

## Praxair Material Safety Data Sheet

### 1. Chemical Product and Company Identification



<b>Product Name:</b> Arsine	<b>Trade Name:</b> Arsine
<b>Product Use:</b> Many.	
<b>Chemical Name:</b> Arsine	<b>Synonym:</b> Arsenic Hydride, Arsenic Trihydride, Arseniuretted Hydrogen, Arsenous Hydride, Hydrogen Arsenide
<b>Chemical Formula:</b> AsH <sub>3</sub>	<b>Chemical Family:</b> Inorganic Hydride
<b>Telephone:</b> <b>Emergencies:</b> * 1-800-363-0042	<b>Supplier /Manufacture:</b> Praxair Canada Inc. 1 City Centre Drive Suite 1200 Mississauga, ON L5B 1M2  <b>Phone:</b> 905-803-1600 <b>Fax:</b> 905-803-1682

*\*Call emergency numbers 24 hours a day only for spills, leaks, fire, exposure, or accidents involving this product. For routine information, contact your supplier or Praxair sales representative.*

### 2. Composition and Information on Ingredients

INGREDIENTS	% (VOL)	CAS NUMBER	LD <sub>50</sub> (Species & Routes)	LC <sub>50</sub> (Rat, 4 hrs.)	TLV-TWA (ACGIH)
Arsine	100	7784-42-1	Not available.	10 ppm.	0.005 ppm

### 3. Hazards Identification

	<b>Emergency Overview</b>	
<p><b>DANGER!</b> Toxic, flammable liquid and gas under pressure. May be fatal if inhaled. Causes severe red blood cell, lung, liver, kidney, nervous system, and heart damage. Liquid may cause frostbite. Symptoms may be delayed. May form explosive mixtures with air. Suspect cancer hazard. Self-contained breathing apparatus must be worn by rescue workers.</p>		

**ROUTES OF EXPOSURE:** Inhalation.

**EFFECTS OF A SINGLE (ACUTE) OVEREXPOSURE:**

**INHALATION:** Extremely toxic. May be fatal if inhaled. Arsine produces rapid intravascular hemolysis (destruction of red blood cells), hemoglobinuria (hemoglobin in urine) with accompanying dark urine, weakness, shivering, decreased blood pressure, dizziness, headache, garlic odour of breath, nausea, vomiting, abdominal and flank pain, diarrhea, thirst and collapse. Acute exposure to high concentrations can also result in difficulty in breathing and pulmonary edema. This interval between onset of exposure and symptoms is dependent on the concentration of gas and duration of exposure. Symptoms can be delayed up to 48 hours. Concentrations in excess of 50 ppm are rapidly fatal. Deaths have been reported from exposures to 25 ppm for 30 minutes.

**SKIN CONTACT:** No harm expected. Liquid may cause frostbite.

**SKIN ABSORPTION:** No harm expected. Liquid may cause frostbite.

**SWALLOWING:** An highly unlikely route of exposure, but frostbite of the lips and mouth may result from contact with the liquid. This product is a gas at normal temperature and pressure.

**EYE CONTACT:** No harm expected. Liquid may cause frostbite.

**EFFECTS OF REPEATED (CHRONIC) OVEREXPOSURE:**

Repeated exposure can result in anemia, peripheral neuropathy, numbness, tingling, and weakness of the extremities, and cardiovascular disease. When inhaled, arsine releases inorganic arsenic; repeated exposure to arsenic may result in increased pigmentation and thickening of the skin.

**OTHER EFFECTS OF OVEREXPOSURE:**

Delayed effects include hemolytic anemia, jaundice and bronzing of the skin, pulmonary edema, and peripheral neuropathy. Severe overexposure can also result in kidney, liver, and heart damage. Kidney failure may occur with oliguria or anuria leading to uremia and death.

**MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE:**

Individuals with anemia or pre-existing kidney, heart, liver, or nervous system disease may be at increased risk.

**SIGNIFICANT LABORATORY DATA WITH POSSIBLE RELEVANCE TO HUMAN HEALTH HAZARD EVALUATION:**

The International Agency for Research on Cancer (IARC) has reported that there is sufficient evidence that inorganic arsenic compounds are skin and lung carcinogens in humans.

**CARCINOGENICITY:**

Inorganic arsenic is listed by NTP (human carcinogen), OSHA (cancer hazard) and IARC (human carcinogen, group 1)

#### 4. First Aid Measures

**INHALATION:**

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.

**SKIN CONTACT:**

If exposed to liquid, avoid breathing vapour. Immediately warm frostbite area with warm water (not to exceed 40 C). In case of massive exposure, remove clothing and shoes while showering with warm water. Get medical attention immediately.

**SWALLOWING:**

This product is a gas at normal temperature and pressure.

**EYE CONTACT:**

Immediately flush eyes with water for a least 15 minutes. See a physician, preferably an ophthalmologist, immediately.

**NOTES TO PHYSICIAN:**

Arsine is the most toxic form of arsenic, capable of producing rapid, massive, intravascular hemolysis. Serious arsine poisoning symptoms occur within 30 to 60 minutes, however, symptoms can be delayed for up to 48 hours. Laboratory findings include severe hemolytic anemia, hemoglobinemia and hemoglobinuria. Acute renal failure may be an early complication. Hypotension is occasionally seen; T-wave elevations are often observed.

BAL (Dimercaprol) treatment will not protect against hemolysis, but may prevent long-term effects from arsine (arsenic) poisoning. If major hemolysis has occurred, exchange transfusions may be performed to remove plasma hemoglobin red blood cells debris, and arsine-hemoglobin complexes, in conjunction with hemodialysis to preserve renal function. Hemodialysis may also assist in decreasing arsenic levels. Contact Poison Control for additional information on patient management and follow-up.

**5. Fire Fighting Measures**

<b>FLAMMABLE :</b> Yes.	<b>IF YES, UNDER WHAT CONDITIONS?</b>	Forms explosive mixtures with air and oxidizing agents.
<b>FLASH POINT (test method)</b> Flammable gas.	<b>AUTOIGNITION TEMPERATURE</b>	Not available.
<b>FLAMMABLE LIMITS IN AIR, % by volume:</b>	<b>LOWER:</b> 5.1	<b>UPPER:</b> 78

**EXTINGUISHING MEDIA:**

Use DRY chemicals, CO2, water spray or foam.

**SPECIAL FIRE FIGHTING PROCEDURES:**

**DANGER!** DANGER: Poisonous gas. Evacuate all personnel from danger area. Do not approach area without self-contained breathing apparatus and protective clothing. Immediately cool containers with water spray from maximum distance taking care not to extinguish flames. Solid streams of water may be ineffective. Remove ignition sources if without risk. If flames are accidentally extinguished, explosive re-ignition may occur. Reduce toxic vapours with water spray or fog. Shut off leak if without risk while continuing cooling water spray. Remove containers away from fire area of fire if without risk. Allow fire to burn out.

**UNUSUAL FIRE AND EXPLOSION HAZARD:**

Poisonous flammable gas. Forms explosive mixtures with air and oxidizing agents. Because the cylinder valve is not equipped with a pressure relief device, the cylinder may rupture due to heat of fire. Do not extinguish flames due to possibility of explosive re-ignition. Flammable and toxic vapours form from this product and may travel or be moved by air currents and ignited by pilot lights, other flames, smoking, sparks, heaters, electrical equipment, static discharges, or other ignition sources at locations distant from product handling point. Explosive atmospheres may linger. Before entering area, especially confined areas, check atmosphere with approved device. No part of a container should be subjected to temperature higher than 52 C. The cylinders are not equipped with pressure relief devices to release pressure. Evacuate the area if the fire cannot be brought under immediate control to protect persons from cylinder rupture and toxic fumes.

**HAZARDOUS COMBUSTION PRODUCTS:**

Arsenic oxides.

**SENSITIVITY TO IMPACT:**

Avoid impact against container.

**SENSITIVITY TO STATIC DISCHARGE:**

Possible. Ground all equipment before use.

## 6. Accidental Release Measures

### STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED:

**DANGER!** Immediately evacuate all personnel from danger area. **DANGER:** Poisonous, flammable gas. Forms explosive mixtures with air. Use self-contained breathing apparatus and protective clothing where needed. Remove all sources of ignition if without risk. Reduce vapours with fog or fine water spray. Shut off leak if without risk. Ventilate area of leak or move leaking container to well ventilated area. Prevent runoff from contaminating surrounding environment. **CAUTION:** Poisonous, flammable vapours may spread from spill. Before entering area, especially confined areas, check atmosphere with appropriate device.

### WASTE DISPOSAL METHOD:

Prevent waste from contaminating the surrounding environment. Keep personnel away. Discard any product, residue, disposable container, or liner in an environmentally acceptable manner, in full compliance with federal, provincial, and local regulations. If necessary, call your local supplier for assistance.

## 7. Handling and Storage

### PRECAUTIONS TO BE TAKEN IN STORAGE:

**DANGER:** Poisonous, flammable, liquefied gas under pressure. May be fatal if inhaled. Do not breathe gas. Do not get liquid or vapours in eyes, or on skin or clothing. Safety showers and eye wash fountains should be immediately available. Use piping and equipment adequately designed to withstand pressures to be encountered. May form explosive mixtures with air. Keep away from heat, sparks and open flame. Ground all equipment. Only use spark-proof tools and explosion-proof equipment. Store and use with adequate ventilation at all times. Use only in a closed system. Close valve when not in use and when empty. Keep away from oxidizing agents and flammables.

### PRECAUTIONS TO BE TAKEN IN HANDLING:

Protect cylinders from damage. Use a suitable hand truck to move cylinders; do not drag, roll, slide, or drop. Electrical equipment must be non-sparking or explosion-proof. Leak check system with soapy water; never use a flame. Never attempt to lift a cylinder by its cap; the cap is intended solely to protect the valve. Never insert an object (e.g., wrench, screwdriver, pry bar) into cap openings; doing so may damage the valve and cause a leak. Use an adjustable strap wrench to remove over-tight or rusted caps. Open valve slowly. If valve is hard to open, discontinue use and contact your supplier. For other precautions, see section 16.

For additional information on storage and handling, refer to Compressed Gas Association (CGA) pamphlet P-1, "Safe Handling of Compressed Gases in Containers," available from the CGA. Refer to section 16 for the address and phone number along with a list of other available publications.

### OTHER HAZARDOUS CONDITIONS OF HANDLING, STORAGE, AND USE:

**Toxic, flammable high-pressure gas.** May be fatal if inhaled. Do not breathe gas. Use only in a closed system. Use piping and equipment adequately designed to withstand pressures to be encountered. Use only spark-proof tools and explosion-proof equipment. Keep away from heat, sparks, and open flame. **May form explosive mixtures with air.** Ground all equipment. Store and use with adequate ventilation. Close valve after each use; keep closed even when empty. **Prevent reverse flow.** Reverse flow into cylinder may cause rupture. Use a check valve or other protective device in any line or piping from the cylinder. **When returning cylinder to supplier,** be sure valve is closed, then install valve outlet plug tightly. **Never work on a pressurized system.** If there is a leak, close the cylinder valve. Vent the system down in a safe and environmentally sound manner in compliance with all federal, provincial, and local laws; then repair the leak. **Never place a compressed gas cylinder where it may become part of an electrical circuit.**

## 8. Exposure Controls/Personal Protection

### VENTILATION/ENGINEERING CONTROLS:

**LOCAL EXHAUST:** Use explosion-proof ventilation with sufficient air flow to keep the material's concentration below the TLV in the worker's breathing zone.

**MECHANICAL (general):** Inadequate. See SPECIAL.

**SPECIAL:** A canopy type of forced-air fume hood equipped with an explosion-proof device may be more desirable for certain applications.

**OTHER:** Not applicable.

#### PERSONAL PROTECTION:

**RESPIRATORY PROTECTION:** For concentrations up to 10 times the applicable exposure limit any NIOSH/MSHA approved supplied air respirator is recommended. UP to 50 times the TLV, a NIOSH/MSHA approved respirator with a full face piece or self-contained breathing apparatus is recommended. For higher concentrations use only self-contained breathing apparatus operated in the pressure demand mode.

**SKIN PROTECTION:** Neoprene gloves.

**EYE PROTECTION:** Wear safety glasses when handling cylinders.

Select in accordance with the current CSA standard Z94.3, "Industrial Eye and Face Protection", and any provincial regulations, local bylaws or guidelines.

**OTHER PROTECTIVE EQUIPMENT:** Metatarsal shoes for cylinder handling. Protective clothing where needed. Cuffless trousers should be worn outside the shoes. Select in accordance with the current CSA standard Z195, "Protective Foot Wear", and any provincial regulations, local bylaws or guidelines.

### 9. Physical and Chemical Properties

<b>PHYSICAL STATE:</b> Gas. (Compressed Gas)	<b>FREEZING POINT:</b> -116.7°C (-178.1°F)	<b>pH:</b> Not applicable.
<b>BOILING POINT:</b> -62.5°C (-80.5°F)	<b>VAPOUR PRESSURE:</b> 1514.1 kPa (@ 20°C)	<b>MOLECULAR WEIGHT:</b> 77.95 g/mole
<b>SPECIFIC GRAVITY:</b> 1.69 @ 84.9 C LIQUID ( Water = 1)	<b>SOLUBILITY IN WATER:</b> Very slightly soluble in cold water.	
<b>SPECIFIC GRAVITY:</b> 2.69 VAPOUR (air = 1)	<b>EVAPORATION RATE:</b> >1 compared to (Butyl Acetate=1):	<b>COEFFICIENT OF WATER/OIL DISTRIBUTION:</b> Not applicable.
<b>VAPOUR DENSITY:</b> 3.24 kg/m <sup>3</sup>	<b>% VOLATILES BY VOLUME:</b> 100% (v/v).	<b>ODOUR THRESHOLD:</b> 0.84 mg/m <sup>3</sup>

**APPEARANCE & ODOUR:** Colourless. Odour: Garlic-like.

### 10. Stability and Reactivity

<b>STABILITY:</b>	Unstable.
<b>CONDITIONS OF CHEMICAL INSTABILITY:</b>	Exposure to light or heat in the presence of moisture. Decomposes at temperatures in excess of 230 - 240 C.
<b>INCOMPATIBILITY (materials to avoid):</b>	Nitric acid, oxidizing agents, ammonium, halogens.
<b>HAZARDOUS DECOMPOSITION PRODUCTS:</b>	Arsenic, arsenic oxides, hydrogen.
<b>HAZARDOUS POLYMERIZATION:</b>	Will not occur.
<b>CONDITIONS OF REACTIVITY:</b>	None known.

### 11. Toxicological Information

See section 3.

### 12. Ecological Information

No adverse ecological effects expected. This product does not contain any Class I or Class II ozone-depleting chemicals. The components of this mixture are not listed as marine pollutants by TDG Regulations.

### 13. Disposal Considerations

**WASTE DISPOSAL METHOD:**

Do not attempt to dispose of residual or unused quantities. Return cylinder to supplier.

### 14. Transport Information

**TDG/IMO SHIPPING NAME:**

Arsine

HAZARD CLASS:	CLASS 2.3(2.1): Toxic and flammable gas.	IDENTIFICATION #:	UN2188	PRODUCT REPORTABLE QUANTITY (PRO):
				Any accidental release in a quantity that could pose a danger to public safety or any sustained release of 10 minutes or more.

**SHIPPING LABEL(s):** Toxic gas, Flammable gas (subsidiary)

**PLACARD (when required):** Toxic gas

**SPECIAL SHIPPING INFORMATION:**

Cylinders should be transported in a secure position, in a well-ventilated vehicle. Cylinders transported in an enclosed, non-ventilated compartment of a vehicle can present serious safety hazards.

### 15. Regulatory Information

The following selected regulatory requirements may apply to this product. Not all such requirements are identified. Users of this product are solely responsible for compliance with all applicable federal, provincial, and local regulations.

**DSL (Canada)** This product is on the DSL list

**WHMIS (Canada)** CLASS A: Compressed gas.  
CLASS B-1: Flammable gas.  
CLASS D-1A: Materials causing immediate and very serious toxic effects.  
CLASS D-2A: Materials causing other Serious Chronic Toxic Effects.

**International Regulations**
**EINECS** Not available.

**DSCL (EEC)** R11- Highly flammable. R23- Toxic by inhalation.

**International Lists** No products found.

## 16. Other Information

### 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 serious injury or death.

### HAZARD RATING SYSTEM:

#### HMIS RATINGS:

HEALTH 4\*

FLAMMABILITY 4

PHYSICAL HAZARD 2

\*An Asterisk used in conjunction with HMIS health hazards ratings designates a carcinogenic or reproductive hazard.

### STANDARD VALVE CONNECTIONS FOR U.S. AND CANADA:

<b>THREADED:</b>	CGA-350
<b>PIN-INDEXED YOKE:</b>	Not applicable.
<b>ULTRA-HIGH-INTEGRITY CONNECTION:</b>	CGA-632

Use the proper CGA connections. **DO NOT USE ADAPTERS.** Additional limited-standard connections may apply. See CGA pamphlets V-1 and V-7 listed below.

Ask your supplier about free Praxair safety literature as referred to in this MSDS and on the label for this product. Further information about this product can be found in the following pamphlets published by the Compressed Gas Association, Inc. (CGA), 4221 Walney Road, 5th Floor, Chantilly, VA 20151-2923, Telephone (703) 788-2700, Fax (703) 961-1831, website: [www.cganet.com](http://www.cganet.com).

AV-1	Safe Handling and Storage of Compressed Gas
P-1	Safe Handling of Compressed Gases in Containers
V-1	Compressed Gas Cylinder Valve Inlet and Outlet Connections
V-7	Standard Method of Determining Cylinder Valve Outlet Connections for Industrial Gas Mixtures
---	Handbook of Compressed Gases, Fourth Edition

### PREPARATION INFORMATION:

<b>DATE:</b>	<b>October 15, 2013</b>
<b>DEPARTMENT:</b>	<b>Safety and Environmental Services</b>
<b>TELEPHONE:</b>	<b>905-803-1600</b>

The opinions expressed herein are those of qualified experts within Praxair Canada Inc. We believe that the information contained herein is current as of the date of this Material Safety Data Sheet. Since the use of this information and the conditions of use of the product are not within the control of Praxair Canada Inc., it is the user's obligation to determine the conditions of safe use of the product.

Praxair Canada Inc. requests the users of this product to study this Material Data Sheet (MSDS) and become aware of product hazards and safety information. To promote safe use of this product, a user should (1) notify its employees, agents and contractors of the information on this MSDS and any product hazards and safety information, (2) furnish this same information to each of its customers for the product, and (3) request such customers to notify their employees and customers for the product of the same product hazards and safety information.

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Product Name: Arsine

MSDS# E-4565-J

Date: Oct 15, 2013



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