MATERIAL SAFETY DATA SHEET
1,1,1,2,3,3,3-HEPTAFLUOROPROPAINE

SECTION 1 – PRODUCT AND COMPANY INFORMATION

TRADE NAME : CHEMOR 227®

SYNONYM : HFC-227ea; HFC-227; R-227; Heptafluoropropane; 2-Hydroperfluoropropane; 2-Hydroheptafluoropropane; 2-H-Heptafluoropropane; Propane,1,1,1,2,3,3,3-Heptafluoro-

MOLECULAR FORMULA : CF₃CHFCF₃

CAS NUMBER : 431-89-0

COMPANY : CHEMORI AMERICAS LLC
16180 SW 72nd Avenue,
Portland, Oregon 97224

PRODUCT USE : Fire extinguishing clean agent

PHONE NUMBERS

PRODUCT INFORMATION : 1-800-893-9619 (within USA and Canada)
+1 503-747-7775 (Outside USA and Canada)

EMERGENCY CONTACT - CHEMTREC : 1-800-424-9300 (within USA and Canada)
(FOR CHEMICAL EMERGENCY ONLY) +1 703-527-3887 (Outside USA and Canada)

EMAIL : msds@chemori.com

SECTION 2 – COMPOSITION AND INGREDIENT INFORMATION

<table>
<thead>
<tr>
<th>INGREDIENT NAME</th>
<th>CAS NUMBER</th>
<th>% w/w</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,1,1,2,3,3,3-Heptafluoropropane</td>
<td>431-89-0</td>
<td>≥ 99.96</td>
</tr>
</tbody>
</table>
SECTION 3 – HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW: Misuse or intentional inhalation abuse can cause suffocation or death. Direct eye or skin contact with the liquid or cold gas can cause chilling or possibly frostbite on exposed tissues.

ACUTE HEALTH EFFECTS

EYE CONTACT: Direct eye contact may induce the symptoms for frostbite or cold burns.

SKIN CONTACT: Direct skin contact may induce the symptoms for frostbite or cold burns.

INHALATION: Inhalation may induce the symptoms of headache, nausea, dizziness, loss of consciousness, or cardiac sensitization (irregular pulse or arrhythmia).

INGESTION: No considered as a potential route of exposure.

CHRONIC HEALTH EFFECTS: Not known.

EFFECTS OF REPEATED EXPOSURE: Persons with cardiac, respiratory, or central nervous system disorders may be susceptible to the effects of an over exposure. The use of epinephrine or sympathomimetic drugs may increase susceptibility to cardiac irregularities upon over exposure.

SECTION 4 – FIRST AID MEASURES

EYE CONTACT: Flush/irigate with fresh water. Seek medical help.

SKIN CONTACT: Flush/irigate with fresh water. Seek medical help if frostbite occurs.

INHALATION: Move to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

INGESTION: No information available.

NOTES TO PHYSICIANS AND FIRST AIDERS: The use of epinephrine or similar compounds can increase susceptibility to heart irregularities caused by over exposure to this compound.

SECTION 5 – FIRE AND EXPLOSION HAZARD

FLASH POINT: Not applicable.

FLAMMABLE LIMIT: Not applicable.

(Air, % by volume)

AUTO – IGNITION TEMPERATURE: Not applicable.

EXTINGUISHING MEDIA: All conventional media are suitable.
UNUSUAL FIRE AND EXPLOSION HAZARDS: Although containers are provided with pressure and temperature relief devices, containers can rupture if exposed to localized heat. Thermal decomposition products may be toxic or corrosive.

SPECIAL FIRE FIGHTING PROCEDURES: Apply water spray from a safe distance to prevent possible container rupture. Use a self-contained breathing apparatus if containers rupture. Thoroughly ventilate affected area to remove product and any decomposition products before allowing re-entry.

PRODUCTS OF COMBUSTION: High temperature in a fire condition or glowing metal surfaces may generate hazardous decomposition products, which include hydrogen fluoride (ACGIH TLV = 3 ppm), carbon monoxide, carbon dioxide, and others.

SECTION 6 – ACCIDENTAL SPILL/RELEASE/LEAK MEASURES

ACCIDENTAL SPILL/RELEASE OR LEAK PROCEDURES: Evacuate and ventilate affected area. Prohibit general entry into areas where high concentrations may exist (especially confined or poorly ventilated areas). Note that the compound vapors are denser than air and thus the concentrations will be higher at lower levels.

PERSONAL PRECAUTIONS: Use appropriate personal protective equipment including self-contained breathing apparatus when entering the affected areas.

SECTION 7 – PRECAUTION IN HANDLING AND STORAGE

HANDLING: Practice precautions as would be used in handling any cryogenic gas.

STORAGE: Store in a cool, dry, well-ventilated area, and separate these products from other incompatible materials. Protect container from possible damage and keep container tightly closed. When use as fire fighting agent in fixed or portable extinguishing systems, follow equipment manufacturer’s instructions for operation, inspection, maintenance, and repair of the system.
SECTION 8 — EXPOSURE CONTROLS AND PERSONAL PROTECTION

VENTILATION : Passive ventilation (windows, doors, etc.) is generally adequate for small areas. Mechanical ventilation for areas used in large storage and filling facilities.

RESPIRATORY PROTECTION : Wear NIOSH/MSHA approved self-contained breathing apparatus.

EYE/FACE & SKIN PROTECTION : Use chemical splash goggles to protect eye & face when handling product. Use cryogenic gloves if handling liquid. Use protective clothing designed to minimize skin contact.

WORK HYGIENIC PRACTICES : Be prudent in confined space. As with all chemical products, wash thoroughly after handling. Wash contaminated clothing before re-use.

SECTION 9 — PHYSICAL AND CHEMICAL CHARACTERISTICS

GENERAL : Colorless, odorless liquefied gas
MOLECULAR WEIGHT : 170.03
BOILING POINT : -16.4°C / 2.48°F
VAPOR PRESSURE @ 21°C/70°F : 58.8 psia
VAPOR DENSITY (AIR=1) : 6.04
WATER REACTIVE : NO
SPECIFIC GRAVITY (H₂O=1) : 1.46
PERCENT VOLATILE (by volume) : No information available.
EVAPORATION RATE (Butyl acetate = 1) : No information available.
VISCOSITY @ 20°C/68°F : No information available.
MELTING POINT : -131°C / -203.8°F
WATER SOLUBILITY @20°C/68°F : 260 mg/L
CRITICAL TEMPERATURE : 101.7°C / 215.1°F
CRITICAL PRESSURE : 422.3 psia

SECTION 10 — STABILITY AND REACTIVITY

CHEMICAL STABILITY : Stable under normal storage condition and temperature.
CONDITIONS TO AVOID : Avoid source of heat and open flame.
INCOMPATIBLE MATERIALS : Strong reducing agent, such as alkali metals (e.g. sodium, potassium), alkali – earth metals (e.g. magnesium, calcium), powdered metals (e.g. aluminum, magnesium or zinc), and most halogenated organic compounds.
HAZARDOUS DECOMPOSITION PRODUCTS: Thermal decomposition may produce hydrogen fluoride, carbon monoxide, and carbon dioxide.

HAZARDOUS POLYMERIZATION: Will not occur.

SECTION 11 – TOXICOLOGICAL INFORMATION

TOXICITY DATA

<table>
<thead>
<tr>
<th>INGREDIENT NAME</th>
<th>TEST</th>
<th>RESULT</th>
<th>ROUTE</th>
<th>SPECIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,1,1,2,3,3,3-Heptafluoropropane</td>
<td>LC₅₀</td>
<td>&gt; 788,698 ppm for 4 hours</td>
<td>Inhalation</td>
<td>Rats</td>
</tr>
</tbody>
</table>

SECTION 12 – ECOLOGICAL INFORMATION

ENVIRONMENTAL FATE

ATMOSPHERIC LIFETIME (IN YEARS) : 34.2 years
OZONE DEPLETION POTENTIAL (R-11 = 1) : 0
GLOBAL WARMING POTENTIAL (CO₂ = 1) : 3,220 for a 100-year time horizon

ECO-TOXICITY

No information available.

SECTION 13 – DISPOSAL CONSIDERATIONS

WASTE DISPOSAL: Product may be reclaimed if not contaminated. All disposals should be in accordance with the local authority having jurisdiction, generally by incineration at an accredited facility with appropriate scrubber and emission control process.

SECTION 14 – TRANSPORT INFORMATION

U.S.DOT

PROPER SHIPPING NAME : Heptafluoropropane or refrigerant gas R-227
HAZARD CLASS : 2.2 Non-flammable gas
UN NUMBER : UN3296
AIR TRANSPORT - ICAO OR IATA

PROPER SHIPPING NAME : Heptafluoropropane or refrigerant gas R-227
HAZARD CLASS : 2.2 Non-flammable gas
UN NUMBER : UN3296

WATER - IMDG

PROPER SHIPPING NAME : Heptafluoropropane or refrigerant gas R-227
HAZARD CLASS : 2.2 Non-flammable gas
UN NUMBER : UN3296

SECTION 15 – REGULATORY INFORMATION

U.S. Federal Regulations

Toxic Substance Control Act (TSCA) Inventory: Listed

SARA Title III Hazard Classifications under Sections 311 and 312

<table>
<thead>
<tr>
<th>Hazard</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fire</td>
<td>No</td>
</tr>
<tr>
<td>Sudden Release of Pressure</td>
<td>No</td>
</tr>
<tr>
<td>Reactive</td>
<td>No</td>
</tr>
<tr>
<td>Acute</td>
<td>Yes</td>
</tr>
<tr>
<td>Chronic</td>
<td>No</td>
</tr>
</tbody>
</table>

SECTION 16 – OTHER INFORMATION

NFPA CODES

HEALTH = 1
FLAMMABILITY = 0
REACTIVITY = 1

HMIS CODES

HEALTH = 1
FLAMMABILITY = 0
REACTIVITY = 0
PROTECTION = x

HAZARD INDEX

0 = MINIMAL HAZARD, 1 = SLIGHT HAZARD, 2 = MODERATE HAZARD, 3 = SERIOUS HAZARD, 4 = SEVERE HAZARD, x = DEPENDING ON THE USE CONDITIONS
NOTICE TO READER

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