MATERIAL SAFETY DATA SHEET

Solchem ® 404A

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY/UNDERTAKING

1.1. Identification of the substance or preparation

Product name	: Solchem ® 404A
Chemical characterisation	: Mixture containing 1,1,1-Trifluoroethane, Pentafluoroethane and 1,1,1,2-Tetrafluoroethane
Synonym(s)	: R 404A (HFC 404A)
Formula	: CHF_2CF_3, CH_3CF_3, CH_2FCF_3

1.2. Use of the substance/preparation

Recommended uses	: - Refrigeration

1.3. Company Address

Address	: DAICHEM TRADING SDN. BHD. NO. 2, Jalan TPK 2/3, Seksyen 2, Taman Perindustrial Kinrara, Puchong. 41780, Selangor. Malaysia.
Tel.	: +603-80759118
Fax	: +603-80759843
Email	: daichem@streamyx.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

1,1,1-Trifluoroethane (HFC 143a)

CAS Number	: 000420-46-2
EC Number (EINECS)	: 206-996-5
Symbols	: F+
Phrases R	: R12
Concentration	: **52.00 %**

Pentafluoroethane (HFC 125)

CAS Number	: 000354-33-6
EC Number (EINECS)	: 206-557-8
Concentration	: **44.00 %**

1,1,1,2-Tetrafluoroethane (HFC 134a)

CAS Number	: 000811-97-2
EC Number (EINECS)	: 212-377-0
Concentration	: **4.00 %**

3. HAZARDS IDENTIFICATION

- Low acute toxicity. High exposures may cause abnormal heart rhythm and prove suddenly fatal. Very high atmospheric concentrations may cause an abnormal heart rhythm anaesthetic effects and asphyxiation.
- Liquid splashes or spray may cause freeze burns to skin and eyes.

4. FIRST-AID MEASURES

4.1. Inhalation

- Remove the subject from the contaminated area.
- Oxygen or cardiopulmonary resuscitation if necessary.
- Consult with a physician in case of respiratory and nervous symptoms.

4.2. Eyes contact

- Keep eyelids open to allow evaporation of product.
- Flush eyes with running water for several minutes, while keeping the eyelids wide open.
- Consult with an ophthalmologist in case of persistent pain.

4.3. Skin contact

- Allow product to evaporate.
- Rinse with lukewarm running water.
- Consult with a physician in case of persistent pain or redness.

4.4. Ingestion

- Ingestion is unlikely because of the physical properties and is not expected to be hazardous.
- Do not induce vomiting unless instructed to do so by a physician.

Further Medical Treatment

Symptomatic treatment and supportive therapy as indicated. Adrenalin an similar sympathomimetic drugs should be avoided following exposure as cardiac arrhythmia may result with possible subsequent cardiac arrest.

5. FIRE-FIGHTING MEASURES

This refrigerant is not flammable in air under ambient conditions of temperature and pressure. Certain mixtures of this refrigerant and air when under pressure may be flammable. Certain mixtures of HFCs and chlorine may be flammable or reactive under certain conditions. Combustion or thermal decomposition will evolve very toxic and corrosive vapours (hydrogen fluoride)

5.1. Extinguishing Media

- Allow gas fires to burn until exhausted.
- Water spray should be used to cool containers.

5.2. Fire Fighting Protective Equipment

- A self contained breathing apparatus and full protective clothing must be worn in fire conditions. See also Section 8.

6. ACCIDENTAL RELEASE MEASURES

Ensure personal protection (including respiratory protection) during removal of spillages. See also Section 8. Provided it is safe to o so, isolate the source of the leak. Allow small spillages to evaporate provide there is adequate ventilation. Large spillages: Ventilate area. Contain spillages with sand, earth or any suitable adsorbent material. Prevent liquid from entering drains, sewers, basements and work pits since the vapour may create a suffocating atmosphere.

7. HANDLING AND STORAGE

7.1. Handling

- Keep away from sources of ignition – No smoking.
- Take precautionary measures against static discharges.
- Avoid inhalation of high concentrations of vapours.
- Atmospheric levels should be controlled in compliance with the occupational exposure limit.
- Atmospheric concentrations well below the occupational exposure limit can be achieved by good occupational hygiene practice.
- The vapour is heavier than air, high concentrations may be produced at low levels where general ventilation is poor, in such cases provide adequate ventilation or wear suitable respiratory protective equipment with positive air supply.
- Avoid contact with naked flames an hot surfaces as corrosive and very toxic decomposition products can be formed.
- Avoid contact between the liquid and skin and eyes.

7.2. Process Hazards

- Liquid transfers between refrigerant containers and to and from systems can result in static generation.
- Ensure adequate earthing.
- Certain mixtures of HFCs and chlorine may be flammable or reactive under certain conditions.

7.3. Storage

- Keep in a well ventilated place. Keep in a cool place away from fire risk, direct sunlight and all sources of heat such as electric and steam radiators.
- Avoid storing near to the intake of air conditioning units, boiler units and open drains.
- Cylinders and drums:
  Keep container dry.
  Storage temperature <45°C.

7.4. Other precautions

- Warn people about the dangers of the product.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Wear suitable protective clothing, gloves and eye/face protection. Wear thermal insulating gloves when handling liquefied gases. In cases of insufficient ventilation, where exposure to high concentrations of vapour is possible, suitable respiratory protective equipment with positive air supply should be used.

Occupational Exposure Limits

HAZARDOUS INGREDIENT(S)	LTEL 8hr TWA ppm	LTEL 8hr TWA mg/m3	STEL ppm	STEL mg/m3	Notes
1,1,1-Trifluoroethane (HFC 143a)	1000	-	-	-	COM
Pentafluoroethane (HFC 125)	1000	-	-	-	COM
1,1,1,2-Tetrafluoroethane (HFC 134a)	1000	4240	-	-	OES

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1. General information

Appearance	: pressurized liquefied gas.
Color/Colour	: colorless/colourless.
Odor/Odour	: ether-like (slightly)

9.2. Important health, safety and environmental information

pH	: neutral
Boiling point	: -47.2°C to -46.4°C (boiling range)
Flash point	: Not applicable *Remark*: Non-flammable mixture
Flammability	: No flammability limit in air *Method*: following standard ASTM E-681 *Remark*: Non flammable gas.
Explosive properties	: *Remark*: See also section 10
Oxidising properties	: Non oxidizer
Vapor/vapour pressure	: 182.9 psia @ 70°F 370.9 psia @ 130°F
Specific Gravity (water = 1.0)	: 1.08 @ 21.1°C (70°F)
Solubility (Water)	: insoluble
Solubility (Other)	: soluble in: chlorinated solvents, alcohols, esters
Vapor/vapour density (air=1)	: 3.42 approx, at bubble point temperature

10. STABILITY AND REACTIVITY

10.1. Hazardous Reactions

- Certain mixtures of HFCs and chlorine may be flammable or reactive under certain conditions.
- Incompatible materials: finely divided metals, magnesium and alloys containing more than 2% magnesium.
- Can react violently if in contact with alkali metals, alkaline earth metals- sodium, potassium, barium.
- May react violently with: oxidising agents.

10.2. Hazardous Decomposition Products

- Hydrogen chloride, hydrogen fluoride by decomposition and hydrolysis.

11. TOXICOLOGICAL INFORMATION

11.1. Health effects

Inhalation

- High exposures may cause abnormal heart rhythm and prove suddenly fatal.
- Very high atmospheric concentrations may cause an abnormal heart rhythm anaesthetic effects and asphyxiation.

Skin Contact

- Liquid splashes or spray may cause freeze burns.
- Unlikely to be hazardous by skin absorption.

Eye Contact

- Liquid splashes or spray may cause freeze burns.

Ingestion

- Highly unlikely - but should this occur freeze burns will result.

11.2. Toxicological dates

Immediate (Acute) Effects:

HFC-125 : LC50: 4 hr.(rat) -> 800,000ppm / Cardiac Sensitization threshold (dog) 75,000ppm
HFC-143a : LC50: 4hr.(rat) -> 540,000ppm / Cardiac Sensitization threshold (dog) >250,000ppm
HFC-134a : LC50: 4hr.(rat) -> 500,000ppm / Cardiac Sensitization threshold (dog) >80,000ppm

Delayed (Subchronic and Chronic) Effects:

HFC-125 : Teratogenic NOEL (rat and rabbit) – 50,000ppm
Subchronic inhalation (rat) NOEL -> 50,000ppm / Chronic NOEL – 10,000ppm
HFC-143a : Teratogenic NOEL (rat and rabbit) – 50,000ppm
Subchronic inhalation (rat) NOEL -> 50,000ppm
HFC-134a : Teratogenic NOEL (rat and rabbit) – 40,000ppm
Subchronic inhalation (rat) NOEL – 50,000ppm / Chronic NOEL – 10,000ppm

Other Data

HFC-125, HFC-134a : Not active in four genetic studies
HFC-143a : Not active in two genetic studies

12. ECOLOGICAL INFORMATION

12.1. Environmental Fate and Distribution

- High tonnage material produced in wholly systems.
- High tonnage material used in open systems. Vapour.

12.2. Persistence and Degradation

HFC 143a

- Decomposed slowly in the lower atmosphere (troposphere). Atmospheric lifetime is 53.5 yrs.
- Has a Global Warming Potential (GWP) of 3800 (relative to 1 for carbon dioxide at 100 yrs.

HFC 125

- Decomposed slowly in the lower atmosphere (troposphere). Atmospheric lifetime is 32.6 yrs.
- Has a Global Warming Potential (GWP) of 2800 (relative to 1 for carbon dioxide at 100 yrs.

HFC 134a

- Decomposed comparatively rapidly in the lower atmosphere (troposphere). Atmospheric lifetime is 13.6 yrs.
- Has a Global Warming Potential (GWP) of 1300 (relative to 1 for carbon dioxide at 100 yrs.

HFC 143a, HFC 125, HFC 134a

- Does not influence photochemical smog (i.e. is not a VOC under terms of the UNECE agreement).

12.3. Effect on Effluent Treatment

- Discharges of the product will enter the atmosphere and will not result in long term aqueous contamination.

13. DISPOSAL CONSIDERATIONS

13.1. Waste treatment

- Dispose in compliance with local/federal and national regulations.
- It is recommended to contact the producer for recycling/recovery.

13.2. Packaging treatment

- To avoid treatments, as far as possible, use dedicated containers.

14. TRANSPORT INFORMATION

ADR

Class	: 2
Classification Code	: 2A
HI No.	: 20
UN-Number	: 3337
Labelling No.	: 2.2
Proper shipping name	: Refrigerant gas R 404A

IATA_C

Class	: 2.2
UN-Number	: 3337
Hazard label	: 2.2
Labelling No.	: 2.2
Proper shipping name:	Refrigerant gas R 404A

IMDG

Class	: 2.2
UN-Number	: 3337
Hazard label	: 2.2
EmS No.	: P-C
Labelling No.	: 2.2
Proper shipping name:	Refrigerant gas R 404A

15. REGULATORY INFORMATION

- Not classified as dangerous to users.

16. OTHER INFORMATION

16.1. Reason for update

- System maintenance

This MSDS is intended for only the selected countries to which it is applicable. For example, this MSDS is not intended for use on distribution within North America.
The information given corresponds to the current state of our knowledge and experience of the product, and is not exhaustive. This applies to product which conforms to the specification, unless otherwise stated. In this case of combinations and mixtures one must make sure that no new dangers can arise. In any case, the user is not exempt from observing all legal, administrative and regulatory procedures relating to the product, personal hygiene, and protection of human welfare and the environment.