Sheet

Material Name: Hydrogen in Argon/Helium/Nitrogen or Air Gas Mixture

None of this product's components are listed under SARA Sections 302/304 (40 CFR 355 Appendix A), SARA Section 313 (40 CFR 372.65), CERCLA (40 CFR 302.4), TSCA 12(b), or require an OSHA process safety plan.

SARA Section 311/312 (40 CFR 370 Subparts B and C) reporting categories
Gas Under Pressure; Simple Asphyxiant

U.S. State Regulations
The following components appear on one or more of the following state hazardous substances lists:

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS</th>
<th>CA</th>
<th>MA</th>
<th>MN</th>
<th>NJ</th>
<th>PA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrogen</td>
<td>1333-74-0</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Nitrogen</td>
<td>7727-37-9</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Helium</td>
<td>7440-59-7</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Argon</td>
<td>7440-37-1</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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</table>

Not listed under California Proposition 65

Canada Regulations

Canadian WHMIS Ingredient Disclosure List (IDL)
The components of this product are either not listed on the IDL or are present below the threshold limit listed on the IDL.

Component Analysis - Inventory

Hydrogen (1333-74-0)

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<tr>
<td>Yes</td>
<td>DS L</td>
<td>EIN</td>
<td>Yes</td>
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Nitrogen (7727-37-9)

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<td>Yes</td>
<td>DS L</td>
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<td>Yes</td>
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Helium (7440-59-7)

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</table>
### Safety Data Sheet

**Material Name:** Hydrogen in Argon/Helium/Nitrogen or Air Gas Mixture

**SDS ID:** 00244778

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#### Section 16 - OTHER INFORMATION

**NFPA Ratings**
- Health: 2
- Fire: 0
- Reactivity: 0

**Summary of Changes**
- New SDS: 03/30/2016

**Key / Legend**
- ACGIH - American Conference of Governmental Industrial Hygienists
- ADR - European Road Transport
- Australia
- BOD - Biochemical Oxygen Demand
- C - Celsius
- CA - Canada
- CA/MA/MN/NJ/PA - California/Massachusetts/Minnesota/New Jersey/Pennsylvania
- CAS - Chemical Abstracts Service
- CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act
- CFR - Code of Federal Regulations (US)
- CLP - Classification, Labelling, and Packaging
- CN - China
- CPR - Controlled Products Regulations
- DFG - Deutsche Forschungsgemeinschaft
- DOT - Department of Transportation
- DSD - Dangerous Substance Directive
- DSL - Domestic Substances List
- EC - European Commission
- EEC - European Economic Community
- EIN - European Inventory of (Existing Commercial Chemical Substances)
- EINECS - European Inventory of Existing Commercial Chemical Substances
- ENCS - Japan Existing and New Chemical Substance Inventory
- EPA - Environmental Protection Agency
- EU - European Union
- F - Fahrenheit
- F - Background (for Venezuela Biological Exposure Indices)
- IARC - International Agency for Research on Cancer
- IATA - International Air Transport Association
- ICAO - International Civil Aviation Organization
- IDL - Ingredient Disclosure List
- IDLH - Immediately Dangerous to Life and Health
- IMDG - International Maritime Dangerous Goods
- ISHL - Japan Industrial Safety and Health Law
- IUCLID - International Uniform Chemical Information Database
- JP - Japan
- Kow - Octanol/water partition coefficient
- KR KECI Annex 1 - Korea Existing Chemicals Inventory (KECI) / Korea

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<td>Yes</td>
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<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Safety Data Sheet

Material Name: Hydrogen in Argon/Helium/Nitrogen or Air Gas Mixture  

Existing Chemicals List (KECL); KR KECl Annex 2 - Korea Existing Chemicals Inventory (KECI) / Korea Existing Chemicals List (KECL) , KR - Korea; LD50/LC50 - Lethal Dose/ Lethal Concentration; LEL - Lower Explosive Limit; LLV - Level Limit Value; LOLI - List Of Lists™ - ChemADVISOR’s Regulatory Database; MAK - Maximum Concentration Value in the Workplace; MEL - Maximum Exposure Limits; MX - Mexico; Ne- Non-specific; NFPA - National Fire Protection Agency; NIOSH - National Institute for Occupational Safety and Health; NJTSR - New Jersey Trade Secret Registry; Nq - Non-quantitative; NSL – Non-Domestic Substance List (Canada); NTP - National Toxicology Program; NZ - New Zealand; OSHA - Occupational Safety and Health Administration; PEL- Permissible Exposure Limit; PH - Philippines; RCRA - Resource Conservation and Recovery Act; REACH-Registration, Evaluation, Authorisation, and restriction of Chemicals; RID - European Rail Transport; SARA - Superfund Amendments and Reauthorization Act; Sc - Semi-quantitative; STEL - Short-term Exposure Limit; TCCA – Korea Toxic Chemicals Control Act; TDG - Transportation of Dangerous Goods; TLV - Threshold Limit Value; TSCA - Toxic Substances Control Act; TW – Taiwan; TWA - Time Weighted Average; UEL - Upper Explosive Limit; UN/NA - United Nations /North American; US - United States; VLE - Exposure Limit Value (Mexico); VN (Draft) - Vietnam (Draft); WHMIS - Workplace Hazardous Materials Information System (Canada).

Other Information

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