

Material Safety Data Sheet

(REFRIGERANT R404A)

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1. PRODUCT AND COMPANY IDENTIFICATION

Material Identification

Corporate MSDS Number: HFC 404A

CAS Number: 420-46-2/354-33-6/811-97-2

EC No.: 206-996-5/206-557-8/212-377-0

Product Name HFC 404A

Chemical Formula C₂H₃F₃/C₂H₂F₅/C₂H₂F₄

Chemical Name 1,1,1-Trifluoroethane /Pentafluoroethane/1,1,1,2-Tetrafluoroethane

Product Use refrigerant

Company Identification

MANUFACTURER/DISTRIBUTOR: Cosutin Industrial CO., Limited

Add: Unit B, 10/F Lee May Building 788-790 Nathan Road, Mongkok, Kowloon, H.K.

Tel.: +852 21395855 Fax: +852 81673777

PHONE NUMBERS Product Information: +86 136 31481545

Transport Emergency: +86 136 31481545

Medical Emergency: +86 136 31481545

2. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical name of the substance:

1,1,1-Trifluoroethane /Pentafluoroethane/1,1,1,2-Tetrafluoroethane

General name: HALOGENATED HYDROCARBON

CAS Number: 420-46-2/354-33-6/811-97-2

Einecs Number: 206-996-5/206-557-8/212-377-0

Ingredient Name	CAS No.	Typical Wt. %
1,1,1-Trifluoroethane	420-46-2	52%
Pentafluoroethane	354-33-6	44%
1,1,1,2-Tetrafluoroethane	811-97-2	4%

Hazardous components according to Regulation (EC) 1272/2008 as amended

Substance name	Hazard class	Hazard category	H Phrases
1,1,1-Trifluoroethane (143a)	Flammable gases	Category 1	H220
	Gases under pressure	Liquefied gas	H280
Pentafluoroethane (R125)	Gases under pressure	Liquefied gas	H280
1,1,1,2-Tetrafluoroethane (R134a)	Gases under pressure	Liquefied gas	H280

3. HAZARDS IDENTIFICATION

EC Classification

EC Directive 67/548/EEC

Regulation (EC) No. 1272/2008 (CLP)

Not classified as hazardous

Gases under pressure – Liquefied gas

Label Elements

Name on label

Hazardous components

1,1,1-Trifluoroethane (143a)

Pentafluoroethane (R125)

1,1,1,2-Tetrafluoroethane (R134a)

Hazard statement(s)

H280: Contains gas under pressure; may explode if heated

Signal word(s)

Warning

Hazard pictogram(s)



4. FIRST AID MEASURES

Inhalation Remove to fresh air. Oxygen or artificial respiration if needed. If symptoms persist, call a physician.

Skin contact Allow to evaporate. Wash off with warm water. If symptoms persist, call a physician.

Eye contact Immediately irrigate with eyewash solution or clean water, holding the eyelids apart for at least 10 minutes. Obtain immediate medical attention.

Ingestion Unlikely route of exposure.

Most important symptoms/effects, acute and delayed

Inhalation In case of higher concentrations: narcosis, asphyxia, may cause cardiac arrhythmia.

Skin contact Contact with liquid or refrigerated gas can cause cold burns and frostbite. Prolonged skin contact may defat the skin and produce dermatitis.

Eye contact Causes frostbite burns to eyes. Symptoms: Lachrymation, redness, swelling of tissue, frostbite, burn.

Ingestion Gas. Not applicable.

5. FIRE FIGHTING MEASURES

Extinguishing media

Suitable extinguishing media: As appropriate for surrounding fire. Keep fire exposed containers cool by spraying with water.

Unsuitable extinguishing media: None.

Specific hazards arising: The product is not flammable.

from the Chemical: Hazardous decomposition products formed under fire conditions.

Special protective actions for Fire-Fighters: Wear self-contained breathing apparatus and protective suit.

Wear chemical resistant oversuit.

In case of fire, use water spray.

Keep product and empty container away from heat and sources of ignition.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Advice for non-emergency personnel

Prevent further leakage or spillage if safe to do so
Keep away from incompatible products

Advice for emergency responders

Immediately evacuate personnel to safe areas
Keep people away from and upwind of spill/leak
Wear self-contained breathing apparatus and protective suit
Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing
Suppress (knock down) gases/vapours/mists with a water spray jet
Avoid spraying the leak source
Ventilate area

Environmental precautions

Discharge into the environment must be avoided
Inform the responsible authorities in case of gas leakage or of entry into waterways, soil or drains

Methods and materials for containment and cleaning up

Allow to evaporate
Prevent product from entering drains

Reference to other sections

Refer to protective measures listed in sections 7 and 8.

7. HANDLING AND STORAGE

Precautions for safe handling

Use only in well-ventilated areas
Use only clean and dry utensils
Keep away from water
Preferably transfer by pump or gravity
Keep away from incompatible products

Conditions for storage, including incompatibilities

Storage

Keep only in the original container
Store in a receptacle equipped with a vent

Keep containers tightly closed in a cool, well-ventilated place Keep in properly labelled containers
 Keep in a bunded area Keep away from heat/sparks/open flames/hot surfaces. No smoking.
 Keep away from incompatible products
 Suitable material – steel cylinder
 For further information, please contact supplier.

Packing material

Specific use(s)

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters

Exposure limit values

Substance	Harp acceptable exposure limit	EH40 workplace exposure limits
Pentafluoroethane	TWA = 1000 ppm	Not listed
1,1,1-Trifluoroethane	TWA = 1000 ppm	Not listed
1,1,1,2-Tetrafluoroethane	TWA = 1000 ppm	TWA = 1000 ppm / 4240 mg/m ³

Exposure controls

Appropriate engineering controls Ensure adequate ventilation
 Apply technical measures to comply with the occupational exposure limits

Respiratory protection Self-contained breathing apparatus (EN 133) Wear self-contained breathing apparatus in confined spaces, in cases where the oxygen level is depleted, or in case of significant emissions
 Use only respiratory protection that conforms to international / national standards

Hand protection Take note of the information given by the producer concerning permeability and break through times and of special workplace conditions (mechanical strain, duration of contact). Protective gloves Suitable material: Fluoroelastomer

Eye protection Tightly fitted safety goggles

Skin and body protection Wear suitable protective clothing If splashes are likely to occur, wear: apron, boots, Neoprene

Hygiene measures Eye wash bottles or eye wash stations in compliance with applicable standards When using do not eat, drink or smoke Gloves, overalls and boots have to be double layered (protection against cold temperature).
 Handle in accordance with good industrial hygiene and safety practice

Environmental exposure controls Dispose of regulations. rinse water in accordance with local and national

9. PHYSICAL AND CHEMICAL PROPERTIES

Form	Compressed liquefied gas
Colour	Colourless
Odour	Ether-like
pH	Neutral

pKa	Not applicable
Melting point/freezing point	-103°C (Pentafluoroethane)
Boiling point/boiling range	-46.7°C
Flash point	Not applicable
Evaporation rate	No data
Flammability (solid, gas)	The product is not flammable
Flammability	Not applicable
Explosive properties	Not explosive
Vapour pressure	10.98 bar at 20°C 20.03 bar at 50°C
Vapour density	>3
Density	Not applicable
Bulk density	Not applicable
Solubility	430 mg/l at 25°C, water (pentafluoroethane)
Solubility/qualitative	No data available
Partition coefficient: n-octanol/water	log Pow: 1.48, 20°C (pentafluoroethane)
Auto-ignition temperature	728°C
Decomposition temperature	>700°C
Viscosity	Not applicable
Oxidizing properties	Non oxidizer

10. STABILITY AND REACTIVITY

Reactivity	Risk of violent reaction
Chemical stability	Stable under recommended storage conditions
Possibility of hazardous reactions	Strong oxidizers, alkali metals and alkaline earth metals may cause fires or explosions. Vapours are heavier than air and may spread along floors
Conditions to avoid	Heat
Materials to avoid	Light and/or alkaline metals, powdered metals, alkaline earth metals, oxidising agents
Hazardous decomposition products	Gaseous hydrogen fluoride (HF), Fluorophosgene The release of other hazardous decomposition products is possible

11. TOXICOLOGICAL INFORMATION

Acute toxicity	
Acute oral toxicity	Not applicable
Acute inhalation toxicity	LC50, 4 h, >2,030,000 mg/m ³ (1,1,1-Trifluoroethane) LC0, 4 h, rat, >800000 ppm (Pentafluoroethane)
Acute dermal toxicity	Not relevant
Skin corrosion	Not applicable

Serious eye damage/eye irritation	Not applicable
Respiratory or skin sensitization	Not applicable
Mutagenicity	In vitro tests did not show mutagenic effects (Pentafluoroethane) In vivo tests did not show mutagenic effects (Pentafluoroethane)
Carcinogenicity	No data available
Toxicity for reproduction	No toxicity to reproduction (Pentafluoroethane)
Repeated dose toxicity	Inhalation, after a single exposure, dog, 10% w/w, risk of cardiac sensitization at high dose (Pentafluoroethane) Inhalation, repeated exposure, rat, >=50000ppm, NOAEL (Pentafluoroethane)
Other information	No data available

12. ECOLOGICAL INFORMATION

Toxicity

Fishes	Brachydanio rerio	LC50	96 h	>200 mg/l	1,1,1,3,3-pentafluorobutane
Fishes	Brachydanio rerio	LC50	96 h	Ca. 200 mg/l	1,1,1,3,3-pentafluorobutane
Fishes	Various species	LC50	96 h	109mg/l	1,1,1-Trifluoroethane
Crustaceans	Daphnia magna	EC50	48 h	>200 mg/l	1,1,1,3,3-pentafluorobutane
Crustaceans	Daphnia magna	NOEC	48 h	200 mg/l	1,1,1,3,3-pentafluorobutane
Crustaceans	Daphnia magna	EC50	48 h	300 mg/l	1,1,1-Trifluoroethane
Crustaceans	Various species	EC50	Calculated value	115 mg/l	1,1,1-Trifluoroethane
Algae	Selenastrum capricornutum	NOEC	72 h	13.2 mg/l	1,1,1,3,3-pentafluorobutane
Algae	Selenastrum capricornutum	EC50	72 h	>114 mg/l	1,1,1,3,3-pentafluorobutane
Algae	Various species	EC50	72 h	71 mg/l	1,1,1-Trifluoroethane
Terrestrial plants		NOEC	growth	>=6 g/m ³	1,1,1,3,3-pentafluorobutane

Persistence and degradability

Abiotic degradation

Air, indirect photo-oxidation. Conditions: sensitizer: OH radicals.
Degradation products: carbon dioxide (CO₂) / hydrofluoric acid
Water. Result: non-significant hydrolysis

Biodegradation

Aerobic, tested according to closed bottle test, degradation, 5% after 28 d. Result: not readily biodegradable (Pentafluoroethane)

Bioaccumulative potential

Bioaccumulative potential: log Pow 1.48. Result: does not bioaccumulate (Pentafluoroethane)

Mobility	Soil/sediments, adsorption, log KOC: from 1.3 – 2.3. Conditions: calculated value Air, Henry's law constant (H), from 65 – 185 kPa.m ³ /mol, 20°C. Conditions: calculated value, considerable volatility
Other adverse effects	Ozone depletion potential = 0 Result = no effect on stratospheric ozone Ozone depletion potential; ODP; (R11 = 1) (Pentafluoroethane) Global Warming Potential = 0.94 Halocarbon global warming potential; HGWP; (R11 = 1)

13. DISPOSAL CONSIDERATIONS

Waste disposal methods	In accordance with local and national regulations Refer to manufacturer/supplier for information on recovery/recycling
Contaminated packaging	To avoid treatments, as far as possible, use dedicated containers

14. TRANSPORTATION INFORMATION

International transport regulations

IATA-DGR

UN number	UN 3337
Class	2.2
ICAO-Labels	2.2 -Non-flammable, non-toxic gas
Proper shipping name	REFRIGERANT GAS R404A

IMDG

UN number	UN 3337
Class	2.2
IMDG-Labels	2.2 -Non-flammable, non-toxic gas
HI/UN No.	3337
EmS	F-C, S-V
Proper shipping name	REFRIGERANT GAS R404A

ADR

UN number	UN 3337
Class	2
ADR/RID Labels	2.2 -Non-flammable, non-toxic gas
HI/UN No.	20 / 3337
Proper shipping name	REFRIGERANT GAS R404A

RID

UN number	UN 3337
Class	2
ADR/RID Labels	2.2 -Non-flammable, non-toxic gas
HI/UN No.	20 / 3337
Proper shipping name	REFRIGERANT GAS R404A

ADN

UN number	UN 3337
Class	2
ADR/RID Labels	2.2 – Non-flammable, non-toxic gas

Proper shipping name REFRIGERANT GAS R404A

15. REGULATORY INFORMATION

Applicable Laws or Regulations

Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) as amended.

Directive 1999/45/EC of the European Parliament and of the Council of 31 May 1999 concerning the approximation of laws, regulations and administrative provisions of the Member States relating to the classification, packaging and labelling of dangerous preparations, as amended

Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures, as amended

Regulation (EC) No 166/2006 of the European Parliament and of the Council of 18 January 2006 concerning the establishment of a European Pollutant Release and Transfer Register and amending Council Directives 91/689/EEC and 96/61/EC

Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste

EH40/2005 Workplace Exposure Limits, as amended through 1, 10, 2007 (WEL's) published by the Health and Safety Executive (HSE). Issued under the Control of Substances Hazardous to Health Regulations, as amended

Notification status

Inventory information	Status
Australian Inventory of Chemical Substances (AICS)	In compliance with inventory
Canadian Domestic Substances List (DSL)	In compliance with inventory
Inventory of Existing Chemical Substances (China) (IECS)	In compliance with inventory
Japanese Existing and New Chemical Substances (MITI List) (ENCS)	In compliance with inventory
New Zealand Inventory of Chemicals (NZIOC)	In compliance with inventory
Toxic Substance Control Act List (TSCA)	In compliance with inventory
EU List of Existing Chemical Substances (EINECS)	In compliance with inventory
Korean Existing Chemicals Inventory (KECI (KR))	In compliance with inventory
Philippine Inventory of Chemicals and Chemical Substances (PICCS)	In compliance with inventory

16. OTHER INFORMATION

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End of MSDS