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Hydrogen Cyanide in Nitrogen

0.0001-0.02%

MATERIAL SAFETY DATA SHEET

Identification

Revision Date 01-01-15

Formula: HCN in N₂

Document Number: MSDS 135N

Composition and Information on Ingredients

Chemical Name	CAS #	Mole %	Exposure Limits in Air					Other ppm
			ACGIH		OSHA			
			TLV ppm	STEL ppm	PEL ppm	STEL ppm	IDLH ppm	
Hydrogen Cyanide	74-90-8	0.0001 - 0.020%	NE	4.7, C SKIN	10, SKIN	4.7, SKIN (Vacated 1989 PEL)	50	NIOSH REL; 4.7ppm ST: SKIN DFG MAK 10 ppm
Nitrogen	7727-37-9	Balance	There are no specific exposure limits for Nitrogen. Nitrogen is a simple Asphyxiant (SA). Oxygen levels should be maintained above 19.5%.					

NE=Not Established. C=Ceiling Limit. A4=Not Classifiable as a Human Carcinogen. See Section 16 for Definitions of Terms Used.

Note: All WHMIS required information is included.

Hazard Identification

EMERGENCY OVERVIEW: This product is colorless gas and odorless. Hydrogen Cyanide (a component of this gas mixture) is an extremely toxic gas; even brief over-exposures to relatively low doses may have significant health consequences. Acute low-level exposures can cause symptoms such as cyanosis, headache, dizziness, and unsteadiness of gait, a feeling of suffocation and nausea. Additionally, releases of this product may produce oxygen deficient atmospheres (especially in confined spaces or other poorly ventilated environments); individuals in such atmospheres may be asphyxiated.

Hazardous material Information

- ❖ HEALTH (Blue) 3
- ❖ FLAMMABILITY (Red) 0
- ❖ REACTIVITY (Yellow) 1

INHALATION: Due to the small size of an individual cylinder of this product, no unusual health effects from over-exposure to the product are anticipated under routine circumstances of use. The health hazard associated with this gas mixture are the potential for over-exposure to Hydrogen Cyanide and oxygen displacement if this product is released in small, poorly ventilated areas (i.e. enclosed or confined space). Hydrogen Cyanide is an extremely toxic gas. Low concentrations of this gas can cause headache, vertigo, irritation of the throat, difficulty breathing, reddening of eyes, salivation, nausea and vomiting.

Concentration of Hydrogen Cyanide

2-5ppm:
18-36ppm:
110-135ppm:
133ppm:
180ppm:

Observed Effects

Detectable odor threshold.
Slight symptoms after several hours.
Dangerous to life or fatal after 0.5-1 hour.
Fatal after 30 minutes.
Fatal after 10 minutes

Additionally, if this product is released in a confined space or other poorly ventilated area, an oxygen-deficient environment may occur. Individual breathing such an atmosphere may experience symptoms that include headaches, ringing in ears, dizziness, unconsciousness, nausea, vomiting, and depression of all senses.

Health Effects or Risks from Exposure: An Explanation in Lay Terms. Over-exposure to this gas mixture may cause the following health effects:

- ❖ **Acute:** Due to the small size of the individual cylinder of this product, no unusual health effects from exposure to the product are anticipated under routine circumstances of use. Hydrogen Cyanide (a component of this gas mixture) is an extremely toxic gas; even brief over-exposures to relatively low doses may have significant health consequences.
- ❖ **Chronic:** There are wide ranges of chronic symptoms that are thought to occur with chronic, low-level cyanide compound exposure. These include cause persistent runny nose, headache, irritation of the throat, difficulty breathing, reddening of eyes, changes in the perception of taste and smell, salivation, nausea, vomiting, muscle cramps, weight loss, flushing of the face and enlargement of the thyroid gland. As these symptoms are not exclusive to cyanide exposure, the symptoms of chronic cyanide toxicity are not conclusive.
- ❖ **Target Organs:** Respiratory system, skin, and eyes, enzymes associated with oxidation.

First-Aid Measures

If necessary, Self - Contained Breathing Apparatus must be worn. No unusual health effects are anticipated after exposure to this product, due to the small cylinder size. If any adverse symptom develops after over-exposure to this product, remove victim(s) to fresh air as quickly as possible. Only trained personnel should administer supplemental oxygen and/or cardio-pulmonary resuscitation if necessary. Victim(s) who experience any adverse effect after over-exposure to this product must be taken for medical attention. Rescuers should be taken for medical attention if necessary. Take a copy of the label and the MSDS to physician or other health professional with victim(s).

Complete Cyanide Antidote Kit should be available near all areas of use. Personnel should be trained in the use of the kit to administer first aid in advance of medical assistance. The kit should contain at least the following:

- Two boxes (2 dozen) of amyl nitrite pearls.
- Two ampoules of sterile sodium nitrite solution (10ml of 3% solution in each).
- Two ampoules of sterile sodium thiosulfate solution (50ml of 25% solution in each).
- Two 10ml sterile syringes. Two 50ml sterile syringes.
- Two sterile intravenous needles. One tourniquet.
- Twelve gauze pads. One bottle of 70% alcohol.
- One ampoule file.

Because of the special hazard of Cyanide compounds, special treatment procedures are administered to victims of exposure to Hydrogen Cyanide. Personnel should be trained to administer initial first aid treatment to victims of Hydrogen Cyanide poisoning to response from medical professionals. If victim has difficulty breathing, is becoming confused or is losing consciousness, administer amyl nitrite. Crush one pearl of amyl nitrite onto a cloth and hold to the victim's nose 15 to 30 seconds of each minute. Use a new pearl every 5 minutes (0.3-mg size), or every 3 minutes (0.18-mg size). While amyl nitrite is being administered, if possible monitor blood pressure. If blood pressure of the victim drops to 80/60, stop amyl nitrite and obtain advice of professional personnel.

Fire-Fighting Measures

Flash Point, (method): Not applicable.

Autoignition Temperature: Not applicable.

Flammability Limits (in air by volume %):

Lower (LEL): Not applicable

Upper (LEL): Not applicable

- Fire Extinguishing Materials: Non – flammable gas mixture. Use extinguishing media appropriate for surrounding fire.
- Unusual Fire and Explosion Hazards: Hydrogen Cyanide is toxic to humans in relatively low concentrations, and in the concentration present this gas mixture presents potential hazard to firefighters. Gas is non-flammable; however, containers, when involved in fire, may rupture or burst in the heat of the fire.
 - Explosion Sensitivity to Mechanical Impact: Not sensitive.
 - Explosion Sensitivity to Static Discharge: Not sensitive.
- Special Fire – Fighting Procedures: Structural firefighters must wear Self – Contained Breathing Apparatus and full protective equipment.

Accidental Release Measures

Leak Response: Due to the small size and content of the cylinder, an accidental release of this product presents significantly less risk of over – exposure to Hydrogen Cyanide, an oxygen-deficient environment and other safety hazards than a similar release from a larger cylinder. However, as with any chemical release, extreme caution must be used during emergency response procedures. In the event of a release in which the atmosphere is unknown, and in which other chemicals are potentially involved, evacuate immediately area. Such release should be responded to by trained personnel using pre- planned procedures. Proper protective equipment should be used. In case of a leak, clear the affected area, protect people, and respond with trained personnel.

Allow the gas mixture to dissipate. If necessary, monitor the surrounding area (and the original area of the release) for oxygen. A colorimetric tube is available for Hydrogen Cyanide. The level of Hydrogen Cyanide must be at acceptable levels (less than 50% of the TLV; TLV=4.7 ppm) and Oxygen levels must be above 19.5% oxygen before non-emergency personnel are allowed to re – enter area. If leaking comes from the cylinder, contact your supplier.

Handling and Use

- **Handling and Storage Precautions**

Use only in well – ventilated areas. Eye wash stations/safety showers should be near areas where this product is used or stored. All work operations should be monitored in such way that emergency personnel can be contacted immediately in the event of a release. Do not attempt to repair, adjust, or in any other way modify cylinders contained with this gas mixture. If there is a malfunction or another type of operational problem, contact nearest distributor immediately.

Valve protection caps must remain in place unless container is secured with valve outlet piped to use point. Do not drag, slide or roll cylinders. Use a suitable hand truck for cylinder movement. Use a pressure-reducing regulator when connecting cylinder to lower pressure (<3000 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 backflow into the system. Protect cylinders from physical damage. Store in cool, dry, well – ventilated area of noncombustible construction away from heavily trafficked areas and emergency exits. Do not allow the temperature where cylinders are stored to exceed 130°F (54°C). Cylinders should be stored upright and firmly secured to prevent falling or being knocked over. Use a “first in, first out” inventory system to prevent full cylinders being stored for excessive periods of time. There should be no sources of ignition in the storage or use area. Never carry a compressed gas cylinder or a container of a gas in cryogenic liquid form in an enclosed space such as a car trunk, van or station wagon. A leak can result in a fire, asphyxiation or toxic exposure.

Exposure Controls – Personal Protection

Ventilation and Engineering Controls: No special ventilation systems or engineering controls are needed under normal circumstances of use. As with all chemicals, use this product in well – ventilated areas. If this product is used in a poorly – ventilated area, install automatic monitoring to detect the levels of Hydrogen Cyanide and Oxygen.

Respiratory Protection: No special respiratory protection is required under normal circumstances of use. Maintain Hydrogen Cyanide levels below 50% of the TLV (TLV=4.7 ppm C) and oxygen levels below 19.5%, or during emergency response to a release of this product

Eye/Face Protection: Safety goggles or glasses.

Skin Protection: Protective gloves of any material.

Other/General Protection: Safety shoes.

Physical and Chemical Properties

GAS DENSITY @32°F (0°C) and 1 atm: 0.072lbs/ft³ (1.153kg/m³)

BIOLING POINT: -320.4°F (-195.8°C)

FREEZING/MELTING POINT @ 10psig –345.8°F (-210°C)

SPECIFIC GRAVITY (air = 1) @ 70°F (21.1°C): 0.906

SOLUBILITY IN WATER vol./vol. @ 32°F (0°C) and 1 atm: 0.023

EVAPORATING RATE (nBuAc = 1): Not applicable.

ODOR THRESHOLD: 0.06 ppm (Chlorine)

VAPOR PRESSURE @ 70°F (21.1°C) psig: Not applicable.

COEFFICIENT WATER/OIL DISTRIBUTION: Not applicable.

pH: Not applicable.

MOLECULAR WEIGHT: 28.01

EXPANSION RATIO: Not applicable

SPECIFIC VOLUME (ft³/lb): 13.8

Appearance and Color: This product is colorless gas mixture, which is odorless.

How to Detect this Substance (warning properties): Fittings and joints can be painted with soap solution to detect leak.

Stability and Reactivity

- Stability: Normally stable in gaseous state. Pure Hydrogen Cyanide is very unstable as it is sensitive to heat.
- Decomposition Products: When heated to combustion, Hydrogen Cyanide emits toxic fumes of carbon monoxide, carbon dioxide and nitrogen oxides. Nitrogen does not decompose, per se, but can react with other compounds in the heat of fire.
- Materials with which Substance is Incompatible: Titanium will burn in Nitrogen (a main component of this product). Lithium reacts slowly with Nitrogen at ambient temperatures. Hydrogen Cyanide can react with any other compounds, but not usually violently unless the other chemical is also highly reactive.
- Hazardous Polymerization: Will no occur.
- Conditions to Avoid: Contact with incompatible materials. Cylinders exposed to high temperature or direct flame can rupture or burst.

Toxicological Information

Hydrogen Cyanide:

Oral - Human LDLo: 570 mg/kg	Intravenous - Rat LD50:810 mg/kg
Inhalation - Man LCLo:400 mg/m ³ /2 minutes	Oral - Mouse LD50:3700 mg/kg
Inhalation - Human LCLo:200 ppm/5 minutes	Inhalation - Mouse LC50:323 ppm/5 minutes
Inhalation - Human LCLo:120 mg/m ³ /1 hour	Intraperitoneal - Mouse LD50:2990 mg/kg
Inhalation - Human LCLo:200mg/m ³ /m ³ /10	Subcutaneous - Mouse LDLo:3 mg/kg
Subcutaneous - Human LDLo:1 mg/kg	Intravenous – Mouse LD50:990 mg/kg
Intravenous - Human LD50:1 mg/kg	Oral – Dog, adult LDLo:4 mg/kg
Intravenous - Man TDLo:55 mg/kg: Pulmonary system effects	Inhalation – Dog, adult LC50:616 mg/m ³ /1 minute
Unreported - Man LDLo:1471 mg/kg	Subcutaneous – Dog, adult LDLo:1700 mg/kg
Intramuscular - Rabbit, adult LD50:486 mg/kg	Intravenous – Dog, adult LD50:1340 mg/kg

- Hydrogen Cyanide may be irritating to contaminated eyes.
- This gas mixture is not known to cause sensitization in humans.
- Any respiratory disorder may be aggravated by over-exposure to the components of this product. Skin and eye conditions may be aggravated by Hydrogen Cyanide exposures.
- Victims of exposure to Hydrogen Cyanide must be monitored closely. In case of severe Hydrogen Cyanide exposure: administer amyl nitrate inhalations. If victim does not respond inject intravenously 0.3 grams sodium nitrite (10ml of a 3% solution at a rate of 2.5-5.0ml/minute), follow at once by 12.5 grams of sodium thiosulfate intravenously (50ml of a 25% solution injected at about the same rate as the sodium nitrite solution).

Ecological Information

Effects of Material on Plants or Animals: Due to presence of Hydrogen Cyanide, this gas mixture may be harmful to over – exposed plants or animal life.

Effects of Chemical on Aquatic Life: Hydrogen Cyanide is soluble in water; therefore, this gas mixture may be harmful or fatal to aquatic life in contaminated bodies of water.

Disposal Considerations

Waste disposal must be in accordance with appropriate Federal, State, and local regulations. Cylinders with undesired residual product may be safely vented outdoors with the proper regulator. For further information, refer to Section 16 (Other Information).

Transportation Information

Proper Shipping Name:	Compressed gases, n.o.s. (Nitrogen, Hydrogen Cyanide)
Hazard Class Number and Description:	2.2 (Non – Flammable Gas)
UN Identification Number:	UN 1956
CT (DOT) Label (s) Required:	Non – Flammable Gas

Regulatory Information

Hydrogen Cyanide

SARA Section 302 (40CFR355.30): Yes

SARA Section 304 (40CFR355.40): Yes

SARA Section 313 (40CFR372.65): Yes

Other Information

CT 39 (DOT 39) cylinders ship as hazardous materials when full. Once the cylinders are relieved of pressure (empty) they are not considered hazardous material or waste. Residual gas in this type of cylinder is not an issue because toxic gas mixtures are prohibited. Calibration gas mixtures typically packed in these cylinders are Nonflammable n.o.s., UN 1956. A small percentage of calibration gases packed in CT 39 (DOT 39) cylinders are flammable or oxidizing gas mixtures.

For disposal of used CT 39 (DOT-39) cylinders, it is acceptable to place them in a landfill if local laws permit. Their disposal is no different than that employed with other CT (DOT) containers such as spray paint cans, household aerosols, or disposable cylinders of propane (for camping, torch etc.). When feasible, we recommended recycling for scrap metal content. Precision Gas Products Inc. will do this for any customer that wishes to return cylinders to us prepaid. All that is required is a phone call to make arrangements so we may anticipate arrival. Scrapping cylinders to valued customers who want to participate.

MIXTURES: When two or more gases or liquefied gases are mixed, their hazardous properties may combine to create additional, unexpected hazards. Obtain and evaluate the safety information for each component before you produce the mixture. Consult an Industrial Hygienist or other trained person when you make your safety evaluation of the end product. Remember gases and liquids have properties, which can cause injury or death.

<p>This Material Safety Data Sheet is offered pursuant to OSHA's Hazard Communication Standard, 29 CFR 1910.1200. Other government regulations must be reviewed for applicability to this product. To the best of Precision Gas Products Inc. knowledge, the information contained herein is reliable and accurate as of this date; however, accuracy, stability or completeness is not guaranteed and no warranties of any type, either express or implied, are provided. The information contained herein relates only to this specific product. If this product is combined with other materials, all component properties must be considered. Data may be changed from time to time.</p>
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