Safety Data Sheet

Material Name: CARBONYL FLUORIDE

Section 1 - PRODUCT AND COMPANY IDENTIFICATION

Material Name
CARBONYL FLUORIDE

Synonyms
MTG MSDS 20: CARBONIC DIFLUORIDE; CARBON DIFLUORIDE OXIDE; CARBON FLUORIDE OXIDE; CARBON OXYFLUORIDE; CARBONYL DIFLUORIDE; FLUOROPHOSGENE; DIFLUOROFORMALDEHYDE; DIFLUOROOXOMETHANE; DIFLUOROPHOSGENE; FLUOROFORMYL FLUORIDE

Chemical Family
carbonyls

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 - Single exposure - Category 1 ( lungs. )
Specific target organ toxicity - Repeated exposure - Category 1 ( kidneys , skeletal system. )

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. ( lungs )
Causes damage to organs through prolonged or repeated exposure. ( kidneys , skeletal system )

Precautionary Statement(s)
Prevention
Safety Data Sheet

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Do not breathe gas.
Use only outdoors or in a well-ventilated area.
Wear respiratory protection.
Wash thoroughly after handling.
Wear protective gloves/protective clothing/eye protection/face protection.
Do not eat, drink or smoke when using this product.

Response
IF exposed.
Call a POISON CENTER or doctor/physician.
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.
Wash contaminated clothing before reuse.
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
Rapid release of compressed gas may cause frostbite.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>CAS</th>
<th>Component Name</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>353-50-4</td>
<td>CARBONYL FLUORIDE</td>
<td>100.0</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
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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. Destroy contaminated shoes.

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

Ingestion
If swallowed, get medical attention.

Most Important Symptoms/Effects

Acute
respiratory tract burns, skin burns, eye burns, frostbite, lung damage

Delayed
fluorosis, kidney damage

Note to Physicians
For inhalation, consider oxygen.

Section 5 - FIRE FIGHTING MEASURES

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

Unsuitable Extinguishing Media
None known.

Special Hazards Arising from the Chemical
Negligible fire hazard.

Hazardous Combustion Products
oxides of fluoride.

Fire Fighting Measures
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. 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). Use extinguishing agents appropriate for surrounding fire. Cool containers with water spray until well after the fire is out. Apply water from a protected location or from a safe distance. Do not get water directly on material. Reduce vapors with water spray. 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
Keep unnecessary people away, isolate hazard area and deny entry. Stay upwind and keep out of low areas. Stop leak if possible without personal risk.

Environmental Precautions
Avoid release to the environment.

Section 7 - HANDLING AND STORAGE

Precautions for Safe Handling
Do not breathe gas. Use only outdoors or in a well-ventilated area. Wear respiratory protection. Wash thoroughly after handling. Wear protective gloves and eye/face protection. Do not eat, drink or smoke when using this product.
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. Keep separated from incompatible substances.

Incompatible Materials
amines

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

Component Exposure Limits

<table>
<thead>
<tr>
<th>Component</th>
<th>Exposure Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>CARBONYL FLUORIDE</td>
<td>353-50-4</td>
</tr>
<tr>
<td>ACGIH:</td>
<td>2 ppm TWA</td>
</tr>
<tr>
<td></td>
<td>5 ppm STEL</td>
</tr>
<tr>
<td>NIOSH:</td>
<td>2 ppm TWA ; 5 mg/m3 TWA</td>
</tr>
<tr>
<td></td>
<td>5 ppm STEL ; 15 mg/m3 STEL</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 ppm TWA [VLE-PPT ]</td>
</tr>
<tr>
<td></td>
<td>5 ppm STEL [PPT-CT ]</td>
</tr>
</tbody>
</table>

ACGIH - Threshold Limit Values - Biological Exposure Indices (BEI)
CARBONYL FLUORIDE (353-50-4)
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. Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode. 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.

Glove Recommendations
For the gas: Wear appropriate chemical resistant gloves. For the liquid: Wear insulated gloves.

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### Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>colorless gas</td>
<td>Physical State</td>
<td>gas</td>
</tr>
<tr>
<td>Odor</td>
<td>pungent odor</td>
<td>Color</td>
<td>colorless</td>
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<tr>
<td>Odor Threshold</td>
<td>Not available</td>
<td>pH</td>
<td>Not available</td>
</tr>
<tr>
<td>Melting Point</td>
<td>-114 °C (-173 °F)</td>
<td>Boiling Point</td>
<td>-83 °C (-117 °F)</td>
</tr>
<tr>
<td>Boiling Point Range</td>
<td>Not available</td>
<td>Freezing point</td>
<td>Not available</td>
</tr>
<tr>
<td>Evaporation Rate</td>
<td>Not available</td>
<td>Flammability (solid, gas)</td>
<td>Not available</td>
</tr>
<tr>
<td>Autoignition Temperature</td>
<td>Not available</td>
<td>Flash Point</td>
<td>Not available</td>
</tr>
<tr>
<td>Lower Explosive Limit</td>
<td>Not available</td>
<td>Decomposition temperature</td>
<td>Not available</td>
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<tr>
<td>Upper Explosive Limit</td>
<td>Not available</td>
<td>Vapor Pressure</td>
<td>Not available</td>
</tr>
<tr>
<td>Vapor Density (air=1)</td>
<td>Not available</td>
<td>Specific Gravity (water=1)</td>
<td>1.139 at -114 °C</td>
</tr>
<tr>
<td>Water Solubility</td>
<td>(hygroscopic, Decomposes)</td>
<td>Partition coefficient: n-octanol/water</td>
<td>Not available</td>
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<tr>
<td>Viscosity</td>
<td>Not available</td>
<td>Kinematic viscosity</td>
<td>Not available</td>
</tr>
<tr>
<td>Solubility (Other)</td>
<td>Not available</td>
<td>Density</td>
<td>Not available</td>
</tr>
<tr>
<td>Physical Form</td>
<td>gas</td>
<td>Molecular Formula</td>
<td>C-F2-O</td>
</tr>
<tr>
<td>Molecular Weight</td>
<td>66.01</td>
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</tr>
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</table>

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### Section 10 - STABILITY AND REACTIVITY

**Reactivity**
Contact with water or moist air may generate flammable and/or toxic gases.

**Chemical Stability**
May decompose on contact with water or moist air.

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

**Conditions to Avoid**
Protect from physical damage and heat. Containers may rupture or explode if exposed to heat.

**Incompatible Materials**
amines
Material Name: CARBONYL FLUORIDE  
SDS ID: MAT04320

Hazardous decomposition products
miscellaneous decomposition products; hydrogen fluoride

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Section 11 - TOXICOLOGICAL INFORMATION

Information on Likely Routes of Exposure

Inhalation
Fatally if inhaled. Burns, vomiting, chest pain, difficulty breathing, dizziness, bluish skin color, lung congestion

Skin Contact
Blisters, frostbite burns.

Eye Contact
Frostbite, blurred vision burns.

Ingestion
Frostbite

Acute and Chronic Toxicity

Component Analysis - LD50/LC50
The components of this material have been reviewed in various sources and the following selected endpoints are published:

CARBONYL FLUORIDE (353-50-4)
Inhalation LC50 Rat 360 ppm 1 h

Product Toxicity Data

Acute Toxicity Estimate
No data available.

Immediate Effects
Respiratory tract burns, skin burns, eye burns, frostbite, lung damage

Delayed Effects
Fluorosis, kidney damage

Irritation/Corrosivity Data
Eye burns, skin burns, respiratory tract burns

Respiratory Sensitization
No data available.

Dermal Sensitization
No data available.

Component Carcinogenicity

<table>
<thead>
<tr>
<th>CARBONYL FLUORIDE</th>
<th>353-50-4</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
Respiratory system, Skin, Eye, lungs

Specific Target Organ Toxicity - Repeated Exposure
Kidneys, skeletal system

Aspiration hazard
Not applicable.
Medical Conditions Aggravated by Exposure
None known.

Section 12 - ECOLOGICAL INFORMATION
Component Analysis - Aquatic Toxicity
No LOLI ecotoxicity data are available for this product's components.
Persistence and Degradability
Readily hydrolyzes to form hydrogen fluoride.
Bioaccumulative Potential
No data available.
Mobility
No data available.

Section 13 - DISPOSAL CONSIDERATIONS
Disposal Methods
Dispose in accordance with all applicable regulations.
Component Waste Numbers

<table>
<thead>
<tr>
<th>CARBONYL FLUORIDE</th>
<th>353-50-4</th>
<th>Series</th>
</tr>
</thead>
<tbody>
<tr>
<td>RCRA:</td>
<td>waste number U033 (Reactive waste, Toxic waste )</td>
<td>U</td>
</tr>
</tbody>
</table>

Section 14 - TRANSPORT INFORMATION
US DOT Information:
Shipping Name: CARBONYL FLUORIDE
Hazard Class: 2.3
UN/NA #: UN2417
Required Label(s): 2.3

IMDG Information:
Shipping Name: CARBONYL FLUORIDE
Hazard Class: 2.3
UN#: UN2417
Required Label(s): 2.3

TDG Information:
Shipping Name: CARBONYL FLUORIDE
Hazard Class: 2.3
UN#: UN2417
Required Label(s): 2.3

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
This material contains one or more of the following chemicals required to be identified under SARA Section 302 (40 CFR 355 Appendix A), SARA Section 313 (40 CFR 372.65), CERCLA (40 CFR 302.4), TSCA 12(b), and/or require an OSHA process safety plan.
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SDS ID: MAT04320

<table>
<thead>
<tr>
<th>CARBONYL FLUORIDE</th>
<th>353-50-4</th>
</tr>
</thead>
<tbody>
<tr>
<td>CERCLA:</td>
<td>1000 lb final RQ ; 454 kg final RQ</td>
</tr>
<tr>
<td>TSCA 12b:</td>
<td>Section 5 , 1 % de minimus concentration</td>
</tr>
<tr>
<td>OSHA (safety):</td>
<td>2500 lb TQ</td>
</tr>
</tbody>
</table>

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>CARBONYL FLUORIDE</td>
<td>353-50-4</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

California Safe Drinking Water and Toxic Enforcement Act (Proposition 65)
Not listed under California Proposition 65.

Component Analysis - Inventory
CARBONYL FLUORIDE (353-50-4)

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>EIN</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>KR - REACH CCA</th>
<th>MX</th>
<th>NZ</th>
<th>PH</th>
<th>TH-TECI</th>
<th>TW</th>
<th>VN (Draft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Section 16 - OTHER INFORMATION

NFPA Ratings
Health: 4 Fire: 0 Instability: 1
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
Safety Data Sheet

Material Name: CARBONYL FLUORIDE

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; LOLI - 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; NJTSR - New Jersey Trade Secret Registry; Nq - Non-quantitative; NSL – Non-Domestic Substance List (Canada); NTP - National Toxicology Program; NZ - New Zealand; OSHA - Occupational Safety and Health Administration; PEL- Permissible Exposure Limit; PH - Philippines; RCRA - Resource Conservation and Recovery Act; REACH-Registration, Evaluation, Authorisation, and restriction of Chemicals; RID - European Rail Transport; SARA - Superfund Amendments and Reauthorization Act; Sc - Semi-quantitative; STEL - Short-term Exposure Limit; TCCA - Korea Toxic Chemicals Control Act; TDG - Transportation of Dangerous Goods; TLV - Threshold Limit Value; TSCA - Toxic Substances Control Act; TW – Taiwan; TWA - Time Weighted Average; UEL - Upper Explosive Limit; UN/NA - United Nations /North American; US - United States; VLE - Exposure Limit Value (Mexico); VN (Draft) - Vietnam (Draft); WHMIS - Workplace Hazardous Materials Information System (Canada).

Other Information

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