Material Safety Data Sheet

Section 1: Chemical Product / Company Identification

Trade name: R-407C
Synonym: HFC 32/HFC 125/HFC 134a: 23/25/52

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>
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</thead>
<tbody>
<tr>
<td>Difluoromethane</td>
<td>23</td>
<td>75-10-5</td>
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<tr>
<td>Pentafluoroethane</td>
<td>25</td>
<td>354-33-6</td>
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<tr>
<td>1,1,1,2-tetrafluoroethane</td>
<td>52</td>
<td>811-97-2</td>
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</table>

Section 3: Hazard identification

Potential Health Effects
This product may cause asphyxia if released in a confined area.
Rapidly evaporating liquid may cause frostbite.

Inhalation may include temporary nervous system depression with anesthetic effects such as dizziness, headache, confusion, incoordination, and loss of consciousness.

Higher exposures may lead to temporary alteration of the heart’s electrical activity with irregular pulse, palpitations, or inadequate circulation. Fatality may occur from gross overexposure.

Individuals with preexisting diseases of the central nervous or cardiovascular system may have increased susceptibility to the toxicity of excessive exposures.

Carcinogenicity Information:
None of the components present in this material at concentrations equal to or greater than 0.1% are listed by IARC, NTP, OSHA or ACGIH as a carcinogen.

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:
- Flash Point: none
- Auto-Ignition Temperature: Not determined
- Flammable Limits: Nonflammable

Potential Combustibility:
R-407C is not flammable at temperatures up to 100 °C at atmospheric pressure. However, mixtures of R-407C with high concentrations of air at elevated pressure can become combustible at ambient temperature. As the temperature of the mixture is increased, lower pressure (but still greater than atmospheric pressure) can create the same effect. Therefore, R-407C should not be mixed with air under pressure for leak testing or other purposes.
In general, R-407C should not be used or allowed to exist with high concentrations of air above atmospheric pressure.

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.
- Do not store or consume food, drink, or tobacco in areas where they may become contaminated with this material.
- Follow safe industrial hygiene practices and wear proper protective equipment when handling this compound.

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-134a; WEEL (AIHA): 1000 ppm, 8 Hr. TWA
  HFC-32; 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 butyl rubber gloves, apron, pants, and jacket.
  Respirators Self-contained breathing apparatus (SCBA) is required if a large release occurs.

SECTION 9: Physical and chemical properties

Form Liquefied gas
Color Colorless
Odor Faint ether-like odor
Boiling point -43.6 °C
Vapor Pressure 1.19 MPa (25 °C)
% Volatiles 100
Solubility in water insoluble

SECTION 10: Stability and reactivity
Stability:
  Stable at room temperature in closed containers under normal storage and handling conditions.

Conditions to avoid:
  The product is unstable to high temperature and flames.

Incompatibilities:
  Alkali or alkaline earth metals, finely powdered metals (aluminum, magnesium, zinc) and alloys containing more than 2% magnesium.

Decomposition:
  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.

Difluoromethane (HFC 32)
Inhalation:
- 4 hour ALC: > 760,000 ppm in rats
- 4 hour LC50: > 520,000 ppm in rats
Anaesthetic-like effects, such as lethargy and incoordination, are observed in rats at very high inhalation concentrations (greater than 110,000 ppm).
Repeated inhalation exposure studies:
- No adverse effects were observed in rats exposed by inhalation at concentrations of up to 50,000 ppm for up to 90 days.
- No effects were observed in rats exposed by inhalation at concentrations of up to 200,000 ppm for up to 2 weeks.
Not cause teratogenic effects:
- No fetal effects were observed in rats and rabbits at inhalation concentrations of up to 50,000 ppm.
Effects on heart were increased in dogs injected adrenalin into vein at concentrations of 350,000 ppm in air.

Pentafluoroethane (HFC 125)
Inhalation:
- 4 hour ALC: > 800,000 ppm in rats
Even at these high inhalation concentration, no clinical signs of toxicity are evident.
Threshold of effects on heart in dogs administered adrenalin: 8%.
Repeated inhalation exposure studies:
- No adverse effects were observed in rats exposed by inhalation at concentrations of up to 50,000 ppm for up to 90 days.
Not cause teratogenic effects:
- No fetal effects were observed in rats and rabbits at inhalation concentrations of up to 50,000 ppm.

1,1,1,2-tetrafluoroethane (HFC 134a)
Inhalation:
- 4 hour LC50: 500,000 ppm in rats
Anaesthetic-like effects, such as lethargy and incoordination, are observed in rats at very high inhalation concentrations (greater than 200,000 ppm).
Repeated inhalation exposure studies:
- No significant toxicological effects were observed in rats following inhalation exposure for up to one year at concentrations up to 50,000 ppm.
No malignant tumors attributable supported these exposure to HFC-134a were observed.
Not cause teratogenic effects:
- No fetal effects were observed in rabbits at inhalation concentrations of up to 40,000 ppm.

SECTION 12: Ecological information

Difluoromethane (HFC 32):
- Not degradable by microorganisms. Low bioaccumulation.

Pentafluoroethane (HFC 125):
- Not degradable by microorganisms. Low bioaccumulation.

1,1,1,2-tetrafluoroethane (HFC 134a)
R-407C

Not degradable by microorganisms. Low bioaccumulation.

ODP (Ozone depletion potential): 0
GWP: 1500 (IPCC, 1995)

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
Proper Shipping Name              REFRIGERANT GAS R 407C
Hazard Class 2.2
UN Number UN3340
Label NON-FLAMMABLE GAS

SECTION 15: Regulatory information
NFPA-HMIS RATINGS (SCALE 0-4): HEALTH=1, FIRE=1, REACTIVITY=0
EC Classification:
   Hazard Symbol -
   Risk Phrases -
   Safety Phrases 59: Refer to manufacturer/supplier for information on recovery/recycling.
   61: Avoid release to the environment.

SECTION 16: Other information

<table>
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<th>HFC 134a</th>
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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.

Reference: K.Watanabe et al, “Thermodynamic properties of pure and blend HFC refrigerant”, JSRAE