Material Safety Data Sheet

Section 1: Chemical Product / Company Identification

Trade name: R-404A
Synonym: HFC 125/HFC 143a/HFC 134a: 44/52/4

Company identification
Manufacturer: DAIKIN FLUOROCHEMICALS (CHINA) CO., LTD.
CHANGSHU INTERNATIONAL CHEMICAL INDUSTRIAL PARK, HAIYU TOWN, CHANGSHU, JIANGSU 215522 CHINA
PHONE: (+86) 512-5232-2266  FAX: (+86) 512-5232-2366

Emergency telephone
Company: +86-512-5232-2266

Section 2: Composition / Information on Ingredients

<table>
<thead>
<tr>
<th>Component</th>
<th>mass %</th>
<th>CAS No.</th>
<th>Symbol</th>
<th>R-phrases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pentafluoroethane</td>
<td>44</td>
<td>354-33-6</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1,1,1-Trifluoroethane</td>
<td>52</td>
<td>420-46-2</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1,1,1,2-Tetrafluoroethane</td>
<td>4</td>
<td>811-97-2</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Section 3: Hazard Identification

None-flammable liquified gas.

Potential Health Effects
High concentrations in the air cause a deficiency of oxygen with the risk of unconsciousness.
Rapidly evaporating liquid may cause frostbite.
Inhalation of the vapour may cause depression of the central nervous system.
Exposure could cause cardiac arrhythmia and asphyxiation.

WARNING:
Toxic gases (such as CO, CO₂, HF, COF₂) will be produced if this product is decomposed by heat.

Section 4: First Aid Measures

Inhalation
Remove to fresh air. Keep warm and at rest.
If breathing has stopped, give artificial respiration.
Use oxygen as required, provided a qualified operator is available.

Skin Contact
Wash with lukewarm water (not hot).
Consult a physician if frostbitten by liquid or if irritation occurs.

Eyes Contact
Flush with plenty of water for at least 15 minutes (remove contact lenses if easily possible).
Consult a physician.

Ingestion
Ingestion is not considered a potential route of exposure.
SECTION 5: Fire-fighting measures

Flammable Properties: Non flammable

Extinguishing Media:
Water Spray, Water Fog, Dry Chemical, Alcohol Foam, Carbon Dioxide.

Fire fighting procedures:
Keep personnel removed and upwind of fire.
Wear self-contained breathing apparatus (SCBA) and full protective equipment.
Water may be used to cool and protect exposed containers.
Stop the flow of gas if possible.

WARNING:
Hazardous decomposition products including carbon dioxide, carbon monoxide, hydrogen fluoride, toxic gases or particles may be formed during combustion. These products may cause severe eye, nose, throat, and lung irritation or toxic effects.

SECTION 6: Accidental release measures

General Information:
Use proper personal protective equipment as indicated in Section 8.
Keep personnel not involved with emergency activities removed and upwind.

Spills/Leaks:
Protected personnel should shut off leak, if without risk, and provide ventilation.
Remove ignition sources if possible.

SECTION 7: Handling and storage

Handling:
Use proper personal protective equipment as indicated in Section 8.
Use in well ventilated areas.
Wash hands thoroughly after handling.
Wash clothing after use.
Exposure to toxic gases through inhalation can occur if smoking tobacco becomes contaminated by this material. Therefore, do not smoke in the work areas and wash hands and face after handling in order to avoid transfer of the material onto smoking tobacco.
Keep away from heat, sparks and flames.

Storage:
Keep containers tightly closed in a cool place away from heat, sparks, and flames.
Do not heat above 40 °C.

SECTION 8: Exposure controls / personal protection

Exposure Guidelines:
Exposure limits
HFC-125; WEEL (AIHA): 1000 ppm, 4900 mg/m³, 8 Hr. TWA
HFC-143a; WEEL (AIHA): 1000 ppm, 8 Hr. TWA
HFC-134a; WEEL (AIHA): 1000 ppm, 8 Hr. TWA

WEEL: Workable Environmental Exposure Limit
AIHA: American Industrial Hygiene Association

Engineering Controls:
Provide local exhaust to prevent accumulation of high concentrations.

Personal Protective Equipment:
Eyes Wear coverall chemical splash goggles.
Clothing Wear impervious gloves, apron, pants, and jacket.
Respirators Wear NIOSH approved respiratory protection, as appropriate.
SECTION 9:  Physical and chemical properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Form</td>
<td>Liquefied gas</td>
</tr>
<tr>
<td>Color</td>
<td>Colorless</td>
</tr>
<tr>
<td>Odor</td>
<td>Characteristic odor</td>
</tr>
<tr>
<td>Boiling point</td>
<td>-46.8 °C</td>
</tr>
<tr>
<td>Vapor pressure</td>
<td>1.25 MPa (12.75 kgf/cm² abs) at 25 °C</td>
</tr>
<tr>
<td>Vapor density</td>
<td>3.4 (air=1)</td>
</tr>
<tr>
<td>Specific gravity</td>
<td>1.043 at 25 °C</td>
</tr>
<tr>
<td>Solubility in water</td>
<td>0.070/100g H₂O at 25 °C</td>
</tr>
<tr>
<td>Flash point</td>
<td>No data</td>
</tr>
<tr>
<td>Autoignition point</td>
<td>No data</td>
</tr>
<tr>
<td>Flammable limits</td>
<td>No</td>
</tr>
</tbody>
</table>

SECTION 10:  Stability and reactivity

Stability:
Stable at room temperature in closed containers under normal storage and handling conditions.

Conditions to avoid: Ignition sources, excess heat.

Incompatibilities: None reasonably foreseeable.

Thermal decomposition products:
Hazardous decomposition products including carbon dioxide, carbon monoxide, hydrogen fluoride, toxic gases or particles may be formed during combustion. These products may cause severe eye, nose, throat, and lung irritation or toxic effects.

Polymerization: Polymerization will not occur.

SECTION 11:  Toxicological information

The blend is untested.

(HFC-125)
Acute toxicity  Inhalation >800,000ppm in rat (4hours ALC)
Subchronic toxicity Inhalation >50,000ppm in rat (90days NOEL)
Generic study  Ames test: negative
Teratogenicity  Not: >50,000ppm in rat and rabbit
Cardiac sensitization Inhalation: 8% for adrenaline in dog
Carcinogenicity  Not listed in ACGIH, NTP, IARC

(HFC143a)
Acute toxicity  Inhalation >540,000ppm in rat (4hours ALC)
Subacute toxicity Inhalation =10,000ppm in rat (6hours/day; 28days NOEL)
Subchronic toxicity Inhalation =40,000ppm in rat (6hours/day; 90days NOEL)
Generic study  Ames test: negative
Micronucleus test: negative
Carcinogenicity  Not listed in ACGIH, NTP, IARC

(HFC134a)
Acute toxicity  Inhalation >500,000ppm in rat (4hours LC50)
Chronic toxicity  Inhalation =10,000ppm in rat (2years NOEL)
Generic study  Ames test: negative
Teratogenicity  Not: =40,000ppm Inhalation in rabbit
Teratogenicity  Not: =40,000ppm Inhalation in rabbit
SECTION 12: Ecological information

<table>
<thead>
<tr>
<th></th>
<th>HFC-125</th>
<th>HFC-143a</th>
<th>HFC-134a</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biodegradation</td>
<td>no</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>Bioaccumulation</td>
<td>no</td>
<td>no data</td>
<td>no</td>
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</table>

ODP (Ozone depletion potential): 0
GWP: 3300 (relative to a value of 1 for carbon dioxide at 100 years)

G.W.P :Global warming potential

SECTION 13: Disposal considerations

Best to recover and recycle.
If this is not possible, destruction is to be in an approved facility which is equipped to absorb and neutralise acid gases and other toxic processing products.
Treatment, storage, transportation, and disposal must be in accordance with applicable Federal, State/Provincial, and Local regulations.

SECTION 14: Transport information

<table>
<thead>
<tr>
<th></th>
<th>UN Number</th>
<th>ICAO/IATA</th>
<th>IMDG</th>
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<tr>
<td></td>
<td>UN3337</td>
<td>-primary: 2.2</td>
<td>-primary: 2.</td>
</tr>
</tbody>
</table>

SECTION 15: Regulatory information

NFPA-HMIS RATINGS (SCALE 0-4): HEALTH=1, FIRE=0, REACTIVITY=1

EC Classification:
- Hazard Symbol -
- Risk Phrases -
- Safety Phrases -

SECTION 16: Other information

Japan (ENCS) listed
US (TSCA) listed
EU (EINECS) listed
Australia (AICS) listed

This product is not designed, manufactured, or intended for medical uses, including implantation to the body or other applications in direct contact with body fluids or tissues.
Do not use for non-industrial applications.

The information in this Material Safety Data Sheet (MSDS) is believed to be correct as of the date issued. The information does not relate to use in combination with any other material or in any process.