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## SECTION 1: Identification of the substance/mixture and of the company/undertaking

### 1.1. Product identifier

Trade name	HFO-1234yf
Chemical description	2,3,3,3-Tetrafluoropropene
CAS N°	754-12-1
CE N°	468-710-7
Index N°	--
Registration n°	01-0000019665-61
Chemical formula	C <sub>3</sub> H <sub>2</sub> F <sub>4</sub>

### 1.2. Relevant identified uses of the substance or mixture and uses advised against

Relevant identified uses	Industrial and professional Test or calibration gas Manufacture of electronic or photovoltaic components Refrigerant Laboratory use Contact supplier for more information on uses
Uses advised against	Consumer use not recommended

### 1.3. Details of the supplier of the safety data sheet

Company identification	MULTIGAS Route de l'Industrie 102 CH-1564 Domdidier
Phone number	+41 (0) 26 676 94 94
E-mail address	<a href="mailto:info@multigas.ch">info@multigas.ch</a>

### 1.4. Emergency telephone numbers

145 (Toxicology Centre Zurich) or +41 (0) 44 251 51 51  
 +41 (0) 26 676 94 94 (Multigas)

## SECTION 2: Hazards identification

### 2.1. Classification of the substance or mixture

Classification according to Regulation (EC) No. 1272/2008 [CLP]



Physical hazards	Flammable gases, Category 1B	H221
	Gases under pressure : Liquefied gas	H280

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For the complete H-sentences texts mentioned in that chapter, refer to Section 16

## 2.2. Label elements

Labelling according to Regulation (EC) No. 1272/2008 [CLP]

<b>Hazard pictograms</b>	 
	GHS02      GHS04
<b>Signal word</b>	Danger
<b>Hazard statements</b>	
H221	Flammable gas
H280	Contains gas under pressure; may explode if heated
<b>Precautionary statements</b>	
P210	Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking
P377	Leaking gas fire: Do not extinguish, unless leak can be stopped safely
P381	In case of leakage, eliminate all ignition sources
P403+P410	Protect from sunlight. Store in a well-ventilated place

## 2.3. Other hazards

Contact with liquid may cause cold burns/frostbite

## SECTION 3: Composition/information on ingredients

### 3.1. Substances

Name	Product identifier	Concentration	Classification
2,3,3,3-Tétrafluoropropène (HFO-1234yf)	(CAS-No.) 754-12-1 (EC-No.) 468-710-7 (EC Index-No.) -- (Registration-No.) 01-0000019665-61	<= 100%	Flam. Gas 1B, H221 Press. Gas (Liq.), H280

For the complete H-sentences texts mentioned in that chapter, refer to Section 16

Contains no other components or impurities which will influence the classification of the product

### 3.2. Mixtures

Not established

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**SECTION 4: First aid measures**

**4.1. Description of first aid measures**

<b>General advice</b>	See a doctor. Show this safety data sheet to the attending physician
<b>In case of inhalation</b>	In case of inhalation, remove the person from the contaminated area. In case of respiratory arrest, give artificial respiration. See a doctor
<b>In case of skin contact</b>	Frostbites are to be treated like thermal burns: immediate, abundant and prolonged wash with water
<b>In case of eyes contact</b>	Immediate washing, abundant and prolonged with water. If irritation persists, consult a doctor
<b>In case of ingestion</b>	Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. See a doctor

**4.2. Most important symptoms and effects, both acute and delayed**

Misuse or intentional intentional inhalation can cause death without warning symptoms due to cardiac effects. Other symptoms that may be related to misuse or abusive inhalation are: anesthetic effects, dizziness, vertigo, confusion, lack of coordination, drowsiness or unconsciousness  
Refer to section 11

**4.3. Indication of any immediate medical attention and special treatment needed**

None

**SECTION 5: Firefighting measures**

**5.1. Extinguishing media**

<b>Suitable extinguishing media</b>	Water spray or water mist. Dry powder. Carbon dioxide. Foam
<b>Unsuitable extinguishing media</b>	Do not use water jet to extinguish

**5.2. Special hazards arising from the substance or mixture**

<b>Specific hazards</b>	In case of fire or excessive heat, hazardous combustion products may be produced Exposure to fire may cause containers to rupture/explode
<b>Hazardous combustion products</b>	In case of fire or excessive heat, hazardous combustion products may be produced such as : carbon monoxide


**5.3. Additional information**

Cool endangered receptacles with water spray jet from a protected position

**SECTION 6: Accidental release measures**

**6.1. Personal precautions, protective equipment and emergency procedures**

Avoid breathing vapours, spray mists or gases

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Provide adequate ventilation  
 Evacuate personnel to a safe place  
 Personal protective equipment, see section 8

### **6.2. Environmental precautions**

No data available

### **6.3. Methods and material for containment and cleaning up**

Keep area evacuated and free from ignition sources until any spilled liquid has evaporated (ground free from frost)

### **6.4. Reference to other sections**

See also sections 8 and 13

## SECTION 7: Handling and storage

### **7.1. Precautions for safe handling**

For precautions, see section 2.2

### **7.2. Conditions for safe storage, including any incompatibilities**

Store in a cool place. Keep container tightly closed in a dry and well-ventilated place  
 Storage life: > 10 years  
 Recommended storage temperature: < 52 °C  
 Content under pressure

### **7.3. Specific end use(s)**

None

## SECTION 8: Exposure controls/personal protection

### **8.1. Control parameters**

#### **Components with occupational exposure limits**

Component	CAS N°	Exposure value type	Control parameter	Source
2,3,3,3-Tetrafluoropropene (HFO-1234yf)	754-12-1	TWA	-	SUVA: Limit values of exposure to workstations
			-	
		OEL	-	SUVA: Limit values of exposure to workstations
			-	

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## 8.2. Exposure controls

### 8.2.1. Appropriate engineering controls

Provide adequate general and local exhaust ventilation  
Gas detectors should be used when flammable gases may be released

### 8.2.2. Individual protection measures, e.g. personal protective equipment

<b>Eye/face protection</b>	Wear goggles and a face shield when transfilling or breaking transfer connections. Standard EN 166
<b>Skin / hand protection</b>	<p>Wear protective gloves when handling gas cylinders Standard EN 388- Protective gloves against mechanical hazards</p> <p>The selected protective gloves have to satisfy the specifications of EU Directive 89/686 / EEC and the standard EN 374 derived from it</p> <p><b>For short-term use</b></p> <p>Material: Fluoroelastomer Penetration time: &gt;480 min Glove thickness: 0.7 mm</p> <p><b>For long-term use</b></p> <p>Material: Fluoroelastomer. Penetration time:&gt; 480 min Glove thickness: 0.7 mm</p> <p>Have appropriate, chemical-resistant protective clothing ready for use in emergencies</p>
<b>Respiratory protection</b>	Self-contained breathing apparatus (SCBA) or positive pressure air mask must be used in oxygenated atmospheres. Standard EN 137 - Self-contained compressed air device with a full face mask

### 8.2.3. Environmental exposure controls

-

## SECTION 9: Physical and chemical properties

### 9.1. Information on basic physical and chemical properties

<b>Appearance</b>	
<ul style="list-style-type: none"> <li>Physical state at 20°C / 101.3kPa</li> <li>Colour</li> </ul>	<p>Gas</p> <p>Colourless</p>
<b>Odour</b>	No data available
<b>Odour threshold</b>	No data available
<b>pH</b>	No data available
<b>Melting point / Freezing point</b>	No data available

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<b>Boiling point</b>	-29°C
<b>Flash point</b>	No data available
<b>Evaporation rate</b>	No data available
<b>Flammability (solid, gas)</b>	Extremely flammable gas
<b>Explosive limits</b>	6.2 – 12.3 %
<b>Vapour pressure [20°C]</b>	5.8 bar
<b>Vapour pressure [50°C]</b>	13.0 bar
<b>Vapour density</b>	No data available
<b>Relative density, liquid (water=1)</b>	No data available
<b>Relative density, gas (air=1)</b>	3.9
<b>Water solubility</b>	0.2 g/l
<b>Partition coefficient n-octanol/water (Log Kow)</b>	No data available
<b>Auto-ignition temperature</b>	405°C
<b>Decomposition temperature</b>	No data available
<b>Viscosity</b>	No data available
<b>Explosive properties</b>	No data available
<b>Oxidising properties</b>	No data available

**9.2. Other information**

<b>Molar mass</b>	114.04 g/mol
<b>Critical temperature [°C]</b>	94.7°C
<b>Relative vapour density</b>	Gas/vapour heavier than air. May accumulate in confined spaces, particularly at or below ground level

**SECTION 10: Stability and reactivity**
**10.1. Reactivity**

No reactivity hazard other than the effects described in sub-sections below

**10.2. Chemical stability**


Stable under recommended storage conditions

**10.3. Possibility of hazardous reactions**

Can form explosive mixture with air

**10.4. Conditions to avoid**

Keep away from heat and sources of ignition. Avoid contact with flames and red-hot metal surfaces. No smoking

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### **10.5. Incompatible materials**

Air, oxidizers, strong oxidants, strong bases  
 Alkaline earth metals  
 Finely divided metal powders, such as aluminum, zinc  
 For additional information on compatibility refer to ISO 11114

### **10.6. Hazardous decomposition products**

Under normal conditions of storage and use, hazardous decomposition products should not be produced

## SECTION 11: Toxicological information

### **11.1. Chemical safety assessment**

<b>Acute toxicity</b>	Toxicological effects not expected from this product if occupational exposure limit values are not exceeded
<b>Skin corrosion/irritation</b>	No data available
<b>Serious eye damage/irritation</b>	No data available
<b>Respiratory or skin sensitisation</b>	No data available
<b>Germ cell mutagenicity</b>	May cause genetic defects
<b>Carcinogenicity</b>	May cause cancer
<b>Reproductive toxicity</b>	No data available
<b>STOT-single exposure – Target organ(s)</b>	No data available
<b>STOT-repeated exposure</b>	No data available
<b>Ingestion hazard</b>	No data available

## SECTION 12: Ecological information

### **12.1. Toxicity**

<b>Assessment</b>	Classification criteria are not met
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### **12.2. Persistence and degradability**

Hardly biodegradable

### **12.3. Bioaccumulative potential**

Virtually non-bioaccumulative

### **12.4. Mobility in soil**

No data available

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### 12.5. Results of PBT and vPvB assessment

PBT / vPvB assessment is not available because the chemical safety assessment is not required / is not conducted

### 12.6. Other adverse effects

No data available

## SECTION 13: Disposal considerations

### 13.1. Waste treatment methods

<b>Product</b>	<p>Must not be discharged to atmosphere</p> <p>Burn in a chemical incinerator equipped with an afterburner and scrubber</p> <p>Return unused product in original cylinder to supplier</p>
<b>Contaminated container</b>	<p>Eliminate as unused product</p> <p>Contact the supplier if instructions are needed</p>
<b>OMoD Code</b>	<p>14 06 01</p> <p>Solvent, refrigerant and aerosol propellant or organic foam wastes: Chlorofluorocarbons, HCFCs, HFCs</p>

## SECTION 14: Transport information

### 14.1. UN number

Transport par road/rail ADR / RID	Transport by sea IMDG	Transport by air IATA
3161	3161	3161

### 14.2. UN proper shipping name

Transport par road/rail ADR / RID	Transport by sea IMDG	Transport by air IATA
Liquified gas, flammable N.S.A (2,3,3,3-Tetrafluoropropene)	Liquified gas, flammable N.S.A (2,3,3,3-Tetrafluoropropene)	Liquified gas, flammable N.S.A (2,3,3,3-Tetrafluoropropene)

### 14.3. Transport hazard class(es)

Labelling



ADR/RID  
IMDG  
IATA

2.1 : Flammable gases

### 14.4. Packing group

ADR/RID

Not established



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IMDG  
IATA

#### **14.5. Environmental hazards**

ADR/RID	None
IMDG	None
ICAO-TI / IATA-DGR	None

#### **14.6. Special precautions for user**

No data available

#### **14.7. Transport in bulk according to Annex II of Marpol and the IBC Code**

Not applicable

### **SECTION 15: Regulatory information**

#### **15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture**


This safety data sheet complies with the requirements of Regulation (CE) No. 1907/2006

#### **15.2. Chemical safety assessment**

A CSA has been carried out

### **SECTION 16: Other information**

<b>Indication of changes</b>	Revised safety data sheet in accordance with commission regulation (EU) No 2015/830
<b>Abbreviations and acronyms</b>	<p>ADR : European Agreement concerning the International Carriage of Dangerous Goods by Road</p> <p>CAS : Chemical Abstract Service number (USA)</p> <p>CLP : Classification Labelling Packaging Regulation; Regulation (EC) No 1272/2008</p> <p>CSA : Chemical Safety Assessment</p> <p>EIGA : European Industrial Gases Association</p> <p>EINECS : European Inventory of Existing Commercial Chemical Substances</p> <p>EN : European Standard</p> <p>ATE : Acute Toxicity Estimate</p> <p>IATA : International Air Transport Association</p> <p>IMDG Code : International Maritime Dangerous Goods Code</p> <p>LC50 : Lethal Concentration to 50 % of a test population</p> <p>OMoD : Swiss Ordinance on the movement of waste</p> <p>PBT : Persistent, Bioaccumulative and Toxic</p>

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PPE:	Personal Protection Equipment
REACH :	Registration, Evaluation, Authorisation and Restriction of Chemicals Regulation (EC) No 1907/2006
RID :	Regulations concerning the international carriage of dangerous goods by rail
RMM :	Risk Management Measures
STOT-SE :	Specific Target Organ Toxicity - Single Exposure
UN :	United Nations
vPvB :	Very Persistent and Very Bioaccumulative
WGK:	Water Hazards Class

### Full text of H, EUH and P statements used in sections 2 and 3

#### Hazard statements

H221	Flammable gas
H280	Contains gas under pressure; may explode if heated

#### Precautionary statements

P210	Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking
P377	Leaking gas fire: Do not extinguish, unless leak can be stopped safely
P381	In case of leakage, eliminate all ignition sources
P403+P410	Protect from sunlight. Store in a well-ventilated place

#### Disclaimer of liability

Details given in this document have been prepared based on the most available reliable documents and are believed to be correct at the time of going to press  
They do not claim to be exhaustive and should be considered as a guide