Material Safety Data Sheet

Issued Jul-05-2004 Revised (0.1) Aug-06-2004

Section1: 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.
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Section 2: Composition / information on ingredients

Component	mass %	CAS No.	Symbol	R-phrases
Difluoromethane	23	75-10-5	-	-
Pentafluoroethane	25	354-33-6	-	-
1,1,1,2-tetrafluoroethane	52	811-97-2	-	-

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.

Carcinogennicity 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/m^3, 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 ℃
Vapor Pressure	1.19 MPa (25℃)
% 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.

Not mutagenic in an Ames assay, Chinese Hamster Lung assay, chromosomal aberration study with human lymphocytes. Not active in an in vivo mouse micronucleus study.

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.

Not mutagenic in an Ames assay, Chinese Hamster Ovary assay, chromosomal aberration study with human lymphocytes. Not active in an in vivo mouse micronucleus study.

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.

Not mutagenic in an Ames assay, Chinese Hamster Lung cell, chromosomal aberration study with human lymphocytes. Not active in an in vivo mouse micronucleus study.

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)

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

	HFC 32	HFC 125	HFC 134a
TSCA	listed	listed	listed
EU	2008394	2065578	2123770
Canada	NDSL	no	DSL
Australia: AICS	listed	listed	listed
Korea: ECL	97-3-4	97-3-43	KE-33426
Japan: ENCS	2-3705	2-3713	2-3585
Japan: ISHL	2-13-36	2-13-91	2-13-48
Philippine: PICCS	listed	listed	listed
China	listed	listed	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 dose 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