1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

MATHESON TRI-GAS, INC.
150 Allen Road Suite 302
Basking Ridge, New Jersey 07920
Information: 1-800-416-2505

Emergency Contact:
CHEMTREC 1-800-424-9300
Calls Originating Outside the US:
703-527-3887 (Collect Calls Accepted)

SUBSTANCE: GERMANIUM TETRAHYDRIDE

TRADE NAMES/SYNONYMS:
MTG MSDS 47; GERMANE; MONOGERMANE; GERMANOMETHANE; GERMANIUM HYDRIDE; GeH4; UN 2192; MAT10400; RTECS LY4900000

CHEMICAL FAMILY: hydrides

PRODUCT USE: industrial

CREATION DATE: Jan 24 1989
REVISION DATE: Dec 11 2008

2. COMPOSITION, INFORMATION ON INGREDIENTS

COMPONENT: GERMANIUM TETRAHYDRIDE
CAS NUMBER: 7782-65-2
PERCENTAGE: 100.0

3. HAZARDS IDENTIFICATION

NFPA RATINGS (SCALE 0-4): HEALTH=4 FIRE=4 REACTIVITY=3

EMERGENCY OVERVIEW:
COLOR: colorless
PHYSICAL FORM: gas
ODOR: pungent odor, garlic odor

MAJOR HEALTH HAZARDS: potentially fatal if inhaled, skin irritation, eye irritation

PHYSICAL HAZARDS: May explode when heated. Flammable gas. May cause flash fire. May ignite spontaneously on exposure to air.

POTENTIAL HEALTH EFFECTS:
INHALATION:
SHORT TERM EXPOSURE: potentially fatal if inhaled, chills, fever, changes in blood pressure, nausea, vomiting, diarrhea, stomach pain, difficulty breathing, headache, drowsiness, dizziness, bluish skin color, lung congestion, blood disorders, kidney damage, liver damage
LONG TERM EXPOSURE: blood disorders, kidney damage
SKIN CONTACT:
SHORT TERM EXPOSURE: irritation, frostbite
LONG TERM EXPOSURE: same as effects reported in short term exposure
EYE CONTACT:
SHORT TERM EXPOSURE: irritation, frostbite
LONG TERM EXPOSURE: same as effects reported in short term exposure
INGESTION:
SHORT TERM EXPOSURE: ingestion of a gas is unlikely
LONG TERM EXPOSURE: ingestion of a gas is unlikely

4. FIRST AID MEASURES

INHALATION: If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. Get immediate medical attention.

SKIN CONTACT: If frostbite or freezing occur, immediately flush with plenty of lukewarm water (105-115 F; 41-46 C). DO NOT USE HOT WATER. If warm water is not available, gently wrap affected parts in blankets. Get immediate medical attention.

EYE CONTACT: Flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention.

INGESTION: If a large amount is swallowed, get medical attention.

5. FIRE FIGHTING MEASURES

FIRE AND EXPLOSION HAZARDS: Severe fire hazard. May ignite on exposure to air.

EXTINGUISHING MEDIA: Let burn unless leak can be stopped immediately. Large fires: Use regular foam or flood with fine water spray.

FIRE FIGHTING: Move container from fire area if it can be done without risk. Cool containers with water spray until well after the fire is out. Stay away from the ends of tanks. For fires in cargo or storage area: Cool containers with water from unmanned hose holder or monitor nozzles until well after fire is out. If this is impossible then take the following precautions: Keep unnecessary people away, isolate hazard area and deny entry. Let the fire burn. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tanks due to fire. For tank, rail car or tank truck: Evacuation radius: 800 meters (1/2 mile).

FIRE FIGHTING PROTECTIVE EQUIPMENT: Wear full protective fire fighting gear including self...
contained breathing apparatus (SCBA) for protection against possible exposure.

**FLASH POINT:** flammable
**LOWER FLAMMABLE LIMIT:** Not available
**UPPER FLAMMABLE LIMIT:** Not available
**AUTOIGNITION:** 68 F (20 C)

**HAZARDOUS COMBUSTION PRODUCTS:**
Thermal decomposition or combustion products: oxides of germanium

### 6. ACCIDENTAL RELEASE MEASURES

**OCCUPATIONAL RELEASE:**

### 7. HANDLING AND STORAGE

**STORAGE:** Store and handle in accordance with all current regulations and standards. Avoid contact with air. Protect from sunlight. Store in a well-ventilated area. Keep container tightly closed. Subject to storage regulations: U.S. OSHA 29 CFR 1910.101. Keep separated from incompatible substances.

**HANDLING:** Handle this material only in a sealed, purged system. Do not heat cylinder by any means to increase discharge rate of product from the cylinder. If subject to temperature greater than 24 C container may become pressurized which increases the risk of leakage and possible exposure to toxic gas. Keep away from heat, sparks and flame. Do not breathe gas, fumes, vapor, or spray. When using, do not eat, drink or smoke. Wash thoroughly after handling.

### 8. EXPOSURE CONTROLS, PERSONAL PROTECTION

**EXPOSURE LIMITS:**
**GERMANIUM TETRAHYDRIDE:**
0.2 ppm (0.6 mg/m3) OSHA TWA (vacated by 58 FR 35338, June 30, 1993)
0.2 ppm ACGIH TWA
0.2 ppm (0.6 mg/m3) NIOSH recommended TWA 10 hour(s)

**VENTILATION:** Provide local exhaust or process enclosure ventilation system. Ventilation equipment should be explosion-resistant if explosive concentrations of material are present. Provide local exhaust ventilation system. Ensure compliance with applicable exposure limits.

**EYE PROTECTION:** Wear splash resistant safety goggles with a faceshield. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.
CLOTHING: Wear appropriate chemical resistant clothing. For the liquid: Wear appropriate protective, cold insulating clothing.

GLOVES: Wear chemical resistant, insulated gloves.

RESPIRATOR: Under conditions of frequent use or heavy exposure, respiratory protection may be needed. Respiratory protection is ranked in order from minimum to maximum. Consider warning properties before use.

For Unknown Concentrations or Immediately Dangerous to Life or Health -
Any supplied-air respirator with a full facepiece that is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive-pressure mode.
Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode.

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE: gas
COLOR: colorless
ODOR: pungent odor, garlic odor
MOLECULAR WEIGHT: 76.62
MOLECULAR FORMULA: Ge-H4
BOILING POINT: -128 F (-89 C)
FREEZING POINT: -265 F (-165 C)
DECOMPOSITION POINT: 536 F (280 C)
VAPOR PRESSURE: 760 mmHg @ -89 C
VAPOR DENSITY (air=1): 2.6
SPECIFIC GRAVITY (water=1): 1.532 @ -142 C
DENSITY: 3.43 g/L
WATER SOLUBILITY: insoluble
PH: Not applicable
VOLATILITY: Not applicable
ODOR THRESHOLD: Not available
EVAPORATION RATE: Not applicable
VIScosity: Not available
COEFFICIENT OF WATER/OIL DISTRIBUTION: Not applicable
SOLVENT SOLUBILITY:
Soluble: liquid ammonia

10. STABILITY AND REACTIVITY

REACTIVITY: May ignite on exposure to air.
CONDITIONS TO AVOID: Avoid contact with air. Avoid heat, flames, sparks and other sources of ignition. Minimize contact with material. Avoid inhalation of material or combustion by-products. Keep out of water supplies and sewers.

INCOMPATIBILITIES: halogens, air

HAZARDOUS DECOMPOSITION:
Thermal decomposition or combustion products: oxides of germanium
Thermal decomposition products or contact with water or moisture: hydrogen
Thermal decomposition products: hydrogen

POLYMERIZATION: Will not polymerize.

11. TOXICOLOGICAL INFORMATION

GERMANIUM TETRAHYDRIDE:
TOXICITY DATA: 1380 mg/m³ inhalation-rat LC50; 1250 mg/kg oral-mouse LD50
LOCAL EFFECTS:
Irritant: skin, eye
ACUTE TOXICITY LEVEL:
Highly Toxic: inhalation
Moderately Toxic: ingestion
TARGET ORGANS: central nervous system, kidneys, blood
MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: blood system disorders, kidney disorders, liver disorders

12. ECOLOGICAL INFORMATION

ECOTOXICITY DATA:
FISH TOXICITY: No data available.
INVERTEBRATE TOXICITY: No data available.
ALGAL TOXICITY: No data available.
FATE AND TRANSPORT:
BIODEGRADATION: No data available.

13. DISPOSAL CONSIDERATIONS

Dispose in accordance with all applicable regulations. Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): D001. D003.
14. TRANSPORT INFORMATION

U.S. DOT 49 CFR 172.101:
PROPER SHIPPING NAME: Germane
ID NUMBER: UN2192
HAZARD CLASS OR DIVISION: 2.3
LABELING REQUIREMENTS: 2.3; 2.1
QUANTITY LIMITATIONS:
PASSENGER AIRCRAFT OR RAILCAR: Forbidden
CARGO AIRCRAFT ONLY: Forbidden
ADDITIONAL SHIPPING DESCRIPTION: Toxic-Inhalation Hazard Zone B

CANADIAN TRANSPORTATION OF DANGEROUS GOODS:
SHIPPING NAME: Germane
UN NUMBER: UN2192
CLASS: 2.3; 2.1

15. REGULATORY INFORMATION

U.S. REGULATIONS:
CERCLA SECTIONS 102a/103 HAZARDOUS SUBSTANCES (40 CFR 302.4): Not regulated.


SARA TITLE III SARA SECTIONS 311/312 HAZARDOUS CATEGORIES (40 CFR 370 Subparts B and C):
ACUTE: Yes
CHRONIC: Yes
FIRE: Yes
REACTIVE: Yes
SUDDEN RELEASE: Yes


STATE REGULATIONS:
California Proposition 65: Not regulated.

CANADIAN REGULATIONS:
WHMIS CLASSIFICATION: A, B6, D1A.

NATIONAL INVENTORY STATUS:
U.S. INVENTORY (TSCA): Listed on inventory.

TSCA 12(b) EXPORT NOTIFICATION: Not listed.

CANADA INVENTORY (DSL/NDSL): Not determined.

16. OTHER INFORMATION

“RTECS®” is a United States trademark owned and licensed under authority of the U.S. Government, by and through Symyx Software, Inc. Portions ©Copyright 2001, U.S. Government. All rights reserved.

©Copyright 1984-2009 ChemADVISOR, Inc. All rights reserved.

MATHESON TRI-GAS, INC. MAKES NO EXPRESS OR IMPLIED WARRANTIES, GUARANTEES OR REPRESENTATIONS REGARDING THE PRODUCT OR THE INFORMATION HEREIN, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR USE. MATHESON TRI-GAS, INC. SHALL NOT BE LIABLE FOR ANY PERSONAL INJURY, PROPERTY OR OTHER DAMAGES OF ANY NATURE, WHETHER COMPENSATORY, CONSEQUENTIAL, EXEMPLARY, OR OTHERWISE, RESULTING FROM ANY PUBLICATION, USE OR RELIANCE UPON THE INFORMATION HEREIN.