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MATERIAL SAFETY DATA SHEET

No. 72

PRODUCT NAME Less Than 2.9% Hydrogen in Argon	CAS # Hydrogen = 1333-74-0 Argon = 7440-37-1
TRADE NAME AND SYNONYMS Compressed gas, n.o.s. (D.O.T.)	DOT I.D. No.: UN 1956
CHEMICAL NAME AND SYNONYMS <2.9 Molar % Hydrogen in Argon	DOT Hazard Class: Division 2.2
ISSUE DATES AND REVISIONS May 1998	Formula <2.9 Molar % H ₂ in Ar
	Chemical Family: Gas Mixture

HEALTH HAZARD DATA

<p>TIME WEIGHTED AVERAGE EXPOSURE LIMIT Hydrogen and Argon are simple asphyxiants (ACGIH 1997). OSHA 1995 does not list a PEL (8 hr. TWA) for Hydrogen or Argon. (Continued on Page 4).</p>
<p>SYMPTOMS OF EXPOSURE Effects of exposure to high concentrations so as to displace the oxygen in the air necessary for life are headache, dizziness, labored breathing and eventual unconsciousness.</p>
<p>TOXICOLOGICAL PROPERTIES Mixtures are nontoxic but the liberation of a large amount in a confined area could displace the amount of oxygen in air necessary to support life. Neither hydrogen or argon are listed in the IARC, NTP or by OSHA as a carcinogen or potential carcinogen. Persons in ill health where such illness would be aggravated by exposure to these mixtures should not be allowed to work with or handle these products.</p>
<p>RECOMMENDED FIRST AID TREATMENT PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF OVEREXPOSURE TO THESE MIXTURES. RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS. <u>Inhalation:</u> 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 moved to an uncontaminated area, given assisted respiration and supplemental oxyJen. Further treatment should be symptomatic and supportive.</p>

Information contained in this material safety data sheet is offered without charge for use by technically qualified personnel at their discretion and risk. All statements, technical information and recommendations contained herein are based on tests and data which we believe to be reliable, but the accuracy or completeness thereof is not guaranteed and no warranty of any kind is made with respect thereto. This information is not intended as a license to operate under or a recommendation to practice or infringe any patent of this Company or others covering any process, composition of matter or use.
 Since the Company shall have no control of the use of the product described herein, the Company assumes no liability for loss or damage incurred from the proper or improper use of such product.

HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES	
None	
PHYSICAL DATA	
BOILING POINT H ₂ = -423°F (-252.8°C) Ar = -302.6°F (-185.9°C)	LIQUID DENSITY AT BOILING POINT See Page 4
VAPOR PRESSURE See Page 4	GAS DENSITY AT 70°F, 1 atm See Page 4
SOLUBILITY IN WATER Very slightly	FREEZING POINT H ₂ = -423°F (-252.8°C) Ar = -308.9°F (-189.4°C)
EVAPORATION RATE N/A (Gas)	SPECIFIC GRAVITY (AIR=1) See Page 4
APPEARANCE AND ODOR Colorless, odorless gas	

FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method used) N/A	AUTO IGNITION TEMPERATURE N/A	FLAMMABLE LIMITS % BY VOLUME (See Page 4) LEL N/A UEL N/A
EXTINGUISHING MEDIA Nonflammable mixtures		ELECTRICAL CLASSIFICATION Nonhazardous
SPECIAL FIRE FIGHTING PROCEDURES If cylinders are involved in a fire, safely relocate or keep cool with water spray.		
UNUSUAL FIRE AND EXPLOSION HAZARDS None		

REACTIVITY DATA

STABILITY Unstable		CONDITIONS TO AVOID None
Stable	X	
INCOMPATIBILITY (Materials to avoid) None		
HAZARDOUS DECOMPOSITION PRODUCTS None		
HAZARDOUS POLYMERIZATION May Occur		CONDITIONS TO AVOID
Will Not Occur	X	None

SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED Evacuate all personnel from affected area. Use appropriate protective equipment. If leak is in user's equipment, be certain to purge piping with an inert gas prior to attempting repairs. If leak is in container or container valve, contact your closest supplier location or call the emergency telephone number listed herein.
WASTE DISPOSAL METHOD Do not attempt to dispose of waste or unused quantities. Return in the shipping container properly labeled, with any valve outlet plugs or caDs secured and valve protection cap in place to your supplier. For emergency disposal assistance, contact your closest supplier location or call the emergency telephone number listed herein.

SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (Specify type)		Positive pressure air line with mask or self-contained breathing apparatus should be available for emergency use.	
VENTILATION See Local Exhaust	LOCAL EXHAUST See Page 4	SPECIAL	N/A
	MECHANICAL (Gen.)		N/A
PROTECTIVE GLOVES As required when welding. See Other Protective Equipment			
EYE PROTECTION Safety goggles or glasses. When welding, wear helmet or use face (Continued on Page 4)			
OTHER PROTECTIVE EQUIPMENT Safety shoes and appropriate head and eye protection when welding. (Continued on Page 4)			

SPECIAL PRECAUTIONS*

SPECIAL LABELING INFORMATION	
DOT Shipping Name: Compressed gas, n.o.s.	DOT Hazard Class: Division 2.2
DOT Shipping Label: Nonflammable Gas	I.D. No.: UN 1956
SPECIAL HANDLING RECOMMENDATIONS	
<p>Use only in well-ventilated areas. Valve protection caps must remain in place unless container is secured with valve outlet piped to use point. Do not drag, slide, drop or roll cylinders. Use a suitable hand truck for cylinder movement. Use a pressure reducing regulator when connecting cylinder to lower pressure (<3,000 psig) piping or systems. Do not heat cylinder by any means to increase the discharge rate of product from the cylinder. Use a check valve or trap in the discharge line to prevent hazardous back flow into the cylinder. Keep cylinder away from heat and flame. Do not tamper with (valve) safety device. Close valve after each use and when empty. See NFPA Pamphlet 51A "Welding and Cutting" for additional information.</p> <p>For additional recommendations consult Compressed Gas Association's Pamphlet P-1.</p>	
SPECIAL STORAGE RECOMMENDATIONS	
<p>Protect cylinders from physical damage. Store in cool, dry, well-ventilated area away from heavily trafficked areas and emergency exits. Do not allow the temperature where cylinders are stored to exceed 125F (52C). Cylinders should be stored upright and firmly secured to prevent falling or being knocked over. Full and empty cylinders should be segregated. Use a "first in - first out" inventory system to prevent full cylinders being stored for excessive Periods of time.</p> <p>For additional recommendations consult Compressed Gas Association's Pamphlet P-1.</p>	
SPECIAL PACKAGING RECOMMENDATIONS	
<p>These mixtures are noncorrosive and may be used with any common structural material.</p>	
OTHER RECOMMENDATIONS OR PRECAUTIONS	
<p>Compressed gas cylinders should not be refilled except by qualified producers of compressed gases. Shipment of a compressed gas cylinder which has not been filled by the owner or with his (written) consent is a violation of Federal Law (49CFR). (Continued on Page 5)</p>	

*Various Government Agencies (i.e. Department of Transportation, Occupational Safety and Health Administration, Food and Drug Administration and others) may have specific regulations concerning the transportation, handling, storage or use of this product which will not be reflected in this data sheet. The customer should review these regulations to ensure that he is in full compliance.

LESS THAN 2.9% HYDROGEN IN ARGON

HEALTH HAZARD DATA TIME WEIGHTED AVERAGE EXPOSURE LIMIT: (Continued)

Oxygen levels should be maintained at greater than 18 Molar percent at normal atmospheric pressure (pO₂>135 torr).

PHYSICAL DATA

LIQUID DENSITY AT BOILING POINT: H₂ = 4.43 lb/ft³ (70.96 kg/m³)
Ar = 7 lb/ft³ (1393 kg/m³)

VAPOR PRESSURE: @ 70°F (21.1°C) = Above the critical temperature of:
H₂ = -399.8°F (-239.9°C)
Ar = -188.1°F (-122.3°C)

GAS DENSITY AT 70°F, 1 atm: .0052 lb/ft³ (.0833 kg/m³)
.1034 lb/ft³ (1.656 kg/m³)

SPECIFIC GRAVITY (AIR=1): H₂ @ 70°F (21.1°C) = .069
Ar @ 70°F (21.1°C) = 1.38

SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION: (Continued)

When welding in confined space or where local exhaust or ventilation does not keep exposure below welding fume TLV, use positive pressure air line with mask or self-contained breathing apparatus.

LOCAL EXHAUST:

To prevent accumulation of high concentrations of gases so as to reduce the oxygen level in the air to less than 18 molar percent. When welding, use enough ventilation, local exhaust at the arc, or both, to keep the welding fumes and gases below the applicable TLVs in the worker's breathing zone and the general area. Train the welder to keep his head out of the fumes.

EYE PROTECTION: (Continued)

shield with filter lens. As a general rule, start with a shade which is too dark to see the weld zone. Then go to the next lighter shade which gives sufficient view of the weld zone. Provide protection screens and flash goggles, if necessary, to shield others from arc rays radiation which can injure eyes and burn skin.

OTHER PROTECTIVE EQUIPMENT: (Continued)

When welding, wear head, hand and body protection which help to prevent injury from radiation, sparks and electrical shock. See ANSI Z-49.1. At a minimum, this includes welder's gloves and a protective face shield and may include arm protectors, aprons, hats, shoulder protection, as well as dark substantial clothing. Train the welder not to touch live electrical parts and to insulate himself from work and ground.

CAUTION: Welding or brazing may produce fumes and gases hazardous to health. Short-term (acute) overexposure to welding fumes may result in discomfort such as: dizziness, nausea, or dryness or irritation of nose, throat, or eyes. Long-term (chronic) overexposure may lead to siderosis (iron deposits in the lungs) and is (Continued on Page 5)

LESS THAN 2.9% HYDROGEN IN ARGON

SPECIAL PROTECTION INFORMATION

OTHER PROTECTIVE EQUIPMENT

CAUTION: (Continued)

believed by some investigators to affect pulmonary function. Arc rays can injure eyes and burn skin. Electric shock can kill. Avoid breathing these fumes and gases. Use adequate ventilation. See ANSI Z-49.1 "Safety in Welding and Cutting" published by the American Welding Society.

Consult hazard warnings on boxes or containers (or on tags or labels thereon) containing brazing or welding filler metals, fluxes and fusible granular materials. See OSHA safety regulations under 29CFR 1910.252 "Welding, Cutting and Brazing." Also see ACGIH "TLVs (1996) for Chemical Substances in the Work Environment, Appendix B, Section B2 "Welding Fumes" (Total Particulate TLV-TWA, 5 mg/m3) for further information. Consult manufacturer's material safety data sheet on welding consumables and related products for reactivity and health hazard data, and for further information regarding welding fumes.

SPECIAL PRECAUTIONS

OTHER RECOMMENDATIONS OR PRECAUTIONS: (Continued)

Always secure cylinders in an upright position before transporting them. NEVER transport cylinders in trunks of vehicles, enclosed vans, truck cabs or in passenger compartments. Transport cylinders secured in open flatbed or in open pick-up type vehicles.

Reporting under SARA, Title III, Section 313 not required

NFPA 704 NO. for the these mixtures = 1 0 0 None