

SECTION 1: Identification

1.1. Identification

Product form : Substance
 Substance name : Digermane
 CAS-No. : 13818-89-8
 Product code : SG-1001-06918
 Formula : Ge2H6

1.2. Recommended use and restrictions on use

Use of the substance/mixture : Semiconductor Purposes
 Scientific research and development

1.3. Supplier

Air Liquide USA LLC and its affiliates
 9811 Katy Freeway, Suite 100
 Houston, TX 77024 - USA
 T 1-800-819-1704
www.us.airliquide.com

1.4. Emergency telephone number

Emergency number : Chemtrec: 1-800-424-9300

SECTION 2: Hazard(s) identification

2.1. Classification of the substance or mixture

GHS US classification

Flammable liquids Category 1	H224	Extremely flammable liquid and vapour
Acute toxicity (oral) Category 4	H302	Harmful if swallowed
Acute toxicity (dermal) Category 4	H312	Harmful in contact with skin
Acute toxicity (inhalation:vapour) Category 2	H330	Fatal if inhaled
Skin corrosion/irritation Category 2	H315	Causes skin irritation
Serious eye damage/eye irritation Category 2	H319	Causes serious eye irritation
Specific target organ toxicity (single exposure) Category 3	H335	May cause respiratory irritation

Full text of H statements : see section 16

2.2. GHS Label elements, including precautionary statements

GHS US labeling

Hazard pictograms (GHS US) :



Signal word (GHS US) :

Danger

Hazard statements (GHS US) :

H220 - Extremely flammable gas
 H315 - Causes skin irritation
 H330 - Fatal if inhaled
 H335 - May cause respiratory irritation

Precautionary statements (GHS US) :

P202 - Do not handle until all safety precautions have been read and understood.
 P271 - Use only outdoors or in a well-ventilated area.
 P280 - Wear eye protection, face protection, protective gloves, protective clothing.
 P403 - Store in a well-ventilated place.
 P501 - Dispose of contents/container in accordance with local/regional/national/international regulations

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P210 - Keep away from heat, hot surfaces, open flames, sparks. - No smoking.
P377 - Leaking gas fire: Do not extinguish, unless leak can be stopped safely.
P260 - Do not breathe gas.
P302+P352 - If on skin: Wash with plenty of water
P405 - Store locked up.
P304+P340 - If inhaled: Remove person to fresh air and keep comfortable for breathing
P362 - Take off contaminated clothing and wash before reuse.
P381 - Eliminate all ignition sources if safe to do so.
P307+P311 - If exposed: Call a poison center/doctor
P284 - Wear respiratory protection. Consult respirator supplier's product information for the selection of the appropriate respiratory protection.
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-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 which do not result in classification

No additional information available

2.4. Unknown acute toxicity (GHS US)

Not applicable

SECTION 3: Composition/Information on ingredients

3.1. Substances

Name	Product identifier	%	GHS US classification
Digermane (Main constituent)	(CAS-No.) 13818-89-8	> 99	Flam. Liq. 1, H224 Acute Tox. 4 (Oral), H302 Acute Tox. 4 (Dermal), H312 Acute Tox. 2 (Inhalation:vapour), H330 Skin Irrit. 2, H315 Eye Irrit. 2, H319 STOT SE 3, H335

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 : Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower. Wash contaminated clothing before reuse. If skin irritation occurs: Get medical advice/attention.

First-aid measures after eye contact : Rinse immediately with plenty of water.

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. May cause respiratory irritation.

Symptoms/effects after skin contact : Causes skin irritation.

Symptoms/effects after eye contact : Causes eye irritation.

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.

4.3. Immediate medical attention and special treatment, if necessary

If you feel unwell, seek medical advice. If breathing is difficult, give oxygen.

SECTION 5: Fire-fighting measures

5.1. Suitable (and unsuitable) extinguishing media

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

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

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5.2. Specific hazards arising from the chemical

- Fire hazard : This product is flammable.
- Explosion hazard : Product is not explosive. Heat may build pressure, rupturing closed containers, spreading fire and increasing risk of burns and injuries.
- Reactivity : None known.

5.3. 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.
- 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.

6.1.1. For non-emergency personnel

- Protective equipment : Wear protective equipment consistent with the site emergency plan.
- Emergency procedures : Evacuate personnel to a safe area. Close doors and windows of adjacent premises. Keep containers closed. Mark the danger area. Seal off low-lying areas. Keep upwind.

6.1.2. For emergency responders

- Protective equipment : Standard protective clothing and equipment (e.g, Self Contained Breathing Apparatus) for fire fighters. Equip cleanup crew with proper protection.
- Emergency procedures : Evacuate and limit access. Ventilate area. Remove ignition sources. Monitor concentration of released product. Consider the risk of potentially explosive atmospheres. Wear self-contained breathing apparatus when entering atmospheres of unknown contaminant concentration until proven to be safe.

6.2. Environmental precautions

- Try to stop release if without risk.

6.3. Methods and material 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.

6.4. Reference to other sections

- See also Sections 8 and 13.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

- Additional hazards when processed : Pressurized container: Do not pierce or burn, even after use. Close valve after each use and when empty. Handle empty containers with care because residual vapors are flammable. In use, may form flammable vapor-air mixture.
- 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.

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.

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SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Digermane (13818-89-8)		
ACGIH	ACGIH 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

Hand protection:

Wear working gloves when handling gas containers. 29 CFR 1910.138: Hand protection

Eye protection:

Wear safety glasses with side shields. 29 CFR 1910.133: Eye and Face Protection

Skin and body protection:

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

Respiratory protection:

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 normal and routine operations.

Other information:

Wear safety shoes while handling containers. 29 CFR 1910.136: Foot Protection.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state	: Liquid
Appearance	: Colorless, volatile liquid.
Color	: Colorless
Odor	: Unpleasant
Odor threshold	: No data available
pH	: No data available
Melting point	: No data available
Freezing point	: No data available
Boiling point	: 31 °C
Flash point	: < -60 °C
Relative evaporation rate (butyl acetate=1)	: No data available
Flammability (solid, gas)	: See Section 2.1 and 2.2
Vapor pressure	: 531 mm Hg @ 21 °C
Relative vapor density at 20 °C	: 5.22
Relative density	: No data available
Specific gravity / density	: 1.98 @ -109 °C
Molecular mass	: 151.23
Relative gas density	: Heavier than air.
Solubility	: Water: No data available

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Log Pow	: No data available
Auto-ignition temperature	: < 100 °C
Decomposition temperature	: No data available
Viscosity, kinematic	: No data available
Viscosity, dynamic	: No data available
Explosion limits	: No data available Lower explosive limit (LEL): 0.5 vol % Uncertain; Estimated by Air Liquide UEL: 100 Uncertain; Estimated by Air Liquide
Explosive properties	: Without adequate ventilation formation of explosive mixtures may be possible.
Oxidizing properties	: None.

9.2. Other information

No additional information available

SECTION 10: Stability and reactivity

10.1. Reactivity

None known.

10.2. Chemical stability

Stable under normal conditions.

10.3. Possibility of hazardous reactions

Can form explosive mixture with air.

10.4. Conditions to avoid

None under recommended storage and handling conditions (see section 7).

10.5. Incompatible materials

Oxidizing materials. Air.

10.6. 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)	: Oral: Harmful if swallowed.
Acute toxicity (dermal)	: Dermal: Harmful in contact with skin.
Acute toxicity (inhalation)	: Inhalation:vapour: Fatal if inhaled.

Digermane (13818-89-8)	
LC50 inhalation rat (ppm)	155.5 ppm/4h estimated
ATE US (oral)	500 mg/kg body weight
ATE US (dermal)	1100 mg/kg body weight
ATE US (vapors)	0.5 mg/l/4h

Skin corrosion/irritation	: Causes skin irritation.
Serious eye damage/irritation	: Causes serious eye irritation.
Respiratory or skin sensitization	: Not classified
Germ cell mutagenicity	: Not classified
Carcinogenicity	: Not classified
Reproductive toxicity	: Not classified
Specific target organ toxicity – single exposure	: May cause respiratory irritation.
Specific target organ toxicity – repeated exposure	: Not classified
Aspiration hazard	: Not classified
Viscosity, kinematic	: No data available
Symptoms/effects after inhalation	: Fatal if inhaled. May cause respiratory irritation.
Symptoms/effects after skin contact	: Causes skin irritation.
Symptoms/effects after eye contact	: Causes eye irritation.
Symptoms/effects after ingestion	: Ingestion is not considered a potential route of exposure.

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Symptoms/effects upon intravenous administration : Not known.
Chronic symptoms : Adverse effects not expected from this product.

SECTION 12: Ecological information

12.1. Toxicity

No additional information available

12.2. Persistence and degradability

No additional information available

12.3. Bioaccumulative potential

No additional information available

12.4. Mobility in soil

No additional information available

12.5. Other adverse effects

Effect on ozone layer : No known effects from this product.

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

Department of Transportation (DOT)

In accordance with DOT

Transport document description : UN3384 Toxic by inhalation liquid, flammable, n.o.s. (Digermane), 6.1 (3), I
UN-No.(DOT) : UN3384
Proper Shipping Name (DOT) : Toxic by inhalation liquid, flammable, n.o.s.
Class (DOT) : 6.1 - Class 6.1 - Poisonous materials 49 CFR 173.132
Packing group (DOT) : I - Great Danger
Subsidiary risk (DOT) : 3 - Class 3 - Flammable and combustible liquid 49 CFR 173.120
Hazard labels (DOT) : 6.1 - Poison inhalation hazard
3 - Flammable liquid



DOT Packaging Non Bulk (49 CFR 173.xxx) : 227
DOT Packaging Bulk (49 CFR 173.xxx) : 244
DOT Symbols : G - Identifies PSN requiring a technical name

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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. B9 - Bottom outlets are not authorized. B14 - Each bulk packaging, except a tank car or a multi-unit-tank car tank, must be insulated with an insulating material so that the overall thermal conductance at 15.5 C (60 F) is no more than 1.5333 kilojoules per hour per square meter per degree Celsius (0.075 Btu per hour per square foot per degree Fahrenheit) temperature differential. Insulating materials must not promote corrosion to steel when wet. B32 - MC 312, MC 330, MC 331, DOT 412 cargo tanks and DOT 51 portable tanks must be made of stainless steel, except that steel other than stainless steel may be used in accordance with the provisions of 173.24b(b) of this subchapter. Thickness of stainless steel for tank shell and heads for cargo tanks and portable tanks must be the greater of 6.35 mm (0.250 inch) or the thickness required for a tank with a design pressure at least equal to 1.3 times the vapor pressure of the lading at 46 C (115 F). In addition, MC 312 and DOT 412 cargo tank motor vehicles must: a. Be ASME Code (U) stamped for 100% radiography of all pressure-retaining welds; b. Have accident damage protection which conforms with 178.3458 of this subchapter; c. Have a MAWP or design pressure of at least 87 psig; and d. Have a bolted man way cover. T20 - 10 8 mm Prohibited 178.275(g)(3). TP2 - a. The maximum degree of filling must not exceed the degree of filling determined by the following: (image) Where: tr is the maximum mean bulk temperature during transport, tf is the temperature in degrees celsius of the liquid during filling, and a is the mean coefficient of cubical expansion of the liquid between the mean temperature of the liquid during filling (tf) and the maximum mean bulk temperature during transportation (tr) both in degrees celsius. b. For liquids transported under ambient conditions may be calculated using the formula: (image) Where: d15 and d50 are the densities (in units of mass per unit volume) of the liquid at 15 C (59 F) and 50 C (122 F), respectively. TP13 - Self-contained breathing apparatus must be provided when this hazardous material is transported by sea. TP27 - A portable tank having a minimum test pressure of 4 bar (400 kPa) may be used provided the calculated test pressure is 4 bar or less based on the MAWP of the hazardous material, as defined in 178.275 of this subchapter, where the test pressure is 1.5 times the MAWP. TP38 - Each portable tank must be insulated with an insulating material so that the overall thermal conductance at 15.5 C (60 F) is no more than 1.5333 kilojoules per hour per square meter per degree Celsius (0.075 Btu per hour per square foot per degree Fahrenheit) temperature differential. Insulating materials may not promote corrosion to steel when wet. TP45 - Each portable tank must be made of stainless steel, except that steel other than stainless steel may be used in accordance with the provisions of 173.24b(b) of this subchapter. Thickness of stainless steel for portable tank shells and heads must be the greater of 6.35 mm (0.250 inch) or the thickness required for a portable tank with a design pressure at least equal to 1.3 times the vapor pressure of the hazardous material at 46 C (115 F).
DOT Packaging Exceptions (49 CFR 173.xxx)	: None
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	: 131
Other information	: No supplementary information available.

Transportation of Dangerous Goods

Transport document description	: UN3384 TOXIC BY INHALATION LIQUID, FLAMMABLE, N.O.S., 6.1 (3), I
UN-No. (TDG)	: UN3384
Proper Shipping Name	: TOXIC BY INHALATION LIQUID, FLAMMABLE, N.O.S.
TDG Primary Hazard Classes	: 6.1 - Class 6.1 - Toxic Substances
Packing group	: I - Great Danger
TDG Subsidiary Classes	: 3

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TDG Special Provisions	: 16 - (1) The technical name of at least one of the most dangerous substances that predominantly contributes to the hazard or hazards posed by the dangerous goods must be shown, in parentheses, on the shipping document following the shipping name in accordance with clause 3.5(1)(c)(ii)(A) of Part 3 (Documentation). The technical name must also be shown, in parentheses, on a small means of containment or on a tag following the shipping name in accordance with subsections 4.11(2) and (3) of Part 4 (Dangerous Goods Safety Marks). (2) Despite subsection (1), the technical name for the following dangerous goods is not required to be shown on a shipping document or on a small means of containment when Canadian law for domestic transport or an international convention for international transport prohibits the disclosure of the technical name: (a)UN1544, ALKALOID SALTS, SOLID, N.O.S. or ALKALOIDS, SOLID, N.O.S.; (b)UN1851, MEDICINE, LIQUID, TOXIC, N.O.S.; (c)UN3140, ALKALOID SALTS, LIQUID, N.O.S. or ALKALOIDS, LIQUID, N.O.S.; (d)UN3248, MEDICINE, LIQUID, FLAMMABLE, TOXIC, N.O.S.; or (e)UN3249, MEDICINE, SOLID, TOXIC, N.O.S. An example in Canada is the "Food and Drugs Act". (3) Despite subsection (1), the technical name for the following dangerous goods is not required to be shown on a small means of containment: (a)UN2814, INFECTIOUS SUBSTANCE, AFFECTING HUMANS; or (b)UN2900, INFECTIOUS SUBSTANCE, AFFECTING ANIMALS. SOR/2014-306,23 - (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
ERAP Index	: 1 000
Explosive Limit and Limited Quantity Index	: 0
Passenger Carrying Road Vehicle or Passenger Carrying Railway Vehicle Index	: Forbidden
Passenger Carrying Ship Index	: Forbidden

Transport by sea

Transport document description (IMDG)	: UN 3384 TOXIC BY INHALATION LIQUID, FLAMMABLE, N.O.S., 6.1 (3), I
UN-No. (IMDG)	: 3384
Proper Shipping Name (IMDG)	: TOXIC BY INHALATION LIQUID, FLAMMABLE, N.O.S.
Class (IMDG)	: 6.1 - Toxic substances
Packing group (IMDG)	: I - substances presenting high danger
Subsidiary risks (IMDG)	: 3 - Flammable liquids

Air transport

Forbidden

SECTION 15: Regulatory information

15.1. US Federal regulations

No additional information available

15.2. International regulations

CANADA

No additional information available

EU-Regulations

No additional information available

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National regulations

No additional information available

15.3. US State regulations

No additional information available

SECTION 16: Other information

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Other information : This Safety Data Sheet is offered pursuant to OSHA's Hazard Communication Standard, 29 CFR, 1910.1200. Other government regulations must be reviewed for applicability to this product.

Full text of H-phrases:

H224	Extremely flammable liquid and vapour
H302	Harmful if swallowed
H312	Harmful in contact with skin
H315	Causes skin irritation
H319	Causes serious eye irritation
H330	Fatal if inhaled
H335	May cause respiratory irritation

SDS US (GHS HazCom 2012)

This Safety Data Sheet is offered pursuant to OSHA's Hazard Communication Standard, 29 CFR, 1910.1200. Other government regulations must be reviewed for applicability to this product. To the best of Air Liquide USA LLC and its affiliates' knowledge, the information contained herein is reliable and accurate as of this date; however, accuracy, suitability or completeness are not guaranteed and no warranties of any type, either express or implied, are provided. The information contained herein relates only to this specific product. If this product is combined with other materials, all component properties must be considered. Data may be changed from time to time. Be sure to consult the latest edition.