

Germane (Compressed)

Safety Data Sheet

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

Date of issue: 05/24/2017

Version: 1.0

SECTION 1: Identification

1.1. Product identifier

Product form	: Substance
Substance name	: Germane (Compressed)
Chemical name	: Germane
CAS-No.	: 7782-65-2
Product code	: CA-1001-00912
Formula	: GeH ₄
Synonyms	: Monogermane / Germanomethane / Germanium hydride

1.2. Recommended use and restrictions on use

Recommended uses and restrictions	: Semiconductors Test gas/Calibration gas.
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1.3. Supplier

Air Liquide Canada Inc.
1250, René Lévesque West Blvd. Suite 1700
H3B 5E6 Montreal, QC - Canada
T 1-800-817-7697
www.airliquide.ca

1.4. Emergency telephone number

Emergency number	: 514-878-1667
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SECTION 2: Hazard identification

2.1. Classification of the substance or mixture

Classification (GHS-CA)

Flammable gases, Category 1	H220
Gases under pressure : Liquefied gas	H280
Acute toxicity (inhalation:gas) Category 2	H330
Specific target organ toxicity — single exposure, Category 1	H370
Full text of H statements : see section 16	

2.2. GHS Label elements, including precautionary statements

GHS-CA labelling

Hazard pictograms (GHS-CA)



Signal word (GHS-CA)

: Danger

Hazard statements (GHS-CA)

: H280 - Contains gas under pressure; may explode if heated
H220 - Extremely flammable gas
H370 - Causes damage to organs
H330 - Fatal if inhaled
CGA-HG04 - May form explosive mixtures with air
CGA-HG11 - Symptoms may be delayed

Precautionary statements (GHS-CA)

: P280+P284 - Wear protective gloves/protective clothing/eye protection/respiratory protection and/or face protection
P381 - In case of leakage, eliminate all ignition sources
P377 - Leaking gas fire: Do not extinguish unless leak can be stopped safely
P501 - Dispose of contents/container in accordance with local/regional/national/international regulations.
P403 - Store in a well-ventilated place
P403+P233 - Store in a well-ventilated place. Keep container tightly closed
P410+P403 - Protect from sunlight. Store in a well-ventilated place
P405 - Store locked up
P260 - Do not breathe dust/fume/gas/mist/vapours/spray

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P202 - Do not handle until all safety precautions have been read and understood
P210 - Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking
P310 - Immediately call a POISON CENTER or doctor
P321 - Specific treatment (see supplemental first aid instruction on this label)
P320 - Specific treatment is urgent (see supplemental first aid instruction on this label)
P284 - In case of inadequate ventilation wear respiratory protection
P280 - Wear protective gloves/protective clothing/eye protection/face protection
P270 - Do not eat, drink or smoke when using this product
P264 - Wash hands, forearms and face thoroughly after handling
P271 - Use only outdoors or in a well-ventilated area
P304+P340 - IF INHALED: Remove person to fresh air and keep comfortable for breathing
P308+P311 - IF exposed or concerned: Call a POISON CENTER or doctor
P307+P311 - If exposed: Call a poison center/doctor
CGA-PG02 - Protect from sunlight when ambient temperature exceeds 52 °C/125 °F
CGA-PG05 - Use a back flow preventive device in the piping
CGA-PG06 - Close valve after each use and when empty
CGA-PG10 - Use only with equipment rated for cylinder pressure
CGA-PG14 - Approach suspected leak area with caution
CGA-PG18 - When returning cylinder, install leak tight valve outlet cap or plug
CGA-PG21 - Open valve slowly

2.3. Other hazards

No additional information available

2.4. Unknown acute toxicity (GHS-CA)

No data available

SECTION 3: Composition/information on ingredients

3.1. Substances

Name	Chemical name/Synonyms	Product identifier	%	Classification (GHS-CA)
Germane (Compressed) (Main constituent)	Germane Monogermane / Germanomethane / Germanium hydride	(CAS-No.) 7782-65-2	> 99.9	Flam. Gas 1, H220 Press. Gas (Liq.), H280 Acute Tox. 2 (Inhalation:gas), H330 STOT SE 1, H370

Full text of hazard classes and H-statements : see section 16

3.2. Mixtures

Not applicable

SECTION 4: First-aid measures

4.1. Description of first aid measures

First-aid measures after inhalation : Remove victim to fresh air and keep at rest in a position comfortable for breathing. Apply artificial respiration with bag and mask if breathing stopped. Get immediate medical advice/attention.

First-aid measures after skin contact : Adverse effects not expected from this product.

First-aid measures after eye contact : Adverse effects not expected from this product.

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/effects after inhalation : Fatal if inhaled. Causes damage to organs (blood, kidneys, liver) (Inhalation).

Symptoms/effects after skin contact : Adverse effects not expected from this product.

Symptoms/effects after eye contact : Adverse effects not expected from this product.

Symptoms/effects after ingestion : Ingestion is not considered a potential route of exposure.

Symptoms/effects upon intravenous administration : Not known.

Chronic symptoms : Adverse effects not expected from this product.

Most important symptoms and effects, both acute and delayed : Delayed adverse effects possible. Refer to section 11.

4.3. Immediate medical attention and special treatment, if necessary

Other medical advice or treatment : If you feel unwell, seek medical advice. If breathing is difficult, give oxygen.

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SECTION 5: Fire-fighting measures

5.1. Suitable extinguishing media

Suitable extinguishing media : Use extinguishing media appropriate for surrounding fire.

5.2. Unsuitable extinguishing media

Unsuitable extinguishing media : Do not use water jet to extinguish.

5.3. Specific hazards arising from the hazardous product

Fire hazard : This product is flammable.

Explosion hazard : Heat may build pressure, rupturing closed containers, spreading fire and increasing risk of burns and injuries. May form flammable/explosive vapour-air mixture.

Hazardous combustion products : If involved in a fire the following toxic and/or corrosive fumes may be produced by thermal decomposition: Germanium and its oxides.

5.4. Special protective equipment and precautions for fire-fighters

Firefighting instructions : In case of fire: Evacuate area. Fight fire remotely due to the risk of explosion. Use water spray or fog for cooling exposed containers. Exercise caution when fighting any chemical fire. Exposure to fire may cause containers to rupture/explode.

Protection during firefighting : Standard protective clothing and equipment (e.g. Self Contained Breathing Apparatus) for fire fighters. Do not enter fire area without proper protective equipment, including respiratory protection.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

General measures : Ensure adequate ventilation.

Personal Precautions, Protective Equipment and Emergency Procedures : EVACUATE ALL PERSONNEL FROM AFFECTED AREA. Use appropriate protective equipment. If leak is on user's equipment, be certain to purge piping before attempting repairs. If leak is on a container or container valve contact the closest Air Liquide Canada location.

6.2. Methods and materials for containment and cleaning up

For containment : Try to stop release if without risk.

Methods for cleaning up : Dispose of contents/container in accordance with local/regional/national/international regulations.

Methods and material for containment and cleaning up : Ventilate area.

6.3. Reference to other sections

For further information refer to section 8: "Exposure controls/personal protection"

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Precautions for safe handling : Do not handle until all safety precautions have been read and understood. Use only outdoors or in a well-ventilated area. Keep away from heat/sparks/open flames/hot surfaces. – No smoking. Use only non-sparking tools.

Hygiene measures : Do not eat, drink or smoke when using this product.

Additional hazards when processed : Pressurized container: Do not pierce or burn, even after use. Use only with equipment rated for cylinder pressure. Close valve after each use and when empty. Handle empty containers with care because residual vapours are flammable. In use may form flammable vapour-air mixture.

7.2. Conditions for safe storage, including any incompatibilities

Technical measures : Comply with applicable regulations. Proper grounding procedures to avoid static electricity should be followed.

Storage conditions : Do not expose to temperatures exceeding 52 °C/ 125 °F. Keep container closed when not in use. Protect cylinders from physical damage; do not drag, roll, slide or drop. Store in well ventilated area. Store locked up.

Incompatible products : None known.

Incompatible materials : Oxidizing materials. Air.

Conditions for safe storage, including any incompatibilities : Observe all regulations and local requirements regarding storage of containers. Containers should not be stored in conditions likely to encourage corrosion. Container valve guards or caps should be in place. Containers should be stored in the vertical position and properly secured to prevent them from falling over. Stored containers should be periodically checked for general condition and leakage. Keep container below 50°C in a well ventilated place. Store containers in location free from fire risk and away from sources of heat and ignition. Keep away from combustible materials. Segregate from oxidant gases and other oxidants in store. All electrical equipment in the storage areas should be compatible with the risk of a potentially explosive atmosphere.

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SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Germane (Compressed) (7782-65-2)		
USA - ACGIH	ACGIH TWA (ppm)	0.2 ppm
Canada (Quebec)	VEMP (mg/m ³)	0.63 mg/m ³
Canada (Quebec)	VEMP (ppm)	0.2 ppm
Alberta	OEL TWA (mg/m ³)	0.6 mg/m ³
Alberta	OEL TWA (ppm)	0.2 ppm
British Columbia	OEL TWA (ppm)	0.2 ppm
Manitoba	OEL TWA (ppm)	0.2 ppm
New Brunswick	OEL TWA (mg/m ³)	0.63 mg/m ³
New Brunswick	OEL TWA (ppm)	0.2 ppm
New Foundland & Labrador	OEL TWA (ppm)	0.2 ppm
Nova Scotia	OEL TWA (ppm)	0.2 ppm
Nunavut	OEL STEL (ppm)	0.6 ppm
Nunavut	OEL TWA (ppm)	0.2 ppm
Northwest Territories	OEL STEL (ppm)	0.6 ppm
Northwest Territories	OEL TWA (ppm)	0.2 ppm
Ontario	OEL TWA (ppm)	0.2 ppm
Prince Edward Island	OEL TWA (ppm)	0.2 ppm
Saskatchewan	OEL STEL (ppm)	0.6 ppm
Saskatchewan	OEL TWA (ppm)	0.2 ppm
Yukon	OEL STEL (mg/m ³)	1.8 mg/m ³
Yukon	OEL STEL (ppm)	0.6 ppm
Yukon	OEL TWA (mg/m ³)	0.6 mg/m ³
Yukon	OEL TWA (ppm)	0.2 ppm

8.2. Appropriate engineering controls

- Appropriate engineering controls : Ensure exposure is below occupational exposure limits (where available). Provide adequate general and local exhaust ventilation. Systems under pressure should be regularly checked for leakages. Consider the use of a work permit system e.g. for maintenance activities. Alarm detectors should be used when toxic gases may be released.
- Environmental exposure controls : Refer to local regulations for restriction of emissions to the atmosphere. See section 13 for specific methods for waste gas treatment.

8.3. Individual protection measures/Personal protective equipment

Personal protective equipment:

Gloves. Safety glasses. Protective clothing. Safety shoes.

Hand protection:

Wear working gloves when handling gas containers.

Eye protection:

Wear safety glasses with side shields.

Skin and body protection:

Wear suitable protective clothing, e.g. lab coats, coveralls or flame resistant clothing.

Respiratory protection:

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Wear a respirator when performing non-routine tasks not limited to line breaking or sampling. Wear a respirator during routine operations if determined to be necessary during a process-specific review. Consult respirator suppliers' product information or their representatives for the selection of the appropriate respirator. See Sections 5 & 6.



Thermal hazard protection:

None necessary during routine operations.

Other information:

Wear safety shoes while handling containers.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state	: Gas
Appearance	: Clear, colorless gas.
Colour	: Colourless
Odour	: Pungent.
Odour threshold	: No data available
pH	: Not applicable.
Relative evaporation rate (butylacetate=1)	: No data available
Relative evaporation rate (ether=1)	: Not applicable for gases and gas mixtures.
Molecular mass	: 76.67176 g/mol
Melting point	: No data available
Freezing point	: -166 °C
Boiling point	: No data available
Flash point	: No data available
Critical temperature	: 34.8 °C
Auto-ignition temperature	: 85 °C
Decomposition temperature	: No data available
Flammability (solid, gas)	: See Section 2.1 and 2.2
Vapour pressure	: 6573.1168624215 mbar
Vapour pressure at 50 °C	: No data available
Relative vapour density at 20 °C	: 2.64
Relative density	: Not known
Relative gas density	: Heavier than air
Solubility	: Water: No data available
Log Pow	: Not applicable for inorganic gases.
Viscosity, kinematic	: Not applicable.
Viscosity, dynamic	: Not applicable.
Explosive properties	: Without adequate ventilation formation of explosive mixtures may be possible.
Oxidising properties	: None.
Explosive limits	: No data available Lower explosive limit (LEL): 2 (2 - 98) vol % AS400

9.2. Other information

Gas group	: Press. Gas (Liq.)
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SECTION 10: Stability and reactivity

10.1. Reactivity

Reactivity	: None known.
Chemical stability	: Stable under normal conditions.
Possibility of hazardous reactions	: Can form explosive mixture with air.
Conditions to avoid	: None under recommended storage and handling conditions (see section 7).
Incompatible materials	: Oxidizing materials. Air.
Hazardous decomposition products	: Under normal conditions of storage and use hazardous decomposition products should not be produced.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute toxicity (oral)	: Not classified
Acute toxicity (dermal)	: Not classified
Acute toxicity (inhalation)	: Inhalation:gas: Fatal if inhaled.

Germane (Compressed) (7782-65-2	
LC50 inhalation rat (ppm)	311 ppm/4h
ATE CA (gases)	311.00000000 ppmv/4h

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	: Not classified
Reproductive toxicity	: Not classified
STOT-single exposure	: Causes damage to organs.
STOT-repeated exposure	: Not classified
Aspiration hazard	: Not classified

SECTION 12: Ecological information

12.1. Toxicity

Ecology - general	: No data available.
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12.2. Persistence and degradability

Germane (Compressed) (7782-65-2)	
Persistence and degradability	Not applicable for inorganic gases.

12.3. Bioaccumulative potential

Germane (Compressed) (7782-65-2)	
Log Pow	Not applicable for inorganic gases.
Bioaccumulative potential	No data available.

12.4. Mobility in soil

Germane (Compressed) (7782-65-2)	
Log Pow	Not applicable for inorganic gases.
Ecology - soil	Because of its high volatility, the product is unlikely to cause ground or water pollution.

12.5. Other adverse effects

Effect on ozone layer	: No known effects from this product.
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SECTION 13: Disposal considerations

13.1. Disposal methods

- Waste treatment methods : Contact supplier if guidance is required. Do not discharge into any place where its accumulation could be dangerous. Ensure that the emission levels from local regulations or operating permits are not exceeded. Waste gas should be flared through a suitable burner with flash back arrestor. Do not discharge into areas where there is a risk of forming an explosive mixture with air.
- Product/Packaging disposal recommendations : Refer to the CGA Pamphlet P-63 "Disposal of Gases" available at www.cganet.com for more guidance on suitable disposal methods.

SECTION 14: Transport information

14.1. Basic shipping description

In accordance with TDG

Transportation of Dangerous Goods

- UN-No. (TDG) : UN2192
- TDG Primary Hazard Classes : 2.3 - Class 2.3 - Toxic Gas.
- TDG Subsidiary Classes : 2.1
- Transport Document Description : UN2192 GERMANE, 2.3 (2.1)
- Proper Shipping Name : GERMANE

- Hazard labels (TDG) : 2.3 - Toxic gases
2.1 - Flammable gases



- TDG Special Provisions : 23 - (1) A consignor of these dangerous goods must include, except for UN1005, ANHYDROUS AMMONIA, the words "toxic by inhalation" or "toxic — inhalation hazard" or "toxique par inhalation" or "toxicité par inhalation" in the following places, unless the words are already part of the shipping name: (a) on a shipping document, immediately after the description of the dangerous goods; (b) on a small means of containment, next to the shipping name of the dangerous goods; and (c) on a large means of containment, next to the placard for the primary class of the dangerous goods or the placard for the subsidiary class, if any. For example, the notation on a shipping document would be "UN1935, CYANIDE SOLUTION, N.O.S, Class 6.1, PG I, toxic by inhalation". (2) This special provision does not apply to a person who transports these dangerous goods in accordance with an exemption set out in sections 1.15, 1.17 or 1.17.1 of Part 1 (Coming Into Force, Repeal, Interpretation, General Provisions and Special Cases). (3) A consignor of UN1005, ANHYDROUS AMMONIA, must include the words "inhalation hazard" or "dangereux par inhalation": (a) on a shipping document, immediately after the shipping name of the dangerous goods; and (b) on a small means of containment, next to the shipping name of the dangerous goods. When UN1005, ANHYDROUS AMMONIA, is contained in a large means of containment on which is affixed the anhydrous ammonia placard, the words "Anhydrous Ammonia, Inhalation Hazard" or "Ammoniac anhydre, dangereux par inhalation" must be displayed next to the placard in accordance with paragraph 4.18.2(b). SOR/2014-306
- 38 - A person must not handle, offer for transport or transport these dangerous goods in a large means of containment if they are in direct contact with the large means of containment. SOR/2014-306
- ERAP Index : 25
- Explosive Limit and Limited Quantity Index : 0
- Passenger Carrying Ship Index : Forbidden
- Excepted quantities (TDG) : E0
- Passenger Carrying Road Vehicle or Passenger Carrying Railway Vehicle Index : Forbidden

14.2. Transport information/DOT - USA

Department of Transport

- DOT NA no. : UN2192
- UN-No.(DOT) : 2192

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Transport Document Description : UN2192 Germane, 2.3
Proper Shipping Name (DOT) : Germane
Contains Statement Field Selection (DOT) : DOT_TECHNICAL - Proper Shipping Name - Technical (DOT)

Class (DOT) : 2.3 - Class 2.3 - Poisonous gas 49 CFR 173.115
Division (DOT) : 2.3
Hazard labels (DOT) : 2.3 - Poison gas
2.1 - Flammable gas



Dangerous for the environment : No

DOT Special Provisions (49 CFR 172.102) : 2 - This material is poisonous by inhalation (see 171.8 of this subchapter) in Hazard Zone B (see 173.116(a) or 173.133(a) of this subchapter), and must be described as an inhalation hazard under the provisions of this subchapter.

DOT Packaging Exceptions (49 CFR 173.xxx) : None

DOT Packaging Non Bulk (49 CFR 173.xxx) : 302

DOT Packaging Bulk (49 CFR 173.xxx) : 245

DOT Quantity Limitations Passenger aircraft/rail (49 CFR 173.27) : Forbidden

DOT Quantity Limitations Cargo aircraft only (49 CFR 175.75) : Forbidden

DOT Vessel Stowage Location : D - The material must be stowed "on deck only" on a cargo vessel and on a passenger vessel carrying a number of passengers limited to not more than the larger of 25 passengers or one passenger per each 3 m of overall vessel length, but the material is prohibited on passenger vessels in which the limiting number of passengers is exceeded.

DOT Vessel Stowage Other : 40 - Stow "clear of living quarters"

Emergency Response Guide (ERG) Number : 119;173

Special transport precautions : Avoid transport on vehicles where the load space is not separated from the driver's compartment. Ensure vehicle driver is aware of the potential hazards of the load and knows what to do in the event of an accident or an emergency. Before transporting product containers:
- Ensure there is adequate ventilation. - Ensure that containers are firmly secured. - Ensure cylinder valve is closed and not leaking. - Ensure valve outlet cap nut or plug (where provided) is correctly fitted. - Ensure valve protection device (where provided) is correctly fitted.

Other information : No supplementary information available.

14.3. Air and sea transport

IMDG

UN-No. (IMDG) : 2192
Proper Shipping Name (IMDG) : GERMANE
Transport Document Description (IMDG) : UN 2192 GERMANE, 2.3 (2.1)
Class (IMDG) : 2 - Gases
MFAG-No : 119
Ship Safety Act : Gases under pressure/Gases toxic under pressure(Dangerous Goods Notification Schedule first second and third Article Dangerous Goods Regulations)
Port Regulation Law : Hazardous materials/High pressure gas (Article 21, Paragraph 2 of Law, Article 12 rule, notice attached table that defines the type of dangerous goods)

IATA

UN-No. (IATA) : 2192
Proper Shipping Name (IATA) : Germane
Transport Document Description (IATA) : UN 2192 Germane, 2.3 (2.1)
Class (IATA) : 2

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Civil Aeronautics Law

: Gases under pressure/Gases toxic under pressure(Hazardous materials notice Appended Table 1 Article 194 of the Enforcement Regulations)

SECTION 15: Regulatory information

15.1. National regulations

Germane (Compressed) (7782-65-2)

Listed on the Canadian DSL (Domestic Substances List)

15.2. International regulations

Germane (Compressed) (7782-65-2)

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 Japanese ISHL (Industrial Safety and Health Law)
Listed on the Korean ECL (Existing Chemicals List)
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
Listed on INSQ (Mexican National Inventory of Chemical Substances)

SECTION 16: Other information

Date of issue

: 05/24/2017

Full text of H-statements:

H220	Extremely flammable gas
H280	Contains gas under pressure; may explode if heated
H330	Fatal if inhaled
H370	Causes damage to organs

SDS Canada (GHS)

THE INFORMATION, RECOMMENDATIONS AND DATA CONTAINED IN THIS DOCUMENT ARE INTENDED TO BE USED BY PROPERLY TRAINED AND QUALIFIED PERSONNEL ONLY AND AT THEIR SOLE RISKS AND DISCRETION. THE INFORMATION, RECOMMENDATIONS AND DATA HEREIN CONTAINED ARE DERIVED FROM SOURCES WHICH WE BELIEVE TO BE RELIABLE. HOWEVER, AIR LIQUIDE CANADA INC. MAKES NO REPRESENTATION AND GIVES NO WARRANTY OF ANY KIND WHATSOEVER WITH RESPECT TO THEIR ACCURACY OR COMPLETENESS AND ASSUMES NO LIABILITY FOR DAMAGES OR LOSS ARISING DIRECTLY OR INDIRECTLY FROM THEIR USE, WHETHER PROPER OR IMPROPER.