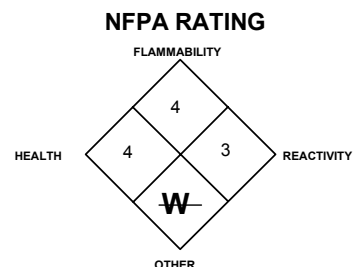


MATERIAL SAFETY DATA SHEET

Prepared to U.S. OSHA, CMA, ANSI and Canadian WHMIS Standards



PART I *What is the material and what do I need to know in an emergency?*

1. PRODUCT IDENTIFICATION

CHEMICAL NAME; CLASS: **GERMANE - GeH₄**
Document Number: 001072

PRODUCT USE: For general analytical/synthetic chemical uses.

SUPPLIER/MANUFACTURER'S NAME: AIRGAS INC.
ADDRESS: 259 N. Radnor-Chester Road
 Suite 100
 Radnor, PA 19087-5283

BUSINESS PHONE: 1-610-687-5253
EMERGENCY PHONE: CHEMTREC: 1-800-424-9300
 International: 703-527-3887 (Call Collect)

DATE OF PREPARATION: May 17, 1998

2. COMPOSITION and INFORMATION ON INGREDIENTS

CHEMICAL NAME	CAS #	mole %	EXPOSURE LIMITS IN AIR					
			ACGIH		OSHA		IDLH ppm	OTHER
			TLV ppm	STEL ppm	PEL ppm	STEL ppm		
Germane	7782-65-2	> 99%	0.2	NE	0.2 (Vacated 1989 PEL)	NE	NE	NIOSH REL: 0.2 TWA
Maximum Impurities		< 1%	None of the trace impurities in this product contribute significantly to the hazards associated with the product. All hazard information pertinent to this product has been provided in this Material Safety Data Sheet, per the requirements of the OSHA Hazard Standard (29 CFR 1910.1200) and State equivalents standards.					

NE = Not Established

See Section 16 for Definitions of Terms Used.

NOTE: All WHMIS required information is included. It is located in appropriate sections based on the ANSI Z400.1-1993 format.

3. HAZARD IDENTIFICATION

EMERGENCY OVERVIEW: Germane is a colorless, extremely toxic, flammable, pyrophoric gas at room temperature and atmospheric pressure, with a characteristic pungent odor. The health effects associated with Germane over-exposures are considered to be similar to Arsine and would be primarily related to the destruction of red blood cells. Exposure to even very small quantities can result in severe health effects and death. Germane can spontaneously react with air to form explosive mixtures and presents an extreme fire hazard when accidentally released. Germane is a strong reducing agent and can react vigorously with mild to strong oxidizing agents. Germane is heavier than air and may travel a considerable distance to a distant source of ignition and flash-back to a leak. Germane can ignite and generate hydrogen gas on contact with water. Emergency responders must wear adequate personal protective equipment and provide suitable fire protection during response situations.

SYMPTOMS OF OVEREXPOSURE BY ROUTE OF EXPOSURE:

Germane is toxic by all routes of exposure. The following paragraphs describe the symptoms of overexposure, via route of entry, to this gas.

INHALATION: Germane is considered a hemolytic gas with similar health effects as Arsine, and so should be considered a toxic gas (although less toxic). Both chronic and acute over-exposures to this gas should be considered dangerous. Development of symptoms may be delayed for up to 24 hours.

As Germane is considered a hemolytic agent, the effects of an acute over-exposure would be related hemolysis (destruction of red blood cells), due to the reaction of the Germane molecule with hemoglobin within red blood cells. Symptoms of such over-exposure may include the following: blood in urine, malaise, dizziness, headache, nausea, vomiting, abdominal pain, pain in the lower back (as a result of kidneys effects), liver dysfunction, heart damage, diarrhea, collapse, and coma. Hemolysis can continued for 96 hours after the over-exposure ends. In severe over-exposures, the mucous membranes, the rear side of the lips, and the flesh under the finger nails, may have a bluish discoloration. Pulmonary edema may occur following over-exposure. Germane is moderately irritating to contaminated skin and eyes.

There are no specific effects (based on the concentration) for Germane; however, since Germane is considered to have serious health effects similar to arsine, the specific effects of Arsine are presented below for use by qualified medical personnel: in treating Arsine exposure cases:

ARSINE CONCENTRATION

3 ppm

6.25-15.5 ppm

250 - 500 ppm

500 ppm or higher

HEALTH EFFECT

The maximum concentration tolerated for several hours without serious symptoms.

Lethal within 30 -60 minutes.

Lethal within 30 minutes.



Instantly lethal.

HEALTH EFFECTS OR RISKS FROM EXPOSURE: An Explanation in **Lay Terms**. Over-exposure to Germane may cause the following health effects:

ACUTE: Based on a comparison with Arsine, Germane should be considered an extremely toxic gas; even brief over-exposures may result in severe health problems and may be fatal. As Germane is considered to be a hemolytic agent, effects of an acute over-exposure are related to hemolysis (destruction of red blood cells). Symptoms of such over-exposure may include the following: blood in urine, fatigue, dizziness, headache, nausea, vomiting, abdominal pain, pain in the lower pack, diarrhea, and collapse. Pulmonary edema may also occur following over-exposure.

CHRONIC: Currently, no chronic health effects are known to occur upon chronic over-exposure to Germane.

TARGET ORGANS: By analogy to Arsine, target organs should be considered to be the red blood cells and the blood system; circulatory system; nervous system; kidneys; liver.

HAZARDOUS MATERIAL INFORMATION SYSTEM			
HEALTH		(BLUE)	4
FLAMMABILITY		(RED)	4
REACTIVITY		(YELLOW)	3
PROTECTIVE EQUIPMENT			X
EYES	RESPIRATORY	HANDS	BODY
	SEE SECTION 8		SEE SECTION 8
For routine applications.			

See Section 16 for Definition of Ratings

PART II *What should I do if a hazardous situation occurs?*

4. FIRST-AID MEASURES

RESCUERS SHOULD NOT ATTEMPT TO RETRIEVE VICTIMS OF EXPOSURE TO GERMANE WITHOUT ADEQUATE PERSONAL PROTECTIVE EQUIPMENT. At a minimum, Self-Contained Breathing Apparatus and Chemically-Resistant and Fire-Retardant Personal Protective equipment should be worn. Adequate fire protection must be provided during rescue situations.

INHALATION: If Germane is inhaled, remove victim(s) to fresh air, as quickly as possible. Treatment for Germane poisoning must be prompt. All over-exposed individuals must receive medical evaluation, because the development of symptoms to potentially life-threatening conditions may be delayed. Keep victims warm and comfortable. Only trained personnel should administer supplemental oxygen and/or cardio-pulmonary resuscitation if necessary. Remove or cover gross contamination to avoid exposure to rescuers.

SKIN EXPOSURE: If Germane contaminates the skin, immediately begin decontamination with large quantities of running water. Minimum flushing is for 15 minutes. Remove exposed or contaminated clothing, taking care not to contaminate eyes. Victim must seek medical attention if any adverse reaction occurs.

NOTE: DECONTAMINATION WITH LIMITED VOLUMES OF WATER MAY CAUSE A SEVERE REACTION WHICH CAN BURN THE SKIN. DECONTAMINATION SHOULD BE DONE WITH COPIOUS AMOUNTS OF WATER AS QUICKLY AS POSSIBLE.

EYE EXPOSURE: If Germane enters the eyes, open victim's eyes while under gentle running water. Use sufficient force to open eyelids. Have victim "roll" eyes. Minimum flushing is for 15 minutes. Victim must seek immediate medical attention.

Victim(s) must be taken for medical attention. Rescuers should be taken for medical attention, if necessary. Take copy of label and MSDS to physician or other health professional with victim(s). Physicians should refer to "Recommendations to Physicians" in Section 11 (Toxicological Information) for more information.

5. FIRE-FIGHTING MEASURES

FLASH POINT: Not applicable; spontaneously combustible gas.

AUTOIGNITION TEMPERATURE: Not applicable; spontaneously combustible gas.

FLAMMABLE LIMITS (in air by volume, %):

Lower (LEL): Not available.

Upper (UEL): Not available.

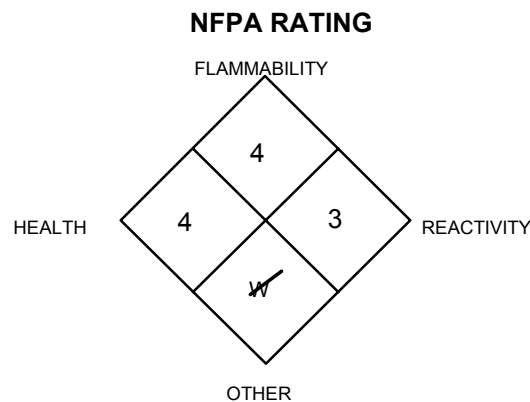
FIRE EXTINGUISHING MATERIALS: Extinguish Germane fires by shutting-off the source of the gas. Use a fine water spray or fog to reduce combustion products formed in air. Cool fire-exposed cylinders with water spray, from the maximum distance possible. Alcohol foam, carbon dioxide or dry chemical forms of fire extinguishing agents can be used against Germane fires.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Germane is an extremely toxic gas. Germane is heavier than air and can travel considerable distances to a distant source of ignition and flash-back to the leak. Germane is considered a pyrophoric or spontaneously combustible gas; however, the auto ignition temperature is rarely encountered. When auto ignition occurs, the combustion products are hydrogen, germanium dioxide and water. This gas is a strong reducing agent and can react vigorously with mild to strong oxidizing agents. Germane can ignite and generate hydrogen gas on contact with water.

DANGER! Fires impinging (direct flame) on the outside surface of unprotected cylinders of this product can be very dangerous. Direct flame exposure on the cylinder wall can cause a catastrophic failure of the cylinder releasing the contents into a massive fireball and explosion. The resulting fire and explosion can result in severe equipment damage and personnel injury or death over a large area around the cylinder.

Explosion Sensitivity to Mechanical Impact: Not sensitive.

Explosion Sensitivity to Static Discharge: Sensitive. Static charge can build-up due to the low conductivity of liquid Germane and may cause this product to ignite explosively if released.



**See Section 16 for
Definition of Ratings**

5. FIRE-FIGHTING MEASURES (Continued)

SPECIAL FIRE-FIGHTING PROCEDURES: Structural fire-fighters must wear Self-Contained Breathing Apparatus and full protective equipment. Appropriate chemically-protective clothing may be necessary. Keep away from low-lying areas. Stay upwind. Because of the potential for a catastrophic failure of the cylinder, evacuation of non-emergency personnel is essential. If water is not available for cooling or protection of vessel exposures, evacuate the area. Follow the guidelines of the North American Emergency Response Guidebook (Guide #119).

6. ACCIDENTAL RELEASE MEASURES

SPILL AND LEAK RESPONSE: If a leak occurs of a sufficient quantity to cause a dangerous level of Germane, evacuate the immediate area of all personnel. Uncontrolled releases should be responded to by trained personnel using pre-planned procedures. Proper protective equipment must be used. In case of a release, clear the affected area, protect people, and respond with trained personnel.

Eliminate any possible sources of ignition, and provide maximum explosion-proof ventilation. If the gas is leaking from cylinder or valve, contact the supplier. Adequate fire protection must be provided. Use only non-sparking tools and equipment during the response.

Minimum Personal Protective Equipment should be **Level A: fully encapsulating suit, triple-layer of gloves, chemically-resistant boots, hard-hat, and Self-Contained Breathing Apparatus.** Level A protection must be worn during emergency response situations in all areas in which the level of exposure to Germane is above 50% of the TLV (0.2 ppm). Fire retardant clothing must also be worn under Level A gear.

Locate and seal the source of the leaking gas. Protect personnel attempting the shut-off with water-spray. Allow the gas to dissipate, if it can be done to an area in which there are no personnel. Monitor the surrounding area for toxic Germane levels as well as and oxygen level. The atmosphere must be below 50% of the TLV (0.2 ppm) of Germane and must have at least 19.5 percent oxygen before personnel can be allowed in the area without Self-Contained Breathing Apparatus. Attempt to close the main source valve prior to entering the area. If this does not stop the release (or if it is not possible to reach the valve), allow the gas to release in-place or remove it to a safe area and allow the gas to be released there.

NOTE: Use instrumental methods for detection of Germane; refer to the OSHA Chemical Information Manual for further information.

THIS IS AN EXTREMELY TOXIC, PYROPHORIC, WATER-REACTIVE GAS. Protection of all personnel and the area must be maintained.

PART III *How can I prevent hazardous situations from occurring?*

7. HANDLING and STORAGE

WORK PRACTICES AND HYGIENE PRACTICES: All areas where Germane is used should be monitored with very sensitive gas detection instruments. Detection of concentrations below 50% of the TLV level of 0.2 ppm should trigger immediate response and corrective action. Detection of higher levels should initiate an alarm calling for evacuation of all personnel with the potential to be exposed. Due to the extreme toxicity of Germane, cylinders of this product should always be placed in a properly designed and constructed gas cabinet. Double wall piping should be used to deliver gas to the point of use. Exhaust from the cabinet and from the annular space of the tubing should be monitored. Due to the extreme toxicity of Germane, all contaminated clothing should be removed and placed in a sealed container for proper disposal.

STORAGE AND HANDLING PRACTICES: Cylinders should be stored upright (with valve-protection cap in place) and firmly secured to prevent falling or being knocked over. Cylinders can be stored in the open, but in such cases, should be protected against extremes of weather and from the dampness of the ground to prevent rusting. Cylinders should be stored in dry, well-ventilated areas away from sources of heat, ignition and direct sunlight. Keep storage area clear of materials which can burn. Store away from process and production areas, away from building and room exits or main aisles leading to exits. Do not store near elevators, corridors or loading docks.

Cylinders should be separated from oxygen cylinders, or other oxidizers, by a minimum distance of 20 ft., or by a barrier of non-combustible material at least 5 ft. high, having a fire-resistance rating of at least 0.5 hours. Isolate from other incompatible chemicals (refer to Section 10, Stability and Reactivity).

Storage areas must meet national electrical codes for Class 1 Hazardous Areas. Post "No Smoking or Open Flames" signs in storage or use areas. Consider installation of leak detection and alarm for storage and use areas. Have appropriate extinguishing equipment in the storage area (i.e. sprinkler system, portable fire extinguishers).

Keep the smallest amount on-site as is necessary. Full and empty cylinders should be segregated. Use a first-in, first-out inventory system to prevent full containers from being stored for long periods of time.

7. HANDLING and STORAGE (Continued)

Use non-sparking ventilation systems, approved explosion-proof equipment, and appropriate electrical systems. Electrical equipment used in gas-handling operations, or located in storage areas, should be non-sparking or explosion proof. Use a check valve in the discharge line to prevent hazardous backflow.

SPECIAL PRECAUTIONS FOR HANDLING GAS CYLINDERS: Protect cylinders against physical damage. Store in cool, dry, well-ventilated, fireproof area, away from flammable materials and corrosive atmospheres. Store away from heat and ignition sources and out of direct sunlight. Do not allow area where cylinders are stored to exceed 52°C (125°F). Cylinders should be stored upright and be firmly secured to prevent falling or being knocked over. Never tamper with pressure relief devices in valves and cylinders. The following rules are applicable to situations in which cylinders are being used:

Before Use: Move cylinders with a suitable hand-truck. Do not drag, slide or roll cylinders. Do not drop cylinders or permit them to strike each other. Secure cylinders firmly. Leave the valve protection cap in-place until cylinder is ready for use.

During Use: Use designated CGA fittings and other support equipment. Do not use adapters. Do not heat cylinder by any means to increase the discharge rate of the product from the cylinder. Use check valve or trap in discharge line to prevent hazardous backflow into the cylinder. Do not use oils or grease on gas-handling fittings or equipment.

After Use: Close main cylinder valve. Replace valve protection cap. Mark empty cylinders "EMPTY".

NOTE: Use only DOT or ASME Code containers. Earth-ground and bond all lines and equipment associated with this product. Close valve after each use and when empty. Cylinders must not be recharged except by or with the consent of owner. For additional information refer to the Compressed Gas Association Pamphlet P-1, *Safe Handling of Compressed Gases in Containers*. Additionally, refer to CGA Bulletin SB-2 "Oxygen Deficient Atmospheres".

PROTECTIVE PRACTICES DURING MAINTENANCE OF CONTAMINATED EQUIPMENT: Follow practices indicated in Section 6 (Accidental Release Measures). Make certain application equipment is locked and tagged-out safely. Always use product in areas where adequate ventilation is provided.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION

VENTILATION AND ENGINEERING CONTROLS: Install automatic monitoring equipment to detect the level of Germane. Provide explosion-proof ventilation adequate to minimize Germane concentrations. Due to the extreme toxicity of Germane, cylinders of this product should always be placed in a properly designed and constructed gas cabinet. Double wall piping should be used to deliver gas to the point of use. Exhaust from the cabinet and from the annular space of the tubing should be monitored.

RESPIRATORY PROTECTION: Maintain Germane levels below 50% of the TLV (0.2 ppm) and oxygen levels above 19.5% in the workplace. The use of supplied air respiratory protection is recommended when changing Germane cylinders or working on Germane systems. Use supplied air respiratory protection when Germane levels exceed 50% of the TLV (0.2 ppm), oxygen levels are below 19.5%, or during emergency response to a release of this product. During an emergency situation, before entering the area, check the concentration of Germane and oxygen. If respiratory protection is needed, use only protection authorized in the U.S. Federal OSHA Standard (29 CFR 1910.134), applicable U.S. State regulations, or the appropriate standards of Canada and its Provinces. The following NIOSH guidelines for respirator selection for Arsine (which is similar to Germane) are provided for additional information:

NIOSH RECOMMENDATIONS FOR ARSINE CONCENTRATIONS IN AIR:

AT CONCENTRATIONS ABOVE THE NIOSH REL OR AT ANY DETECTABLE CONCENTRATION: Positive pressure, full-facepiece Self-Contained Breathing Apparatus (SCBA); or positive pressure, full-facepiece Supplied Air Respirator (SAR) with an auxiliary positive pressure SCBA.

ESCAPE: Gas mask with canister to protect against Germane; or escape-type SCBA.

EYE PROTECTION: Safety glasses.

HAND PROTECTION: Wear leather gloves when handling cylinders of this product. Otherwise, wear glove protection appropriate to the specific operation for which this product is used.

BODY PROTECTION: Use body protection appropriate for task. Cotton clothing is recommended for use to prevent static electric build-up. Safety shoes are recommended when handling cylinders. For emergency response operations, clothing resistant to the toxic effects of Germane is required (i.e., Level A Protection).

9. PHYSICAL and CHEMICAL PROPERTIES

GAS DENSITY @ 21.1°C (79°F) and 1 atm.: 3.19 kg/m³ (0.199 lb./ft³)

LIQUID DENSITY @ -142.0°C (-233°F): 1.523 kg/dm³ (0.0951 lb./ft³)

BOILING POINT @ 1 atm.: -88.5°C (-127°F)

SPECIFIC GRAVITY (air = 1) @ 21.1°C (70°F) 1 atm.: 2.645

SOLUBILITY IN WATER: Insoluble.

EVAPORATION RATE (nBuAc = 1): Not applicable.

ODOR THRESHOLD: Unknown.

FREEZING/MELTING POINT: -165.9°C (-266.7°F)

pH: Not applicable.

SPECIFIC VOLUME (ft³/lb.): 5.05

EXPANSION RATIO: Not applicable.

9. PHYSICAL and CHEMICAL PROPERTIES (Continued)

VAPOR PRESSURE @ 21.1°C (70°F): 4400 kPa

COEFFICIENT WATER/OIL DISTRIBUTION: Not applicable.

APPEARANCE AND COLOR: Colorless gas, with a characteristic, pungent odor.

HOW TO DETECT THIS SUBSTANCE (warning properties): The odor is not a good warning property of a release for Germane. Monitoring systems must be used for detection of this gas.

10. STABILITY and REACTIVITY

STABILITY: Germane is stable at room temperature, but begins to decompose at 280°C (536°F). Germane can ignite and generate hydrogen gas on contact with water.

DECOMPOSITION PRODUCTS: Hydrogen and germanium are generated from Germane when the gas is heated above 280°C (536°F). Germanium dioxide and water are combustion products of Germane upon ignition.

MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: Germane reacts readily at high temperature. Germane is a strong reducing agent and will react with mild to strong oxidizers. Germane can ignite and generate hydrogen gas on contact with water.

HAZARDOUS POLYMERIZATION: Will not occur.

CONDITIONS TO AVOID: Contact with incompatible materials and exposure to air, moisture and to heat, sparks and other sources of ignition.

PART IV *Is there any other useful information about this material?*

11. TOXICOLOGICAL INFORMATION

TOXICITY DATA: The following data are available for Germane:

Oral-Mouse LD₅₀: 1250 mg/kg

Inhalation-Mouse LC₅₀: 1380 mg/m³

SUSPECTED CANCER AGENT: Germane is not found on the following lists: FEDERAL OSHA Z LIST, NTP, CAL/OSHA, and therefore is not considered to be, nor suspected to be a cancer-causing agent by these agencies.

IRRITANCY OF PRODUCT: Germane is moderately irritating to contaminated skin and eyes.

SENSITIZATION TO THE PRODUCT: Germane is not known to cause sensitization in humans.

REPRODUCTIVE TOXICITY INFORMATION: Listed below is information concerning the effects of this product on the human reproductive system.

Mutagenicity: No mutagenicity effects have been described for Germane.

Embryotoxicity: No embryotoxic effects have been described for Germane.

Teratogenicity: No teratogenicity effects have been described for Germane.

Reproductive Toxicity: No reproductive toxicity effects have been described for Germane.

A mutagen is a chemical which causes permanent changes to genetic material (DNA) such that the changes will propagate through generation lines. An embryotoxin is a chemical which causes damage to a developing embryo (i.e. within the first eight weeks of pregnancy in humans), but the damage does not propagate across generational lines. A teratogen is a chemical which causes damage to a developing fetus, but the damage does not propagate across generational lines. A reproductive toxin is any substance which interferes in any way with the reproductive process.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Acute or chronic respiratory conditions may be aggravated by over-exposure to this product. Additionally, blood, kidney, liver and cardiovascular conditions may also be aggravated (depending on the severity and duration of the over-exposure).

RECOMMENDATIONS TO PHYSICIANS: The health effects of Germane over-exposure are expected to be similar to Arsenic and so will be related to the destruction of the blood's red cells. The oxygen transport capability may be diminished and there is a risk of kidney failure. Administer oxygen. Be observant for pulmonary edema.

Exchange transfusion through heparinized femoral catheters is the standard treatment for severe Germane over-exposures. Such transfusions may require 10-15 exchanges of whole blood. The plasma hemoglobin treatment is used as a guideline; attempts should be made to lower the concentration by 75-85% of the plasma hemoglobin and also return the hematocrit level to normal.

11. TOXICOLOGICAL INFORMATION (Continued)

RECOMMENDATIONS TO PHYSICIANS (continued): Preservation of renal function is essential. Early intravenous Mannitol (25-50 g) is given if the patient is oliguric, and bicarbonate is used to alkalize the urine. Dialysis is a recommended treatment if renal failure supervenes.

There is no specific treatment for Germane poisoning; treatment with BAL (British Anti-Lewisite; Dimercaprol) is a suggested treatment (though its efficacy has been questioned). BAL will not prevent Germane-induced hemolysis, BAL may bind with circulating oxidation products of Germane after the red cells lyse, thus preventing acute and chronic toxicity to other organ systems. The dosage of BAL is 2.5 mg/kg body weight; this dosage should be repeated four to six times the first two days and reduced to twice daily for up to ten days.

The use of EDTA as a chelating agent should be considered early in the course of treatment. EDTA is nephrotoxic and this should be considered when using this compound in treatment.

ACGIH BIOLOGICAL EXPOSURE INDICES (BEIs): Currently, no ACGIH Biological Exposure Indices (BEIs) exist for Germane.

12. ECOLOGICAL INFORMATION

ENVIRONMENTAL STABILITY: This gas will be dissipated rapidly in well-ventilated areas. The gas is a strong reducing agent and will react with a wide variety of oxidizing materials. Hydrogen and Germanium will be generated from Germane when the gas is exposed to decomposition temperature.

EFFECT OF MATERIAL ON PLANTS or ANIMALS: Germane is an extremely toxic gas which can be harmful or fatal to over-exposed plant or animal life. Refer to Section 11 (Toxicology Information) for data on Germane's effects on test animals during clinical studies.

EFFECT OF CHEMICAL ON AQUATIC LIFE: Germane is an extremely toxic gas which is soluble in water; therefore, this gas can be harmful or fatal to aquatic life in contaminated bodies of water.

13. DISPOSAL CONSIDERATIONS

PREPARING WASTES FOR DISPOSAL: Waste disposal must be in accordance with appropriate U.S. Federal, State, and local regulations or with regulations of Canada and its Provinces. Return cylinders with residual product to Airgas, Inc. Do not dispose of locally.

14. TRANSPORTATION INFORMATION

THIS MATERIAL IS HAZARDOUS AS DEFINED BY 49 CFR 172.101 BY THE U.S. DEPARTMENT OF TRANSPORTATION.

<u>PROPER SHIPPING NAME:</u>	Germane
<u>HAZARD CLASS NUMBER and DESCRIPTION:</u>	2.3 (Toxic Gas or Poison Gas)
<u>UN IDENTIFICATION NUMBER:</u>	UN 2192
<u>PACKING GROUP:</u>	Not applicable.
<u>DOT LABEL(S) REQUIRED:</u>	Poison Gas, Flammable Gas
<u>NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK NUMBER (1996):</u>	119

MARINE POLLUTANT: Germane is not classified by the DOT as a Marine Pollutant (as defined by 49 CFR 172.101, Appendix B).

SPECIAL PROVISION: This material must be described "Poison-Inhalation Hazard Zone B" on shipping papers and containers must be marked per the requirements of 49 CFR 172.313.

TRANSPORT CANADA TRANSPORTATION OF DANGEROUS GOODS REGULATIONS: THIS MATERIAL IS CONSIDERED AS DANGEROUS GOODS. Use the above information for the preparation of Canadian Shipments.

15. REGULATORY INFORMATION

ADDITIONAL U.S. REGULATIONS:

U.S. SARA REPORTING REQUIREMENTS: Germane is not subject to the reporting requirements of Sections 302, 304 and 313 of Title III of the Superfund Amendments and Reauthorization Act.

U.S. SARA THRESHOLD PLANNING QUANTITY: Not applicable.

15. REGULATORY INFORMATION (Continued)

U.S. CERCLA REPORTABLE QUANTITY (RQ): Not applicable.

U.S. TSCA INVENTORY STATUS: Germane is listed on the TSCA Inventory.

OTHER U.S. FEDERAL REGULATIONS: Depending on specific operations involving the use of this product, the regulations of the Process Safety Management of Highly Hazardous Chemicals may be applicable (29 CFR 1910.119). Germane is not specifically listed; however, under this regulation, however, any process that involves a flammable gas on-site, in one location, in quantities of 10,000 lb. (4,553 kg) or greater is covered under this regulation unless it is used as a fuel.

U.S. STATE REGULATORY INFORMATION: Germane is covered under specific State regulations, as denoted below:

Alaska - Designated Toxic and Hazardous Substances: Germane.	Michigan - Critical Materials Register List: No.	Pennsylvania - Hazardous Substance List: Germane.
California - Permissible Exposure Limits for Chemical Contaminants: Germane.	Minnesota - List of Hazardous Substances: Germane.	Rhode Island - Hazardous Substance List: Germane.
Florida - Substance List: Germane.	Missouri - Employer Information/Toxic Substance List: Germane.	Texas - Hazardous Substance List: No.
Illinois - Toxic Substance List: Germane.	New Jersey - Right to Know Hazardous Substance List: Germane.	West Virginia - Hazardous Substance List: No.
Kansas - Section 302/313 List: No.	North Dakota - List of Hazardous Chemicals, Reportable Quantities: No.	Wisconsin - Toxic and Hazardous Substances: No

CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT (PROPOSITION 65): Germane is not on the California Proposition 65 lists.

CGA LABELING (For Compressed Gas):

DANGER:

POISONOUS, FLAMMABLE LIQUID AND GAS UNDER PRESSURE.
MAY BE FATAL IF INHALED.
CAUSES SEVERE BLOOD, LIVER, KIDNEY AND OTHER ORGAN DAMAGE.
SYMPTOMS MAY BE DELAYED.
MAY FORM EXPLOSIVE MIXTURES WITH AIR.
MAY IGNITE ON CONTACT WITH AIR.
Do not breathe gas.
Store and use with adequate ventilation, and use in closed systems.
Use only with equipment purged with inert gas or evacuated prior to discharge from cylinder.
Keep away from heat, flames, and sparks.
Cylinder temperature should not exceed 52°C (125°F).
Close valve after each use and when empty.
WHEN RETURNING CYLINDER, INSTALL VALVE OUTLET CAP OR PLUG, LEAK-TIGHT.
Use in accordance with the Material Safety Data Sheet.



POISON
CALL A PHYSICIAN



FIRST-AID:

IF INHALED, or suspicion of any exposure, remove to fresh air. If not breathing, give artificial respiration and supplemental oxygen. If breathing, give oxygen. Call a physician even if no symptoms are present. Symptoms may be delayed. Consider any exposure as a potentially toxic doses.

DO NOT REMOVE THIS PRODUCT LABEL.

15. REGULATORY INFORMATION (Continued)

ADDITIONAL CANADIAN REGULATIONS:

CANADIAN DSL INVENTORY: Germane is listed on the DSL Inventory.

OTHER CANADIAN REGULATIONS: Not Applicable.

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) PRIORITIES SUBSTANCES LISTS: Germane is not on the CEPA Priorities Substances Lists.

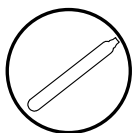
CANADIAN WHMIS SYMBOLS:

Class A: Compressed Gas

Class B1: Flammable Gas

Class D1A: Material Causing Serious and Immediate Effects.

Class D2A: Other Toxic Effects.



16. OTHER INFORMATION

PREPARED BY:

CHEMICAL SAFETY ASSOCIATES, Inc.
9163 Chesapeake Drive, San Diego, CA 92123-1002
619/565-0302

The information contained herein is based on data considered accurate. However, no warranty is expressed or implied regarding the accuracy of these data or the results to be obtained from the use thereof. AIRGAS, Inc. assumes no responsibility for injury to the vendee or third persons proximately caused by the material if reasonable safety procedures are not adhered to as stipulated in the data sheet. Additionally, AIRGAS, Inc. assumes no responsibility for injury to vendee or third persons proximately caused by abnormal use of the material even if reasonable safety procedures are followed. Furthermore, vendee assumes the risk in his use of the material.

DEFINITIONS OF TERMS

A large number of abbreviations and acronyms appear on a MSDS. Some of these which are commonly used include the following:

CAS #: This is the Chemical Abstract Service Number which uniquely identifies each constituent. It is used for computer-related searching.

EXPOSURE LIMITS IN AIR:

ACGIH - American Conference of Governmental Industrial Hygienists, a professional association which establishes exposure limits. **TLV** - Threshold Limit Value - an airborne concentration of a substance which represents conditions under which it is generally believed that nearly all workers may be repeatedly exposed without adverse effect. The duration must be considered, including the 8-hour Time Weighted Average (**TWA**), the 15-minute Short Term Exposure Limit, and the instantaneous Ceiling Level (**C**). Skin absorption effects must also be considered.

OSHA - U.S. Occupational Safety and Health Administration.

PEL - Permissible Exposure Limit - This exposure value means exactly the same as a TLV, except that it is enforceable by OSHA. The OSHA Permissible Exposure Limits are based in the 1989 PELs and the June, 1993 Air Contaminants Rule (*Federal Register*: 58: 35338-35351 and 58: 40191). Both the current PELs and the vacated PELs are indicated. The phrase, "Vacated 1989 PEL," is placed next to the PEL which was vacated by Court Order. **IDLH** - Immediately Dangerous to Life and Health - This level represents a concentration from which one can escape within 30-minutes without suffering escape-preventing or permanent injury. **The DFG** - **MAK** is the Republic of Germany's Maximum Exposure Level, similar to the U.S. PEL. **NIOSH** is the National Institute of Occupational Safety and Health, which is the research arm of the U.S. Occupational Safety and Health Administration (**OSHA**). **NIOSH** issues exposure guidelines called Recommended Exposure Levels (**RELs**). When no exposure guidelines are established, an entry of **NE** is made for reference.

HAZARD RATINGS:

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM: Health Hazard: **0** (minimal acute or chronic exposure hazard); **1** (slight acute or chronic exposure hazard); **2** (moderate acute or significant chronic exposure hazard); **3** (severe acute exposure hazard; onetime overexposure can result in permanent injury and may be fatal); **4** (extreme acute exposure hazard; onetime overexposure can be fatal). Flammability Hazard: **0** (minimal hazard); **1** (materials that require substantial pre-heating before burning); **2** (combustible liquid or solids; liquids with a flash point of 38-93°C [100-200°F]); **3** (Class IB and IC flammable liquids with flash points below 38°C [100°F]); **4** (Class IA flammable liquids with flash points below 23°C [73°F] and boiling points below 38°C [100°F]). Reactivity Hazard: **0** (normally stable); **1** (material that can become unstable at elevated temperatures or which can react slightly with water); **2** (materials that are unstable but do not detonate or which can react violently with water); **3** (materials that can detonate when initiated or which can react explosively with water); **4** (materials that can detonate at normal temperatures or pressures).

NATIONAL FIRE PROTECTION ASSOCIATION: Health Hazard: **0** (material that on exposure under fire conditions would offer no hazard beyond that of ordinary combustible materials); **1** (materials that on exposure under fire conditions could cause irritation or minor residual injury); **2** (materials that on intense or continued exposure under fire conditions could cause temporary incapacitation or possible residual injury); **3** (materials that can on short exposure could cause serious temporary or residual injury); **4** (materials that under very short exposure causes death or major residual injury). Flammability Hazard and Reactivity Hazard: Refer to definitions for "Hazardous Materials Identification System".

FLAMMABILITY LIMITS IN AIR:

Much of the information related to fire and explosion is derived from the National Fire Protection Association (**NFPA**). Flash Point - Minimum temperature at which a liquid gives off sufficient vapors to form an ignitable mixture with air. Autoignition Temperature: The minimum temperature required to initiate combustion in air with no other source of ignition. LEL - the lowest percent of vapor in air, by volume, that will explode or ignite in the presence of an ignition source. UEL - the highest percent of vapor in air, by volume, that will explode or ignite in the presence of an ignition source.

TOXICOLOGICAL INFORMATION:

Human and Animal Toxicology: Possible health hazards as derived from human data, animal studies, or from the results of studies with similar compounds are presented. Definitions of some terms used in this section are: **LD₅₀** - Lethal Dose (solids & liquids) which kills 50% of the exposed animals; **LC₅₀** - Lethal Concentration (gases) which kills 50% of the exposed animals; **ppm** concentration expressed in parts of material per million parts of air or water; **mg/m³** concentration expressed in weight of substance per volume of air; **mg/kg** quantity of material, by weight, administered to a test subject, based on their body weight in kg. Other measures of toxicity include **TDLo**, the lowest dose to cause a symptom and **TCLo** the lowest concentration to cause a symptom; **TDo**, **LDLo**, and **LDo**, or **TC**, **TCo**, **LCLo**, and **LCo**, the lowest dose (or concentration) to cause lethal or toxic effects. **Cancer Information:** The sources are: **IARC** - the International Agency for Research on Cancer; **NTP** - the National Toxicology Program, **RTECS** - the Registry of Toxic Effects of Chemical Substances, **OSHA** and **CAL/OSHA**. **IARC** and **NTP** rate chemicals on a scale of decreasing potential to cause human cancer with rankings from 1 to 4. Subrankings (2A, 2B, etc.) are also used. **Other Information:** **BEI** - ACGIH Biological Exposure Indices, represent the levels of determinants which are most likely to be observed in specimens collected from a healthy worker who has been exposed to chemicals to the same extent as a worker with inhalation exposure to the TLV. **Ecological Information:** **EC** is the effect concentration in water. **BCF** = Bioconcentration Factor, which is used to determine if a substance will concentrate in lifeforms which consume contaminated plant or animal matter. **Tm** = median threshold limit; Coefficient of Oil/Water Distribution is represented by **log K_{ow}** or **log K_{oc}** and is used to assess a substance's behavior in the environment.

REGULATORY INFORMATION:

This section explains the impact of various laws and regulations on the material. **U.S.:** **EPA** is the U.S. Environmental Protection Agency. **DOT** is the U.S. Department of Transportation. **SARA** is the Superfund Amendments and Reauthorization Act. **TSCA** is the U.S. Toxic Substance Control Act. **CERCLA (or Superfund)** refers to the Comprehensive Environmental Response, Compensation, and Liability Act. Labeling is per the American National Standards Institute (**ANSI Z129.1**). **CANADA:** **CEPA** is the Canadian Environmental Protection Act. **WHMIS** is the Canadian Workplace Hazardous Materials Information System. **TC** is Transport Canada. **DSL/NDL** are the Canadian Domestic/Non-Domestic Substances Lists.