

Material Safety Data Sheet for Methane (CH₄)

Reference: Voltaix, Inc. MSDS Document Number - C000 (revision dated 02 Aug 96)
IN AN EMERGENCY, CALL CHEMTREC at 800-424-9300 (US toll free) or 703-527-3887

Contents:

- [1. Chemical Product and Company Identification](#)
- [2. Composition / Information on Ingredients](#)
- [3. Hazards Identification](#)
- [4. First Aid Measures](#)
- [5. Fire Fighting Measures](#)
- [6. Accidental Release Measures](#)
- [7. Handling and Storage](#)
- [8. Exposure Control / Personal Protection](#)
- [9. Physical and Chemical Properties](#)
- [10. Stability and Reactivity](#)
- [11. Toxicological Information](#)
- [12. Ecological Information](#)
- [13. Disposal Considerations](#)
- [14. Transport Information](#)
- [15. Regulatory Information](#)
- [16. Other Information](#)

Section 1: *Chemical Product and Company Identification*

[\(return to contents\)](#)

Material Name: Methane
Chemical Formula: CH₄
Synonyms: Methyl hydride, natural gas, marsh gas, fire damp.
Manufacturer: Voltaix, Inc.:
Post Office Box 5357, North Branch, New Jersey 08876-5357, USA
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Section 2: *Composition/Information on Ingredients*

[\(return to contents\)](#)

Component	CAS Registry Number	Molar (volume) concentration	Exposure Guidelines
Methane	74-82-8	100%	Simple Asphyxiant (ACGIH)

Section 3: Hazards Identification

[\(return to contents\)](#)

Emergency Overview

Methane is a colorless and odorless gas. It is not toxic; the immediate health hazard is that it may cause thermal burns. It is flammable and may form mixtures with air that are flammable or explosive. Methane is violently reactive with oxidizers, halogens, and some halogen compounds. Methane is an asphyxiant 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, Inc.): *Note:* NFPA 325M-91 lists "Health 1", which is not consistent with NFPA 70490.

Health	0
Flammability	4
Reactivity	0
Special	None

Potential Health Effects

Routes of Exposure: Methane is not 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, Inc.

Section 4: First Aid Measures

[\(return to contents\)](#)

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. The concentration required for asphyxiation is above the upper flammable limit. A boundary region, in the flammable range, may exist between contaminated and uncontaminated areas. Take appropriate precaution 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.

Ingestion

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

Chronic Effects

None is known to Voltaix, Inc.

Note to Physicians:

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

Section 5: Fire Fighting Measures

[\(return to contents\)](#)

Flammability and Explosivity

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

Flammability Limits in Air: 5.3% to 15%.

Autoignition Temperature: 537 deg. C (999 deg. 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, Inc.

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.

Section 6: Accidental Release Measures

[\(return to contents\)](#)

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

[\(return to contents\)](#)

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, Inc. 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.

Section 8: Exposure Control/Personal Protection

[\(return to contents\)](#)

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 the secondary containment equipment if a leak is suspected or 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 methane is a simple asphyxiant, 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

[\(return to contents\)](#)

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
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Appearance	colorless
Odor	none
Physical state	gas
pH	N/A
Vapor Pressure	N/A
Vapor Density	1.342 g/L
Boiling point	-161.5 deg. C (-258.7 deg. F)
Melting point	N/A
Solubility in water (v/v, at 20 deg C)	0.033
Specific gravity (liquid)	N/A
Molecular weight	16.04

Section 10: *Stability and Reactivity*

[\(return to contents\)](#)Contents

Chemical Stability: Methane is 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*

[\(return to contents\)](#)Contents

Acute Data (by route): None, methane is a simple asphyxiant.

Chronic and Subchronic Data: Methane is listed in RTECS, but no information on its carcinogenicity or other effects is included.

Special Studies: None known.

Section 12: *Ecological Information*

[\(return to contents\)](#)

Ecotoxicity: None known to Voltaix, Inc.

Environmental Fate: None known to Voltaix, Inc.

Section 13: *Disposal Considerations*

[\(return to contents\)](#)

Classification under RCRA, 40 CFR 261: This material is 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, Inc.'s interpretation of the US federal laws, regulations and policies concerning the material, as shipped by Voltaix, Inc., 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*

[\(return to contents\)](#)

Basic Description: Methane, Compressed, Division 2.1 (Flammable Gas), UN 1971.

Additional Information for shipment by water: IMDG Page Number 2156.

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

Section 15: *Regulatory Information*

[\(return to contents\)](#)

TSCA Status: This material is 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.

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

[\(return to contents\)](#)

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. Cincinnati, 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.

Revision Indication

International telephone number for Chemtrec.

Disclaimer

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