Section 1 - PRODUCT AND COMPANY IDENTIFICATION

Material Name
TUNGSTEN HEXAFLUORIDE

Synonyms
MTG MSDS 85; TUNGSTEN FLUORIDE (WF6); WOLFRAM HEXAFLUORIDE; HEXAFLUOROTUNGSTEN; TUNGSTEN(6+) FLUORIDE; TUNGSTEN HEXAFLUORIDE (WF6); TUNGSTEN VI FLUORIDE; TUNGSTEN FLUORIDE; UN 2196; F6W

Chemical Family
Fluoride, inorganic, metal

Product Use
Industrial and Specialty Gas Applications.

Restrictions on Use
None known.

Details of the supplier of the safety data sheet
MATHESON TRI-GAS, INC.
150 Allen Road, Suite 302
Basking Ridge, NJ 07920
General Information: 1-800-416-2505
Emergency #: 1-800-424-9300 (CHEMTREC)
Outside the US: 703-527-3887 (Call collect)

Section 2 - HAZARDS IDENTIFICATION

Classification in accordance with paragraph (d) of 29 CFR 1910.1200.
Gases Under Pressure - Liquefied gas
Acute Toxicity - Inhalation - Gas - Category 2
Skin Corrosion/Irritation - Category 1
Serious Eye Damage/Eye Irritation - Category 1
Specific target organ toxicity - Repeated exposure - Category 1

GHS Label Elements
Symbol(s)

Signal Word
Danger

Hazard Statement(s)
Contains gas under pressure; may explode if heated.
Fatal if inhaled.
Causes severe skin burns and eye damage.
Causes damage to organs through prolonged or repeated exposure. (bones )

Precautionary Statement(s)
Prevention
Do not breathe gas.
Use only outdoors or in a well-ventilated area.
Safety Data Sheet

Material Name: TUNGSTEN HEXAFLUORIDE

In case of inadequate ventilation wear respiratory protection.
Do not eat, drink or smoke when using this product.
Wear protective gloves/protective clothing/eye protection/face protection.
Wash thoroughly after handling.

Response
IF INHALED.
Remove person to fresh air and keep comfortable for breathing.
Immediately call a POISON CENTER or doctor/physician.
Specific treatment is urgent, see first aid section of Safety Data Sheet.
IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
Immediately call a POISON CENTER or doctor/physician.
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do.
Continue rinsing.
Immediately call a POISON CENTER or doctor/physician.
IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
Immediately call a POISON CENTER or doctor/physician.

Storage
Protect from sunlight. Store in a well-ventilated place.
Keep container tightly closed.
Store locked up.

Disposal
Dispose in accordance with all applicable regulations.

Other Hazards
May cause frostbite upon sudden release of liquefied gas.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>CAS</th>
<th>Component Name</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>7783-82-6</td>
<td>Tungsten hexafluoride</td>
<td>100</td>
</tr>
</tbody>
</table>

Section 4 - FIRST AID MEASURES

Inhalation
If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention.

Skin
Wash skin with soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get immediate medical attention. Thoroughly clean and dry contaminated clothing before reuse. 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.

Eyes
Immediately flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention.

Ingestion
Do NOT induce vomiting. Rinse mouth. Get immediate medical attention.

Most Important Symptoms/Effects
Acute
frostbite, respiratory tract burns, skin burns, eye burns, mucous membrane burns
Delayed
bone damage

Note to Physicians
Section 5 - FIRE FIGHTING MEASURES

Extinguishing Media
Suitable Extinguishing Media
carbon dioxide, regular dry chemical. Large fires: Use regular foam or flood with fine water spray.

Unsuitable Extinguishing Media
None known.

Special Hazards Arising from the Chemical
Containers may rupture or explode if exposed to heat.

Hazardous Combustion Products
Hydrogen fluoride, tungsten compounds

Fire Fighting Measures
Do not get water inside container. Move container from fire area if it can be done without risk. Cool containers with water spray until well after the fire is out. Do not direct water at source of leak or safety devices; icing may occur. Stay away from the ends of tanks. Keep unnecessary people away, isolate hazard area and deny entry. Flood with fine water spray. Apply water from a protected location or from a safe distance. For tank, rail car or tank truck, evacuation radius: 1600 meters (1 mile). Avoid inhalation of material or combustion by-products. Stay upwind and keep out of low areas. Consider downwind evacuation if material is leaking.

Special Protective Equipment and Precautions for Firefighters
Wear full protective fire fighting gear including self contained breathing apparatus (SCBA) for protection against possible exposure.

Section 6 - ACCIDENTAL RELEASE MEASURES

Personal Precautions, Protective Equipment and Emergency Procedures
Wear personal protective clothing and equipment, see Section 8.

Methods and Materials for Containment and Cleaning Up
Fully encapsulating, vapor protective clothing should be worn for spills and leaks with no fire. Do not touch or walk through spilled material. Stop leak if possible without personal risk. If possible, turn leaking containers so that gas escapes rather than liquid. Prevent entry into waterways, sewers, basements, or confined areas. Do not direct water at spill or source of leak. Do not get water directly on material. Use water spray to reduce vapors or divert vapor cloud drift. Isolate area until gas has dispersed.

Environmental Precautions
Avoid release to the environment.

Section 7 - HANDLING AND STORAGE

Precautions for Safe Handling
Damaged cylinders should be handled only by specialists. Do not breathe gas. Use only outdoors or in a well-ventilated area. In case of inadequate ventilation wear respiratory protection. Do not eat, drink or smoke when using this product. Wear protective gloves/clothing and eye/face protection. Wash hands thoroughly after handling.

Conditions for Safe Storage, Including any Incompatibilities
Protect from sunlight. Store in a well-ventilated place. Keep container tightly closed. Store locked up.

Store and handle in accordance with all current regulations and standards. Store in a cool, dry place. Store in a well-ventilated area. Protect from sunlight. Keep locked up. Do not puncture or burn containers, even when empty. Store below 52 C. Keep separated from incompatible substances.

Incompatible Materials
Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

Component Exposure Limits

<table>
<thead>
<tr>
<th>Component</th>
<th>Exposure Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tungsten hexafluoride 7783-82-6</td>
<td>2.5 mg/m³ TWA as F (related to Fluorides)</td>
</tr>
<tr>
<td>ACGIH:</td>
<td>2.5 mg/m³ TWA as F (related to Fluorides)</td>
</tr>
<tr>
<td>NIOSH:</td>
<td>250 mg/m³ IDLH as F (related to Fluorides)</td>
</tr>
<tr>
<td>OSHA (US):</td>
<td>2.5 mg/m³ TWA as F (related to Fluorides)</td>
</tr>
<tr>
<td>Mexico:</td>
<td>2.5 mg/m³ TWA VLE-PPT as F (related to Fluorides)</td>
</tr>
</tbody>
</table>

ACGIH - Threshold Limit Values - Biological Exposure Indices (BEI)

Tungsten hexafluoride (7783-82-6)

2 mg/l Medium: urine Time: prior to shift Parameter: Fluoride (background, nonspecific ); 3 mg/l Medium: urine Time: end of shift Parameter: Fluoride (background, nonspecific ) (related to Fluorides)

Engineering Controls

Provide local exhaust or process enclosure ventilation system. Ensure compliance with applicable exposure limits.

Individual Protection Measures, such as Personal Protective Equipment

Eye/face protection

Wear splash resistant safety goggles with a faceshield. Contact lenses should not be worn. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

Skin Protection

For the gas: Wear appropriate chemical resistant clothing. For the liquid: Wear appropriate protective, cold insulating clothing.

Respiratory Protection

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. 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.

Glove Recommendations

Wear insulated gloves.

Protective Materials

Rubber

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>colorless to yellow liquefied gas</td>
</tr>
<tr>
<td>Physical State</td>
<td>gas</td>
</tr>
<tr>
<td>Odor</td>
<td>pungent odor</td>
</tr>
<tr>
<td>Color</td>
<td>colorless or yellow</td>
</tr>
<tr>
<td>Odor Threshold</td>
<td>Not available</td>
</tr>
<tr>
<td>pH</td>
<td>Not available</td>
</tr>
<tr>
<td>Melting Point</td>
<td>2 - 3 °C (36 - 37 °F )</td>
</tr>
<tr>
<td>Boiling Point</td>
<td>18 - 20 °C (64 - 68 °F )</td>
</tr>
<tr>
<td>Property</td>
<td>Value</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>--------------------------------------------</td>
</tr>
<tr>
<td>Boiling Point Range</td>
<td>Not available</td>
</tr>
<tr>
<td>Freezing point</td>
<td>Not available</td>
</tr>
<tr>
<td>Evaporation Rate</td>
<td>Not available</td>
</tr>
<tr>
<td>Flammability (solid, gas)</td>
<td>Not flammable</td>
</tr>
<tr>
<td>Autoignition Temperature</td>
<td>Not available</td>
</tr>
<tr>
<td>Flash Point</td>
<td>(Not flammable)</td>
</tr>
<tr>
<td>Lower Explosive Limit</td>
<td>Not available</td>
</tr>
<tr>
<td>Decomposition temperature</td>
<td>Not available</td>
</tr>
<tr>
<td>Upper Explosive Limit</td>
<td>Not available</td>
</tr>
<tr>
<td>Vapor Pressure</td>
<td>863 mmHg @ 21 °C</td>
</tr>
<tr>
<td>Vapor Density (air=1)</td>
<td>10.6</td>
</tr>
<tr>
<td>Specific Gravity (water=1)</td>
<td>Not available</td>
</tr>
<tr>
<td>Water Solubility</td>
<td>( Decomposes, Reacts )</td>
</tr>
<tr>
<td>Partition coefficient: n-octanol/water</td>
<td>Not available</td>
</tr>
<tr>
<td>Viscosity</td>
<td>0.01754 cp</td>
</tr>
<tr>
<td>Kinematic viscosity</td>
<td>Not available</td>
</tr>
<tr>
<td>Solubility (Other)</td>
<td>Not available</td>
</tr>
<tr>
<td>Change in color</td>
<td>deliquescent, hygroscopic</td>
</tr>
<tr>
<td>Density</td>
<td>12.9 g/L</td>
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<tr>
<td>Physical Form</td>
<td>liquefied gas</td>
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<tr>
<td>Molecular Formula</td>
<td>F6-W</td>
</tr>
<tr>
<td>Molecular Weight</td>
<td>297.84</td>
</tr>
<tr>
<td>Critical Temperature</td>
<td>444 K</td>
</tr>
</tbody>
</table>

Solvent Solubility
Soluble
alkali, carbon disulfide, Hydrogen fluoride

**Section 10 - STABILITY AND REACTIVITY**

**Reactivity**
Reacts violently with water to generate toxic and/or flammable gases.

**Chemical Stability**
Reacts violently with water.

**Possibility of Hazardous Reactions**
Will not polymerize.

**Conditions to Avoid**
Minimize contact with material. Avoid inhalation of material or combustion by-products. Containers may rupture or explode if exposed to heat.

**Incompatible Materials**
Acids, combustible materials, metals, reducing agents, Water

**Hazardous decomposition products**
Hydrogen fluoride, tungsten compounds

**Water or Moisture**
Hydrogen fluoride, tungsten compounds

**Section 11 - TOXICOLOGICAL INFORMATION**

**Information on Likely Routes of Exposure**
Safety Data Sheet

Material Name: TUNGSTEN HEXAFLUORIDE

Inhalation
burns

Skin Contact
burns, frostbite

Eye Contact
burns

Ingestion
burns

Acute and Chronic Toxicity

Component Analysis - LD50/LC50
The components of this material have been reviewed in various sources and no selected endpoints have been identified.

Product Toxicity Data

Acute Toxicity Estimate
No data available.

Immediate Effects
frostbite, respiratory tract burns, skin burns, eye burns, mucous membrane burns

Delayed Effects
bone damage

Irritation/Corrosivity Data
respiratory tract burns, skin burns, eye burns, mucous membrane burns

Respiratory Sensitization
No data available.

Dermal Sensitization
No data available.

Component Carcinogenicity

<table>
<thead>
<tr>
<th>Tungsten hexafluoride</th>
<th>7783-82-6</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACGIH:</td>
<td>A4 - Not Classifiable as a Human Carcinogen (related to Fluorides)</td>
</tr>
</tbody>
</table>

Germ Cell Mutagenicity
No data available.

Tumorigenic Data
No data available

Reproductive Toxicity
No data available.

Specific Target Organ Toxicity - Single Exposure
No target organs identified.

Specific Target Organ Toxicity - Repeated Exposure
bones

Aspiration hazard
Not applicable.

Medical Conditions Aggravated by Exposure
central nervous system disorders, bone, joint or tooth disorders, eye disorders, kidney disorders, respiratory disorders, skin disorders and allergies

Additional Data
May cross the placenta. May be excreted in breast milk.
Section 12 - ECOLOGICAL INFORMATION

Component Analysis - Aquatic Toxicity
No LOLI ecotoxicity data are available for this product's components.

Persistence and Degradability
Will decompose on contact with water to form hydrogen fluoride.

Bioaccumulative Potential
No data available.

Mobility
No data available.

Other Toxicity
No additional information is available.

Section 13 - DISPOSAL CONSIDERATIONS

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

Component Waste Numbers
The U.S. EPA has not published waste numbers for this product's components.

Section 14 - TRANSPORT INFORMATION

US DOT Information:
Shipping Name: TUNGSTEN HEXAFLUORIDE
Hazard Class: 2.3
UN/NA #: UN2196
Required Label(s): 2.3 8

IMDG Information:
Shipping Name: TUNGSTEN HEXAFLUORIDE
Hazard Class: 2.3
UN#: UN2196
Required Label(s): 2.3 8

International Bulk Chemical Code
This material does not contain any chemicals required by the IBC Code to be identified as dangerous chemicals in bulk.

Section 15 - REGULATORY INFORMATION

U.S. Federal Regulations
None of this product's components are listed under SARA Sections 302/304 (40 CFR 355 Appendix A), SARA Section 313 (40 CFR 372.65), CERCLA (40 CFR 302.4), TSCA 12(b), or require an OSHA process safety plan.

SARA Section 311/312 (40 CFR 370 Subparts B and C) reporting categories
Gas Under Pressure; Acute toxicity; Skin Corrosion/Irritation; Serious Eye Damage/Eye Irritation; Specific Target Organ Toxicity

U.S. State Regulations
The following components appear on one or more of the following state hazardous substances lists:

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS</th>
<th>CA</th>
<th>MA</th>
<th>MN</th>
<th>NJ</th>
<th>PA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tungsten hexafluoride</td>
<td>7783-82-6</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

California Safe Drinking Water and Toxic Enforcement Act (Proposition 65)
Section 16 - OTHER INFORMATION

NFPA Ratings
Health: 3 Fire: 0 Instability: 2
Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe

Summary of Changes
Updated: 05/01/2015

Key / Legend
ACGIH - American Conference of Governmental Industrial Hygienists; ADR - European Road Transport; AU - Australia; BOD - Biochemical Oxygen Demand; C - Celsius; CA - Canada; CA/MA/MN/NJ/PA - California/Massachusetts/Minnesota/New Jersey/Pennsylvania*; CAS - Chemical Abstracts Service; CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act; CFR - Code of Federal Regulations (US); CLP - Classification, Labelling, and Packaging; CN - China; CPR - Controlled Products Regulations; DFG - Deutsche Forschungsgemeinschaft; DOT - Department of Transportation; DSD - Dangerous Substance Directive; DSL - Domestic Substances List; EC – European Commission; EEC - European Economic Community; EIN - European Inventory of (Existing Commercial Chemical Substances); EINECS - European Inventory of Existing Commercial Chemical Substances; ENCS - Japan Existing and New Chemical Substance Inventory; EPA - Environmental Protection Agency; EU - European Union; F - Fahrenheit; F - Background (for Venezuela Biological Exposure Indices); IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; ICAO - International Civil Aviation Organization; IDL - Ingredient Disclosure List; IDLH - Immediately Dangerous to Life and Health; IMDG - International Maritime Dangerous Goods; ISHL - Japan Industrial Safety and Health Law; IUCLID - International Uniform Chemical Information Database; JP - Japan; Kow - Octanol/water partition coefficient; KR KECI Annex 1 - Korea Existing Chemicals Inventory (KECI) / Korea Existing Chemicals List (KECL); KR KECI Annex 2 - Korea Existing Chemicals Inventory (KECI) / Korea Existing Chemicals List (KECL); KR - Korea; LD50/LC50 - Lethal Dose/ Lethal Concentration; LEL - Lower Explosive Limit; LLV - Level Limit Value; LOEL - List Of Lists™ - ChemADVISOR’s Regulatory Database; MAK - Maximum Concentration Value in the Workplace; MEL - Maximum Exposure Limits; MX - Mexico; Ne- Non-specific; NFPA - National Fire Protection Agency; NIOSH - National Institute for Occupational Safety and Health;
Safety Data Sheet

Material Name: TUNGSTEN HEXAFLUORIDE

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