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MATERIAL SAFETY DATA SHEET

No. 007

PRODUCT NAME Arsine	CAS # 7784-42-1
TRADE NAME AND SYNONYMS Arsine, Arsenic Hydride, Arsenic Trihydride, HydrogenArsenide	DOT I.D. No.: UN 2188; RQ 1.0 (0.454)
	DOT Hazard Class: Division 2.3
CHEMICAL NAME AND SYNONYMS Arsenic Hydride	Formula AsH ₃
	Chemical Family: Nonmetal Hydride
ISSUE DATES AND REVISIONS Revised January 1995	

HEALTH HAZARD DATA

TIME WEIGHTED AVERAGE EXPOSURE LIMIT TWA = 0.05 Molar PPM (ACGH 1994-1995). OSHA 1993 PEL (8 Hr. TWA) = 0.05 Molar PPP
SYMPTOMS OF EXPOSURE Arsine is the most toxic of the commonly used "dopants." Symptoms may be delayed for several hours, particularly if very low concentrations have been inhaled. Symptoms may include general malaise, headache, nausea, vomiting, tightness in the chest and pain in the abdomen and loins. The urine will usually become red or darkened in color and the skin will take on a bronze or jaundiced coloration. Tingling of the face and extremities may also occur and respiration and pulse may become more rapid even though the blood pressure is normal.
TOXICOLOGICAL PROPERTIES Arsine is an extremely toxic gas which destroys the red blood cells and can cause widespread organ injury. It is a powerful reducing agent and has a strong affinity for the hemoglobin in the blood. The hemolysis of the red blood cells causes renal failure. The destruction of the red blood cells causes the appearance of hemoglobin and its degradation products in the blood plasma and in the urine. Jaundice is also a primary manifestation of hemolysis. Renal function impairment and possible complete shutdown is the most serious manifestation of arsine poisoning. Permanent injury, especially to the central nervous system, or fatal consequences are also well recognized. (Continued on Page 4)
RECOMMENDED FIRST AID TREATMENT PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF OVEREXPOSURE TO ARSINE. RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS. Regard anyone exposed to arsine as having had a potentially toxic dose. Move the victim to an uncontaminated atmosphere. Keep the victim warm, quiet and at rest. Provide assisted respiration if breathing has stopped. Administer oxygen if breathing is labored and when assisted respiration is given. Medical attention is imperative. Advise the physician of the possible cause of the problem and that he must promptly inform himself (if not familiar with arsine) of the toxic properties of this powerful hemolytic agent.

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 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

It is a very strong reducing agent and will react violently with oxidizing agents such as fluorine, chlorine, nitric acid and nitrogen bichloride. It is flammable in air with a lower flammable limit of 5.8 Molar percent.

PHYSICAL DATA

BOILING POINT -67°F (-55°C)	LIQUID DENSITY AT BOILING POINT 99.9 lb/ft ³ (1600 kg/m ³)
VAPOR PRESSURE @ 70°F (21.1°C) = 205 psig (1413 kPa)	GAS DENSITY AT 70°F, 1 atm 0.20 lb/ft ³ (3.2 kg/m ³)
SOLUBILITY IN WATER Slightly soluble	FREEZING POINT -177°F (-116°C)
EVAPORATION RATE N/A Gas	SPECIFIC GRAVITY (AIR=1) @ 70°F (21.1°C) = 2.67
APPEARANCE AND ODOR Colorless gas with a garlic-like odor.	

FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method used) Gas	AUTO IGNITION TEMPERATURE Not established	FLAMMABLE LIMITS % BY VOLUME (See Page 4) LE 5.8 UEL Not established
EXTINGUISHING MEDIA None; allow fire to burn itself out		ELECTRICAL CLASSIFICATION XX
SPECIAL FIRE FIGHTING PROCEDURES Attempt to stop the flow of gas and allow fire to burn itself out. The products of combustion, are arsenic trioxide (As ₂ O ₃) and water. Since arsenic trioxide is less toxic than arsine, it is safer (from a toxicity standpoint) (Continued on last page)		
UNUSUAL FIRE AND EXPLOSION HAZARDS Ground water contamination with arsenic trioxide can occur if water spray is used to "wash" this aerosol from an arsenic fire.		

REACTIVITY DATA

STABILITY Unstable		CONDITIONS TO AVOID None
Stable	X	
INCOMPATIBILITY (Materials to avoid) Oxidants and oxidizing agents		
HAZARDOUS DECOMPOSITION PRODUCTS Decomposes to arsenic and hydrogen at about 450°F (232°C)		
HAZARDOUS POLYMERIZATION May Occur		CONDITIONS TO AVOID None
Will Not Occur	X	

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 <u>properly labeled, with any valve outlet plugs or caps secured and valve protection cap in place</u> to your supplier. For emergency disposal assistance, contact your closest supplier location or call the emergency number listed herein.

Arsine

HEALTH HAZARD DATA

TOXICOLOGICAL PROPERTIES: (Continued)

The Compressed Gas Association suggests labels for arsine contain the wording "Cancer Suspect Agent;" NIOSH lists it as a "Potential Human Carcinogen" and RTECS, IARC Cancer Review lists "Human Sufficient Evidence." However, neither ACGIH (1994-1995) or OSHA (1993) lists arsine as a "Carcinogen or Suspected Human Carcinogen."

Persons in ill health where such illness would be agravated by exposure to arsine should not be allowed to work with or handle this product.

RECOMMENDED FIRST AID TREATMENT: (Continued)

Note to Physician:

The principal clinical manifestation of arsine intoxication is acute intravascular hemolysis and consequent acute renal failure. Bronze pigmentation of the skin may be confused with jaundice. Elevated T-wave changes on electrocardiography may reflect release of intracellular potassium into the plasma.

Management of arsine intoxication is dependent upon treatment of the hemolytic episode and its consequences. Dimercaprol (BAL) does not appear to alter the course of the hemolysis; however, this agent may be useful in the treatment of arsenic neuropathy that appears to have followed some cases of arsine poisoning (Rer: Wilkinson, S.P., et al ; Arsine Toxicity Aboard the Asiafreighter, Brit. Med. J. 3:559, 1975).

Severe hemolytic anemia may require transfusion of red cells. Alkalinization of the urine with small doses of oral sodium bicarbonate has been recommended by some clinicians in the management of hemoglobinuria. An osmotic diuretic (mannitol) has also been recommended. Exchange transfusions may be indicated.

The physician responsible for treatment of arsine intoxication should obtain the advise of a competent nephrologist as soon as possible since electrolyte imbalance and renal failure will pose the problems most difficult to manage.

FIRE AND EXPLOSION HAZARD DATA

SPECIAL FIRE FIGHTING PROCEDURES: (Continued)

to allow the fire to burn than to extinguish it and allow the more toxic arsine to escape. Arsenic trioxide from an arsine fire exists as aerosol particles which are toxic and can be carried great distances by the wind. A water spray aimed at the "smoke" from an arsine fire may be used to "wash" the aerosol particles from the air and prevent them from being distributed or scattered.

SPECIAL PRECAUTIONS

OTHER RECOMMENDATIONS OR PRECAUTIONS: (Continued)

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).

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 arsine = 4 4 2 None