

In an emergency, Call CHEMTREC at 800-424-9300 or 703-527-3887.

Section 1: Chemical Product and Company Identification

Material Name: Hydrogen-methane mixtures (any concentration)

Chemical formula of principal gas: CH₄.

Synonyms of principal gas: Methyl hydride, natural gas, marsh gas, fire damp.

Manufacturer: Voltaix, LLC: Post Office Box 5357, North Branch, New Jersey 08876-5357 USA

Voice: 908-231-9060 or 800-VOLTAIX, Facsimile: 908-231-9063

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Section 2: Composition/Information on Ingredients

Component	CAS Registry Number	Molar (volume) concentration	Exposure Guidelines
Methane	74-82-8	0 to 100%	Simple Asphyxiant
Hydrogen	1333-74-0	balance	Simple asphyxiant

Section 3: Hazards Identification

Emergency Overview

These methane mixtures are colorless and odorless gases. They are not toxic; the immediate health hazard is that it may cause thermal burns. They are flammable and may form mixtures with air that are flammable or explosive. Methane is violently reactive with oxidizers, halogens, and some halogen compounds. These methane mixtures are asphyxiants and may displace oxygen in a workplace atmosphere. The concentrations at which flammable or explosive mixtures form are much lower than the concentration at which asphyxiation risk is significant.

Note: Commercial grades of methane typically have odors because of impurities.

NFPA 704 Rating (determined by Voltaix): Health 0 Fire 4 Reactivity 0 Special None

Potential Health Effects

Routes of Exposure: Neither component is toxic by any route. Asphyxia may result if the oxygen concentration is reduced to below 18% by displacement.

Lengths of Exposure: None of the available data indicate toxicity for exposures of any duration.

Severity of Effect: No effect identified.

Target Organs: None identified.Type of Effect: No effect identified.

Signs and Symptoms of Exposure: None identified.

Medical Conditions that may be Aggravated by Exposure: None identified.

Reported Carcinogenic and Reproductive Effects: None known to Voltaix

MSDS Number: C003 Revised 21 July 2006 Page 1 of 7



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Section 4: First Aid Measures

Asphyxiation

This is the primary health risk.

- 1) Remove the affected person from the gas source or contaminated area. Note: Personal Protective Equipment (PPE), including positive pressure, self contained breathing apparatus, may be required to assure the safety of the rescuer. A region in the flammable range may exist; take appropriate precautions against ignition of the atmosphere in this region.
- 2) If the affected person is not breathing spontaneously, administer rescue breathing.
- 3) If the affected person does not have a pulse, administer CPR.
- 4) If medical oxygen and appropriately trained personnel are available, administer 100% oxygen to the affected person.
- 5) Summon an emergency ambulance. If an ambulance is not available, contact a physician, hospital, or poison control center for instruction.
- 6) Keep the affected person warm, comfortable, and at rest while awaiting professional medical care. *Monitor the breathing and pulse continuously.* Administer rescue breathing or CPR if necessary.

Skin Contact

No detrimental effect of skin contact has been reported. Treat thermal burns by assuring that affected area is cool by flushing with cool water, then apply dry sterile dressings. If the patient is burned on the face, neck, head, or chest, assume that the airway may also have been burned and obtain professional medical assistance immediately.

Eye Contact

No detrimental effect of eye contact has been reported.

<u>Ingestion</u>

Ingestion is not an observed route of exposure to gaseous hazardous materials.

Chronic Effects

None is known to Voltaix

Note to Physicians:

The combustion products of methane and air are water and carbon dioxide; the combustion product of hydrogen and air is water. Under some conditions, carbon monoxide may also be produced.



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Section 5: Fire Fighting Measures

Flammability and Explosivity

Flash Point: Not applicable, this material is a gas.

Flammability Limits in Air: Depends on concentration and diluent. The flammable range of methane is 5.3% to 15%. The flammable range of hydrogen is 4.0 to 75.0%..

Autoignition Temperature: Depends on concentration and diluent. The autoignition temperature of pure methane is 537 °C (999 °F) The autoignition temperature of pure hydrogen is 500 °C (932 °F).

Flammability Classification (per 29 CFR 1910.1200): Flammable gas.

Known or Anticipated Hazardous Products of Combustion: Carbon monoxide.

Properties that may Initiate or Intensify Fire: Heating cylinder to the point of activation of the pressure relief device.

Reactions that Release Flammable Gases: None known to Voltaix

Extinguishing Media

None.

Fire Fighting Instructions

The only safe way to extinguish a flammable gas fire is to stop the flow of gas. If the flow cannot be stopped, allow the entire contents of the cylinder to burn. Cool the cylinder and surroundings with water from a suitable distance. Extinguishing the fire without stopping the flow of gas may permit the formation of ignitable or explosive mixtures with air. These mixtures may propagate to a source of ignition.

Excessive pressure may develop in gas cylinders exposed to fire, which may result in explosion, regardless of the cylinder's content. Cylinders with pressure relief devices (PRD's) may release their contents through such devices if the cylinder is exposed to fire. Cylinders without PRD's have no provision for controlled release and are therefore more likely to explode if exposed to fire.

Positive pressure, self contained breathing apparatus is required for all fire fighting involving hazardous materials. Full structural fire fighting (bunker) gear is the *minimum* acceptable attire. The need for proximity, entry, and flashover protection and special protective clothing should be determined for each incident by a competent fire fighting safety professional.



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Section 6: Accidental Release Measures

Containment

As these materials are gases at atmospheric conditions, the only means of containment is the enclosure of the space into which the materials are released. Such containment is described in Section 7.

Clean Up

Clean up consists of passing the entire gas volume of the enclosure through appropriate exhaust gas treatment equipment (EGTE). Purge the enclosure with a non-reactive gas, such as nitrogen, through the EGTE until an acceptably low level of contamination remains. The primary consideration is flammability.

Evacuation

If the release is not contained in an appropriate device or system, all personnel not appropriately protected (see Section 8) must evacuate the contaminated spaces. Consider evacuation of additional areas, as a precaution against the spread of the release or subsequent explosion or fire.

Special Instructions

None.

Section 7: Handling and Storage

Handling

Handle this material only in sealed, purged systems. The design of handling systems for hazardous materials is beyond the scope of this MSDS, and should be performed by a competent, experienced professional. Consider the use of doubly-contained piping; diaphragm or bellows sealed, soft seat valves; backflow prevention devices; flash arrestors; and flow monitoring or limiting devices. Gas cabinets, with appropriate exhaust treatment, are recommended, as is automatic monitoring of the secondary enclosures and work areas for release.

Handle sealed gas cylinders in accordance with CGA P-1, Safe Handling of Compressed Gases in Containers.

Some material may have accumulated behind the outlet plug. Face the outlet away from you and wear appropriate protective equipment when removing the plug to connect the cylinder to your system.

Never introduce any substance into a gas cylinder. If you believe your cylinder may have been contaminated, notify Voltaix immediately. Provide as much information as possible on the nature and quantity of contamination.

Storage

Store cylinders in accordance with CGA P-1, *Safe Handling of Compressed Gases in Containers*, local building and fire codes and other relevant regulations. Materials should be segregated by the hazards they comprise for storage.

Protect the cylinders from direct sunlight, precipitation, mechanical damage, and temperatures above 55 °C (130 °F).

Ship and store cylinders with the outlet plug and valve protective cap in place.



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Section 8: Exposure Control/Personal Protection

Engineering Controls

Local exhaust is required. Secondary containment, with appropriate exhaust gas treatment, is strongly encouraged and is required in some jurisdictions.

Monitor the work area and the secondary containment continuously for release of the material. Automatic alerting of personnel and automatic shutdown of flow are appropriate in most applications and are required in some jurisdictions.

Purge all primary containment systems with a nonreactive gas, such as nitrogen, before introducing methane.

Personal Protective Equipment (PPE)

Respiratory Protection: Positive pressure, full face, air supplied breathing apparatus should be used for work within a confined space if a leak is suspected or if the primary containment is to be opened, *e.g.*, for a cylinder change. Air supplied breathing apparatus is required for response to demonstrated or suspected releases from the primary containment.

Eye/Face Protection: When using respiratory protection as described above, use a face mask that provides splash and impact protection for the face and eyes. Otherwise, wear safety glasses.

Skin Protection: Wear appropriate gloves when handling sealed cylinders. Use gloves and other skin protection, as assigned by a competent safety professional, when working within the secondary enclosure with the primary enclosure compromised, *e.g.*, cylinder changing, to protect both from exposure to the material and from fire that may result from its release to the air.

Other Protection: Wear appropriate protective footwear when moving cylinders.

Exposure Guidelines

As all of the components are simple asphyxiants, no TLV (ACGIH), PEL (OSHA), or REL (NIOSH) has been established. Workplace concentrations should be controlled to be below the lower flammable limit.

Section 9: Physical and Chemical Properties

Notes: 1) "N/A" means not applicable.

2) Unless otherwise specified, properties are reported at 0 °C (32 °F) and 1 atmosphere (1.0 bar, 14.7 psia).

Property	Methane	Hydrogen
Appearance	colorless	colorless
Odor	none	none
Physical state	gas	gas
pH	N/A	N/A
Vapor Pressure	N/A	N/A
Vapor Density	1.342 g/L	0.082 g/L
Boiling point	-161.5 °C (-258.7 °F)	-252.9 °C (-423 °F)
Melting point	N/A	N/A
Solubility in water (v/v, at 20 °C)	0.033	0.0182
Specific gravity (liquid)	N/A	N/A
Molecular weight	16.04	2.02



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Section 10: Stability and Reactivity

Chemical Stability: Both components are stable.

Conditions to Avoid: Sources of ignition, exposure to air.

Incompatibility with Other Materials: Oxidizers, halogens and some halogen compounds.

Hazardous Decomposition, Reaction and Oxidation (other than burning) Products: None.

Hazardous Polymerization: Has not been observed.

Section 11: Toxicological Information

Acute Data (by route): None, both components are simple asphyxiants.

Chronic and Subchronic Data: Both components are listed in RTECS, but no information on their carcinogenicity or

other effects is included.

Special Studies: None known.

Section 12: Ecological Information

Ecotoxicity: None known to Voltaix

Environmental Fate: None known to Voltaix

Section 13: Disposal Considerations

Classification under RCRA, 40 CFR 261: These materials are not listed.

US EPA waste number and descriptions: D001 (ignitability).

Special Instructions and Limitations: Treat process and other exhaust streams appropriately before release to the

atmosphere.

Notice: The information above is derived from Voltaix's interpretation of the US federal laws, regulations and policies concerning the material, as shipped by Voltaix, at the time this MSDS was prepared. Federal controls are subject to change and state and local controls may also apply. Proper waste disposal is the responsibility of the owner of the waste. The user is encouraged to consult with appropriate experts in developing a disposal plan.

Section 14: Transport Information

Basic Description: Hydrogen and Methane Mixture, Compressed (Methane x%), Division 2.1 (Flammable Gas), UN

2034.

Note: Substitute the methane concentration for x%.

Additional Information for shipment by water: IMDG Page Number 2149.

Additional Information for shipment by air: Transportation by air is permitted in Cargo Only aircraft.

Section 15: Regulatory Information

TSCA Status: Both components are listed on the Inventory of Chemical Substances.

CERCLA Reportable Quantity (40CFR302.40): This material is not listed. The Reportable Quantity (RQ) for "Unlisted Hazardous Wastes Characteristic of Ignitability" (D001) of 45.4 kg (100 lbs.) therefore applies.

MSDS Number: C003 Revised 21 July 2006 Page 6 of 7



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SARA Title III Status (Section 302 (40CFR355), Section 311/312, Section 313 (40CFR372)): No Threshold Planning Quantities (TPQ's) or Reportable Quantities (RQ's) are listed for these substances. The default federal MSDS submission and inventory requirement filing threshold of 4,540 kg (10,000 lbs.) therefore applies. *Note:* State and local requirements may be more stringent.

Section 16: Other Information

References

Book of SEMI Standards, Facilities Standards and Safety Guidelines. Mountain View, CA: Semiconductor Equipment and Materials International, 1993.

Borak, Jonathan, M.D., Michael Callan and William Abbott, *Hazardous Materials Exposure: Emergency Response and Patient Care.* Englewood Cliffs, NJ: Prentice-Hall, Inc., 1991.

Documentation of TLV's and BEI's. Cincinatti, Ohio: American Conference of Government Industrial Hygienists, 1992.

Fire Protection Guide on Hazardous Materials. Quincy, MA: National Fire Protection Association, 1993.

Safe Handling of Compressed Gases in Containers (Pamphlet P-1). Arlington, VA: Compressed Gas Association, Inc., 1991.

Derivation of this information

The information in this MSDS was obtained by estimating or calculating the characteristics of mixtures based on the characteristics and concentrations of their components. Mixtures of a range of compositions have similar characteristics. A single MSDS is therefore provided for them as a group.

Revision Indication

Revise to reflect company name change

Disclaimer

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