Arsine

Safety Data Sheet E-4565

according to the Hazardous Products Regulation (February 11, 2015)

Date of issue: 10-15-1979 Revision date: 07-28-2023 Supersedes: 01-01-2021 Version: 1.1

SECTION 1: Identification

1.1. Product identifier

Product form	:	Substance
Trade name	:	Arsine
CAS No	:	7784-42-1
Formula	:	AsH3
Other means of identification	:	Arsine
Product group	:	Core Products

1.2. Recommended use and restrictions on use

Recommended uses and restrictions	:	Industrial use,Use as directed.

1.3. Supplier

Linde Canada inc.
500 — 5015 Spectrum Way
Mississauga - Canada L4W 0E4
T 1-905-803-1600 - F 1-905-803-1682
www.lindecanada.ca

1.4. Emergency telephone number

Emergency number : 1-800-363-0042
Call emergency number 24 hours a day only for spills, leaks, fire, exposure, or accidents involving this product.
For routine information, contact your supplier or Linde sales representative.

SECTION 2: Hazard identification

2.1. Classification of the substance or mixture

GHS-CA classification

Flammable gases, Category 1	H220
Gases under pressure : Liquefied gas	H280
Acute toxicity (inhal.), Category 1	H330
Carcinogenicity, Category 2	H351
Specific target organ toxicity — Repeated exposure, Category 2	H373

2.2. GHS Label elements, including precautionary statements

GHS-CA labelling

Hazard pictograms :

GHS02 GHS04 GHS06 GHS08

Signal word : DANGER

Hazard statements : **EXTREMELY FLAMMABLE GAS**
CONTAINS GAS UNDER PRESSURE; MAY EXPLODE IF HEATED
FATAL IF INHALED
SUSPECTED OF CAUSING CANCER (Inhalation)
MAY CAUSE DAMAGE TO ORGANS (LIVER) THROUGH PROLONGED OR REPEATED EXPOSURE (Inhalation)
VERY TOXIC TO AQUATIC LIFE WITH LONG LASTING EFFECTS
MAY FORM EXPLOSIVE MIXTURES WITH AIR.
SYMPTOMS MAY BE DELAYED

Precautionary statements	:	Obtain special instructions before use Do not handle until all safety precautions have been read and understood Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Do not breathe gas Use and store only outdoors or in a well-ventilated area. Avoid release to the environment. Wear protective gloves, protective clothing, eye protection, respiratory protection, and/or face protection. LEAKING GAS FIRE: Do not extinguish, unless leak can be stopped safely. In case of leakage, eliminate all ignition sources Store locked up Dispose of contents/container in accordance with container Supplier/owner instructions Protect from sunlight when ambient temperature exceeds 52°C (125°F). Use a back flow preventive device in the piping. Close valve after each use and when empty. Do not open valve until connected to equipment prepared for use. When returning cylinder, install leak tight valve outlet cap or plug. Use only with equipment of compatible materials of construction and rated for cylinder pressure.

2.3. Other hazards

Other hazards which do not result in classification	:	None.

2.4. Unknown acute toxicity (GHS CA)

Not applicable

SECTION 3: Composition/information on ingredients

3.1. Substances

Name	CAS No.	% (Vol.)	Common Name (synonyms)
Arsine (Main constituent)	(CAS No) 7784-42-1	100	Arsenic hydride / Hydrogen arsenide / Arsenic trihydride / Arsine, adsorbed / arsenic trihydride

3.2. Mixtures

Not applicable

SECTION 4: First-aid measures

4.1. Description of first aid measures

First-aid measures after inhalation	:	Remove to fresh air and keep at rest in a position comfortable for breathing. If not breathing, give artificial respiration. If breathing is difficult, trained personnel should give oxygen. Call a physician. . SYMPTOMS MAY BE DELAYED. Consider any exposure as a potentially toxic dose.
First-aid measures after skin contact	:	The liquid may cause frostbite. For exposure to liquid, immediately warm frostbite area with warm water not to exceed 105°F (41°C). Water temperature should be tolerable to normal skin. Maintain skin warming for at least 15 minutes or until normal coloring and sensation have returned to the affected area. In case of massive exposure, remove clothing while showering with warm water. Seek medical evaluation and treatment as soon as possible.
First-aid measures after eye contact	:	Immediately flush eyes thoroughly with water for at least 15 minutes. Hold the eyelids open and away from the eyeballs to ensure that all surfaces are flushed thoroughly. Contact an ophthalmologist immediately.
First-aid measures after ingestion	:	Ingestion is not considered a potential route of exposure.

4.2. Most important symptoms and effects (acute and delayed)

Symptoms/injuries	:	No additional information available

4.3. Immediate medical attention and special treatment, if necessary

Other medical advice or treatment	:	Obtain medical assistance.

SECTION 5: Fire-fighting measures

5.1. Suitable extinguishing media

Suitable extinguishing media	:	Carbon dioxide, Dry chemical, Water spray or fog.

5.2. Unsuitable extinguishing media

No additional information available

5.3. Specific hazards arising from the hazardous product

Fire hazard : **DANGER! Toxic, flammable liquefied gas** . Vapor forms explosive mixtures with air and oxidizing agents. If leaking gas catches fire, do not extinguish flames. Flammable and toxic vapors may spread from leak and could explode if reignited by sparks or flames. Vapors are heavier than air and may collect in low spots. Explosive atmospheres may linger. Before entering area, especially confined areas, check with an appropriate device.

Reactivity : No reactivity hazard other than the effects described below.

Reactivity in case of fire : No reactivity hazard other than the effects described in sub-sections below.

5.4. Special protective equipment and precautions for fire-fighters

Firefighting instructions : **DANGER! Toxic, flammable liquefied gas**

Evacuate all personnel from the danger area. Use self-contained breathing apparatus (SCBA) and protective clothing. Immediately cool containers with water from maximum distance. Stop flow of gas if safe to do so, while continuing cooling water spray. Remove ignition sources if safe to do so. Remove containers from area of fire if safe to do so. On-site fire brigades must comply with their provincial and local fire code regulations.

Special protective equipment for fire fighters : Standard protective clothing and equipment (Self Contained Breathing Apparatus) for fire fighters.

Other information : Cylinders are **NOT** equipped with a pressure relief valve.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

General measures : **DANGER! Toxic, flammable liquefied gas** . Immediately evacuate all personnel from danger area. Do not approach area without self-contained breathing apparatus and protective clothing. If cylinders are leaking, reduce toxic vapors with water spray or fog. Reverse flow into cylinder may cause rupture. (See section 16.) Shut off flow if without risk. Ventilate area or move cylinder to a well-ventilated area.

6.2. Methods and materials for containment and cleaning up

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Precautions for safe handling : Do not breathe gas/vapour. Avoid all contact with skin, eyes, or clothing. Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure.

Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Use only non-sparking tools. Use only explosion-proof equipment.

Wear leather safety gloves and safety shoes when handling cylinders. Protect cylinders from physical damage; do not drag, roll, slide or drop. While moving cylinder, always keep in place removable valve cover. Never attempt to lift a cylinder by its cap; the cap is intended solely to protect the valve. When moving cylinders, even for short distances, use a cart (trolley, hand truck, etc.) designed to transport cylinders. 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. Slowly open the valve. If the valve is hard to open, discontinue use and contact your supplier. Close the container valve after each use; keep closed even when empty. Never apply flame or localized heat directly to any part of the container. High temperatures may damage the container and could cause the pressure relief device to fail prematurely, venting the container contents. For other precautions in using this product, see section 16.

7.2. Conditions for safe storage, including any incompatibilities

Storage conditions : Store in a cool, well-ventilated place. Store and use with adequate ventilation. Store only where temperature will not exceed 52 °C (125 °F). Firmly secure containers upright to keep them from falling or being knocked over. Install valve protection cap firmly in place by hand. Store full and empty containers separately. Use a first-in, first-out inventory system to prevent storing full containers for long periods.

OTHER PRECAUTIONS FOR HANDLING, STORAGE, AND USE: When handling product under pressure, use piping and equipment adequately designed to withstand the pressures to be encountered. Never work on a pressurized system. Use a back flow preventive device in the piping. Gases can cause rapid suffocation because of oxygen deficiency; store and use with adequate ventilation. If a leak occurs, close the container valve and blow down the system in a safe and environmentally correct manner in compliance with all international, federal/national, state/provincial, and local laws; then repair the leak. Never place a container where it may become part of an electrical circuit.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Arsine (7784-42-1)		
USA - ACGIH	ACGIH OEL TWA [ppm]	0.005 ppm
USA - OSHA	OSHA PEL TWA [1]	0.2 mg/m³
USA - OSHA	OSHA PEL TWA [2]	0.05 ppm
Canada (Quebec)	VEMP (OEL TWA)	0.16 mg/m³
Canada (Quebec)	VEMP (OEL TWA) [ppm]	0.05 ppm
Alberta	OEL TWA	0.2 mg/m³
Alberta	OEL TWA [ppm]	0.05 ppm
British Columbia	OEL TWA [ppm]	0.005 ppm
Manitoba	OEL TWA [ppm]	0.005 ppm
New Brunswick	OEL TWA	0.16 mg/m³
New Brunswick	OEL TWA [ppm]	0.05 ppm
New Foundland & Labrador	OEL TWA [ppm]	0.005 ppm
Nova Scotia	OEL TWA [ppm]	0.005 ppm
Nunavut	OEL STEL [ppm]	0.15 ppm
Nunavut	OEL TWA [ppm]	0.05 ppm
Northwest Territories	OEL STEL [ppm]	0.15 ppm
Northwest Territories	OEL TWA [ppm]	0.05 ppm
Ontario	OEL TWA [ppm]	0.005 ppm
Prince Edward Island	OEL TWA [ppm]	0.005 ppm
Québec	VEMP (OEL TWA)	0.16 mg/m³
Québec	VEMP (OEL TWA) [ppm]	0.05 ppm
Saskatchewan	OEL STEL [ppm]	0.15 ppm
Saskatchewan	OEL TWA [ppm]	0.05 ppm
Yukon	OEL STEL	0.2 mg/m³
Yukon	OEL STEL [ppm]	0.05 ppm
Yukon	OEL TWA	0.2 mg/m³
Yukon	OEL TWA [ppm]	0.05 ppm

8.2. Appropriate engineering controls

Appropriate engineering controls : Use an explosion-proof local exhaust system. Local exhaust and general ventilation must be adequate to meet exposure standards. MECHANICAL (GENERAL): **Inadequate - Use only in a closed system.** Use explosion proof equipment and lighting.

8.3. Individual protection measures/Personal protective equipment

Personal protective equipment : Safety glasses. Face shield. Gloves.

Hand protection : Neoprene rubber (HNBR). Wear work gloves when handling containers. Wear heavy rubber gloves where contact with product may occur.

Eye protection : Wear goggles and a face shield when transfilling or breaking transfer connections. Select in accordance with the current CSA standard Z94.3, "Industrial Eye and Face Protection", and any provincial regulations, local bylaws or guidelines.

Respiratory protection : **Respiratory protection:** Use air supplied respirator when working in confined space or where local exhaust or ventilation does not keep exposure below OEL (if applicable). Select in accordance with provincial regulations, local bylaws or guidelines. Respirators should also be approved by NIOSH and MSHA. For emergencies or instances with unknown exposure levels, use a self-contained breathing apparatus (SCBA).

Thermal hazard protection : Wear cold insulating gloves when transfilling or breaking transfer connections.

Other information : **Other protection :** Safety shoes for general handling at customer sites. Metatarsal shoes and cuffless trousers for cylinder handling at packaging and filling plants. Select in accordance with the current CSA standard Z195, "Protective Foot Wear", and any provincial regulations, local bylaws or guidelines. For working with flammable and oxidizing materials, consider the use of flame resistant anti-static safety clothing.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

(a) Physical state	:	Gas
(b) Colour	:	Colourless.
(c) Odour	:	Garlic like. Poor warning properties at low concentrations.
Odour threshold	:	No data available
(d) Melting point	:	-117 °C (-178 °F)
Freezing point	:	No data available
(e) Boiling point	:	-62.5 °C (-80.1 °F)
(f) Flammability	:	FLAMMABLE GAS
(g) Flammability (solid, gas)	:	5.1 – 78 vol %
(h) Flash point	:	Not applicable.
(i) Auto-ignition temperature	:	No data available
(j) Decomposition temperature	:	230 – 240 °C (446 - 464 °F)
(k) pH	:	Not applicable.
(l) Viscosity, kinematic	:	Not applicable.
(m) Solubility	:	Water: slight
(n) Partition coefficient – n-octanol/water [log Pow/log Kow]	:	Not applicable.
(o) Vapour pressure	:	15.1 bar (219.7 psia)
(p) Density	:	3.23 kg/m³ (0.20 lb/ft3) (vapor density at 21.1°C (70°F) and 1 atm)
Relative gas density	:	2.7
(r) Particle characteristics	:	No data available
(s) Molecular mass	:	78 g/mol
(t) Critical temperature	:	99.9 °C (211.8 °F)
(v) Oxidizing properties	:	None.
(w) Relative evaporation rate (butylacetate=1)	:	No data available
Relative evaporation rate (ether=1)	:	Not applicable.

9.2. Other information

Gas group : Liquefied gas

Additional information : Gas/vapour heavier than air. May accumulate in confined spaces, particularly at or below ground level.

SECTION 10: Stability and reactivity

Reactivity : No reactivity hazard other than the effects described below.
Chemical stability : Stable under normal conditions.
Possibility of hazardous reactions : May occur.
Conditions to avoid : Exposure to light or heat in the presence of moisture.
Incompatible materials : Oxidizing agents. Nitric acid. Halogens. Potassium. Ammonia.
Hazardous decomposition products : Arsenic and its oxides. Hydrogen.

SECTION 11: Toxicological information

11.1 Likely routes of exposure : Inhalation

11.2 Symptoms related to the physical, chemical, and toxicological characteristics : No additional information available

11.3 Delayed and immediate effects and chronic effects

Acute toxicity (oral) : Not classified
Acute toxicity (dermal) : Not classified
Acute toxicity (inhalation) : FATAL IF INHALED.
Skin corrosion/irritation : Not classified
pH: Not applicable.
Serious eye damage/irritation : Not classified
pH: Not applicable.
Respiratory or skin sensitization : Not classified
Germ cell mutagenicity : Not classified
Carcinogenicity : SUSPECTED OF CAUSING CANCER (Inhalation).
IARC group : 1 - Carcinogenic to humans
National Toxicology Program (NTP) Status : 2 - Known Human Carcinogens
Reproductive toxicity : Not classified
Specific target organ toxicity (single exposure) : Not classified
Specific target organ toxicity (repeated exposure) : MAY CAUSE DAMAGE TO ORGANS (LIVER) THROUGH PROLONGED OR REPEATED EXPOSURE (Inhalation).
Aspiration hazard : Not classified

11.4 Toxicity

Arsine (\f)7784-42-1	
LC50 inhalation rat (ppm)	10 ppm/4h
ATE CA (Gases)	10 ppmv/4h
ATE CA (vapours)	0.05 mg/l/4h
ATE CA (dust,mist)	0.005 mg/l/4h

SECTION 12: Ecological information

12.1. Toxicity

Ecology - general : VERY TOXIC TO AQUATIC LIFE WITH LONG LASTING EFFECTS.

12.2. Persistence and degradability

Arsine (7784-42-1)	
Persistence and degradability	Not applicable for inorganic gases.

12.3. Bioaccumulative potential

Arsine (7784-42-1)	
Log Pow	Not applicable.
Log Kow	Not applicable.
Bioaccumulative potential	No data available.

12.4. Mobility in soil

Arsine (7784-42-1)	
Mobility in soil	No data available.
Log Pow	Not applicable.
Log Kow	Not applicable.
Ecology - soil	Because of its high volatility, the product is unlikely to cause ground or water pollution.

12.5. Other adverse effects

Effect on the ozone layer : None.

Effect on global warming : No known effects from this product.

SECTION 13: Disposal considerations

Product/Packaging disposal recommendations : Do not attempt to dispose of residual or unused quantities. Return container to supplier.

SECTION 14: Transport information

14.1. Basic shipping description

In accordance with TDG

TDG

UN-No. (TDG) : UN2188

TDG Primary Hazard Classes : 2.3 - Class 2.3 - Toxic Gases

TDG Subsidiary Classes : 2.1

Proper shipping name : ARSINE

ERAP Index : 25

Explosive Limit and Limited Quantity Index : 0

Passenger Carrying Ship Index : Forbidden

Passenger Carrying Road Vehicle or Passenger Carrying Railway Vehicle Index : Forbidden

Marine pollutant : Yes (IMDG only)

14.2. Air and sea transport

IMDG

UN-No. (IMDG) : 2188

Proper Shipping Name (IMDG)	:	ARSINE
Class (IMDG)	:	2 - Gases
MFAG-No	:	119

IATA

UN-No. (IATA)	:	2188
Proper Shipping Name (IATA)	:	Arsine
Class (IATA)	:	2 - Gases

SECTION 15: Regulatory information

15.1. National regulations

Arsine (7784-42-1)

Listed on the Canadian DSL (Domestic Substances List)

15.2. International regulations

Arsine (7784-42-1)

Listed on the AICS (Australian Inventory of Chemical Substances)
Listed on IECSC (Inventory of Existing Chemical Substances Produced or Imported in China)
Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)
Listed on the Japanese ENCS (Existing & New Chemical Substances) inventory
Listed on the Korean ECL (Existing Chemicals List)
Listed on NZIoC (New Zealand Inventory of Chemicals)
Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances)
Listed on the United States TSCA (Toxic Substances Control Act) inventory
Japanese Poisonous and Deleterious Substances Control Law
Japanese Pollutant Release and Transfer Register Law (PRTR Law)
Listed on INSQ (Mexican National Inventory of Chemical Substances)

SECTION 16: Other information

Date of issue	:	15/10/1979
Revision date	:	28/07/2023
Supersedes	:	01/01/2021

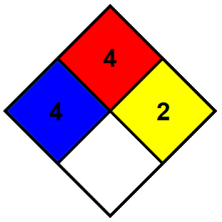
Indication of changes:

Other information : When you mix two or more chemicals, you can 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 evaluate the end product. Before using any plastics, confirm their compatibility with this product.

Linde Canada asks users of this product to study this SDS and become aware of the product hazards and safety information. To promote safe use of this product, a user should (1) notify employees, agents, and contractors of the information in this SDS and of any other known product hazards and safety information, (2) furnish this information to each purchaser of the product, and (3) ask each purchaser to notify its employees and customers of the product hazards and safety information.

The opinions expressed herein are those of qualified experts within Linde Canada Inc. We believe that the information contained herein is current as of the date of this Safety Data Sheet. Since the use of this information and the conditions of use are not within the control of Linde Canada Inc, it is the user's obligation to determine the conditions of safe use of the product. Linde Canada Inc, SDSs are furnished on sale or delivery by Linde Canada Inc, or the independent distributors and suppliers who package and sell our products. To obtain current SDSs for these products, contact your Linde sales representative, local distributor, or supplier, or download from www.lindecanada.ca.

NFPA health hazard	:	4 - Very short exposure could cause death or serious residual injury even though prompt medical attention was given.
NFPA fire hazard	:	4 - Will rapidly or completely vaporize at normal pressure and temperature, or is readily dispersed in air and will burn readily.
NFPA instability	:	2 - Normally unstable and readily undergo violent decomposition but do not detonate. Also: may react violently with water or may form potentially explosive mixtures with water.



HMIS III Rating

Health	:	4 Severe Hazard - Life-threatening, major or permanent damage may result from single or repeated overexposures * - *** CHRONIC HEALTH EFFECTS:** This material may cause chronic (long term) health effects or may be carcinogenic (may cause cancer).
Flammability	:	4 Severe Hazard - Flammable gases, or very volatile flammable liquids with flash points below 73 F, and boiling points below 100 F. Materials may ignite spontaneously with air. (Class IA)
Physical	:	2 Moderate Hazard - Materials that are unstable and may undergo violent chemical changes at normal temperature and pressure with low risk for explosion. Materials may react violently with water or form peroxides upon exposure to air.

SDS Canada (GHS) - Linde NEW

This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product.