

Safety data sheet

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

Creation date : 28.01.2005
Revision date : 04.11.2011

Version : 1.5

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

1.1. Product identifier

Product name

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

EC No (from EINECS): 212-377-0

CAS No: 811-97-2

Index-Nr.

Chemical formula C₂H₂F₄

REACH Registration number:

01-2119459374-33

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

Relevant identified uses

Industrial and professional. Perform risk assessment prior to use., Refrigerant.

Uses advised against

Consumer use.

1.3. Details of the supplier of the safety data sheet

Company identification

BOC, Priestley Road, Worsley, Manchester M28 2UT

E-Mail Address ReachSDS@boc.com

1.4. Emergency telephone number

Emergency phone numbers (24h): 0800 111 333

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

Classification acc. to Regulation (EC) No 1272/2008/EC (CLP/GHS)

Press. Gas (Liquefied gas) - Contains gas under pressure; may explode if heated.

Classification acc. to Directive 67/548/EEC & 1999/45/EC:

Proposed by the industry

Not classified as dangerous substance.

Asphyxiant in high concentrations.

Risk advice to man and the environment

Liquefied gas.

Contact with liquid may cause cold burns/frost bite.

2.2. Label elements

- Labelling Pictograms



- Signal word

Warning

- Hazard Statements

H280

Contains gas under pressure; may explode if heated.

EIGA-As

Asphyxiant in high concentrations.

- Precautionary Statements

Precautionary Statement Prevention

None.

Precautionary Statement Response

None.

Precautionary Statement Storage

P403

Store in a well-ventilated place.

Precautionary Statement Disposal

None.

2.3. Other hazards

Contact with liquid may cause cold burns/frost bite.

SECTION 3: Composition/information on ingredients

Substance / Mixture: Substance.

3.1. Substances

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

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

3.2. Mixtures

Not applicable.

SECTION 4: First aid measures

4.1. Description of first aid measures

First Aid General Information:

Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped.

First Aid Inhalation:

Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped.

First Aid Skin / Eye:

In case of frostbite spray with water for at least 15 minutes. Apply a sterile dressing. Obtain medical assistance. Immediately flush eyes thoroughly with water for at least 15 minutes.

First Aid Ingestion:

Ingestion is not considered a potential route of exposure.

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

In high concentrations may cause asphyxiation. Symptoms may include loss of mobility/consciousness. Victim may not be aware of asphyxiation. In low concentrations may cause narcotic effects. Symptoms may include dizziness, headache, nausea and loss of co-ordination.

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

None.

SECTION 5: Fire fighting measures

5.1. Extinguishing media

Suitable extinguishing media

Dry powder. Carbon dioxide. Water fog. Foam.

Unsuitable extinguishing media

Do not use a solid water stream.

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5.2. Special hazards arising from the substance or mixture

Hazardous combustion products

If involved in a fire the following toxic and/or corrosive fumes may be produced by thermal decomposition:

Carbon monoxide, Carbonyl fluoride, Hydrogen fluoride.

5.3. Advice for fire-fighters

Specific methods

If possible, stop flow of product. Move container away or cool with water from a protected position. Prevent water used in emergency cases from entering sewers and drainage systems.

Special protective equipment for fire-fighters

Normal firefighters' equipment consists of an appropriate SCBA (open-circuit positive pressure compressed air type) in combination with fire kit. Equipment and clothing to the following standards will provide a suitable level of protection for firefighters.

Guideline:

EN 469:2005: Protective clothing for firefighters. Performance requirements for protective clothing for firefighting., EN 137 Respiratory protective devices — Self-contained open-circuit compressed air breathing apparatus with full face mask — Requirements, testing, marking., EN 15090 Footwear for firefighters., EN 443 Helmets for fire fighting in buildings and other structures., EN 659 Protective gloves for firefighters.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

Evacuate area. Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe. Ensure adequate air ventilation. Prevent from entering sewers, basements and workpits, or any place where its accumulation can be dangerous. EN 137 Respiratory protective devices — Self-contained open-circuit compressed air breathing apparatus with full face mask — Requirements, testing, marking.

6.2. Environmental precautions

Try to stop release.

6.3. Methods and material for containment and cleaning up

Ventilate area.

6.4. Reference to other sections

See also sections 8 and 13.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Only experienced and properly instructed persons should handle gases under pressure. The substance must be handled in accordance with good industrial hygiene and safety procedures. Use only properly specified equipment which is suitable for this product, its supply pressure and temperature. Contact your gas supplier if in doubt. Do not smoke while handling product. Ensure the complete gas system has been (or is regularly) checked for leaks before use. Refer to supplier's handling instructions. Suck back of water into the container must be prevented. Do not allow backfeed into the container. Protect containers from physical damage; do not drag, roll, slide or drop. When moving containers, even for short distances, use appropriate equipment eg. trolley, hand truck, fork truck etc. Leave valve protection caps in place until the container has been secured against either a wall or bench or placed in a container stand and is ready for use. If user experiences any difficulty operating container valve discontinue use and contact supplier. Never attempt to repair or modify container valves or safety relief devices. Damaged valves should be reported immediately to

the supplier. Keep container valve outlets clean and free from contaminates particularly oil and water. Replace valve outlet caps or plugs and container caps where supplied as soon as container is disconnected from equipment. Close container valve after each use and when empty, even if still connected to equipment. Never attempt to transfer gases from one container to another. Never use direct flame or electrical heating devices to raise the pressure of a container. Do not remove or deface labels provided by the supplier for the identification of the container contents. Purge system with dry inert gas (e.g. helium or nitrogen) before gas is introduced and when system is placed out of service.

7.2. Conditions for safe storage, including any incompatibilities

Keep container below 50°C in a well ventilated place. Observe all regulations and local requirements regarding storage of containers. Cylinders should be stored in the vertical position and properly secured to prevent falling over. Stored containers should be periodically checked for general conditions and leakage. Container valve guards or caps should be in place. Store containers in location free from fire risk and away from sources of heat and ignition. Keep away from combustible materials. Containers should not be stored in conditions likely to encourage corrosion.

7.3. Specific end use(s)

None.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Exposure limit value

Value type	value	Note
Great Britain - LTEL	1.000 ppm	EH 40/07

Derived No Effect Levels

Type	Exposure	Value	Population	Effects
DNEL	Long term inhalation	13,936 g/m3	Workers	Systemic

Predicted No Effect Concentrations

Type	Environmental Compartment	Value
PNEC	Fresh water	0,1 mg/l
PNEC	Marine	0,01 mg/l
PNEC	Intermittent release	1 mg/l
PNEC	STP (Sewage Treatment Plant)	73 mg/l
PNEC	Fresh water sediment	0,75 mg/kg dw

8.2. Exposure controls

Appropriate engineering controls

A risk assessment should be conducted and documented in each work area to assess the risks related to the use of the product and to select the PPE that matches the relevant risk. The following recommendations should be considered. Product to be handled in a closed system. Oxygen detectors should be used when asphyxiating gases may be released. The substance must be handled in accordance with good industrial hygiene and safety procedures. Consider work permit system e.g. for maintenance activities. Systems under pressure should be regularly checked for leakages. Provide adequate general or local ventilation. Keep concentrations well below occupational exposure limits.

Personal protective equipment

Eye and face protection

Wear a face-shield when transfilling and breaking transfer connections. Safety eyewear, goggles or face-shield to EN166

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should be used to avoid exposure to liquid splashes. Wear eye protection to EN 166 when using gases.

Skin protection

Hand protection

Advice: Wear working gloves and safety shoes while handling containers., Wear cold insulating gloves.

Guideline: EN 511 Protective gloves against cold.

Body protection

Protect eyes, face and skin from contact with product.

Other protection

Wear working gloves and safety shoes while handling containers. EN ISO 20345 Personal protective equipment - Safety footwear.

Thermal hazards

If there is a risk of contact with the liquid, all protective equipment should be suitable for extremely low temperatures.

Environmental Exposure Controls

Refer to local regulations for restriction of emissions to the atmosphere. See section 13 for specific methods for waste gas treatment.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

General information

Appearance/Colour: Colourless gas.

Odour: Ethereal

Odour threshold:

Odour threshold is subjective and inadequate to warn for over exposure.

Melting point: -101 °C

Boiling point: -26 °C

Flash point: Not applicable for gases and gas mixtures.

Evaporation rate:

Not applicable for gases and gas mixtures.

Flammability range: Non flammable.

Vapour Pressure 20 °C: 5,7 bar

Relative density, gas (Air=1): 3,6

Solubility in water: 1930 mg/l

Partition coefficient: n-octanol/water: 0,94 logPow

Autoignition temperature: Not applicable.

Molecular weight: 102 g/mol

Critical temperature: 100,6 °C

9.2. Other information

Gas/vapour heavier than air. May accumulate in confined spaces, particularly at or below ground level.

SECTION 10: Stability and reactivity

10.1. Reactivity

Unreactive under normal conditions.

10.2. Chemical stability

Stable under normal conditions.

10.3. Possibility of hazardous reactions

None.

10.4. Conditions to avoid

Heat.

10.5. Incompatible materials

Moisture. Oxidising agents. May react violently with alkaline-earth and alkali metals. For material compatibility see latest version of ISO-11114.

10.6. Hazardous decomposition products

Under normal conditions of storage and use, hazardous decomposition products should not be produced. The following decomposition products may be produced:

Carbon monoxide, Carbonyl fluoride, Hydrogen fluoride.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute oral toxicity

Not applicable.

Acute inhalation toxicity

Value: LC50

Species: Rat

Exposure time: 4 h

Value in non-standard unit: 567000 ppm

Method: OECD Test Guideline 403

Acute dermal toxicity

Not applicable.

Acute toxicity other routes

Ingestion is not considered a potential route of exposure.

Skin irritation

Species: Rabbit

Result: Slight irritation.

Not classified as an irritant

Eye irritation

Species: Rabbit

Result: Slight irritation.

Not classified as an irritant

Sensitization

Species: Guinea-pig

This substance is not classified as a sensitizer.

Repeated dose toxicity

Species: Rat

Route of application: Inhalation

Exposure time: Several years

Value type: NOAEL

Value: 50000 ppm

No known effects from this product.

Genetic toxicity in vitro

Test type: Ames test in vitro:

Inactive (Method: OECD Guideline 471)

Test type: In vitro chromosomal abnormality test on human lymphocytes:

Inactive (Method: OECD Guideline 473)

Test type: In vitro gene mutations test on mammalian cells:

Inactive

Genetic toxicity in vivo

Test type: Micronucleus test in vivo mouse:

Result: Inactive

Test type: DNA repair test on rats hepatocytes:

Result: Inactive

Assessment mutagenicity

There is no evidence of mutagenic potential.

Carcinogenicity

Species: Rat

Route of application: Inhalation

Value type: NOAEL

Value: 10.000 ppm

Species: Rat

Route of application: Oral

Value type: NOAEL

Value: 300 mg/kg bw/day

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Assessment carcinogenicity

No evidence of carcinogenic effects.

Toxicity to reproduction/fertility

Test type: Fertility

Species: Mouse

Route of application: Inhalation

Value type: NOAEL

Value: 50.000 ppm

Test type: Gestation

Species: Rabbit

Route of application: Inhalation

Value type: NOAEL

Value: 40.000 ppm

Value type: NOAEC (maternal toxicity)

Value: 2.500 ppm

Method: OECD Test Guideline 414 (Prenatal Developmental Toxicity Study).

Assessment toxicity to reproduction

No indication of toxic effects.

Assessment teratogenicity

No data available.

Experiences with human exposure

Inhalation of thermal decomposition products in high concentrations may cause shortness of breath (lung oedema)

Narcosis.

Irregular cardiac activity.

SECTION 12: Ecological information

12.1. Toxicity

When discharged in large quantities may contribute to the greenhouse effect.

Acute and prolonged toxicity fish

Species: Rainbow trout (*Oncorhynchus mykiss*)

Exposure time: 96 h

Value type: LC50

Value in standard unit mg/l: 450 mg/l

Acute toxicity aquatic invertebrates

Species: Water flea (*Daphnia magna*)

Exposure time: 48 h

Value type: LC50

Value in standard unit mg/l: 980 mg/l

Species: Crustaceans

Exposure time: 48 h

Value type: LC50

Value in standard unit mg/l: 980 mg/l

Toxicity aquatic plants

Species: Algae

Exposure time: 72 h

Value type: EC50

Value in standard unit mg/l: 118 mg/l

Toxicity microorganisms

Species: *Pseudomonas putida*.

Exposure time: 6 h

Value type: EC10

Value in standard unit mg/l: > 730 mg/l

12.2. Persistence and degradability

Not readily biodegradable.

Photo degradation

Compartment: Air

Degradation products: Carbon dioxide/hydrofluoric acid.

Degradation by OH radicals.

Half life (direct photolysis): 3.541 d

Compartment: Air

Degradation by OH radicals., Indirect photo-oxidation

Stability in water

Non-significant hydrolysis

Biodegradation

Test type: Aerobic

Exposure time: 28 d

Method: Closed bottle test

Not readily biodegradable.

12.3. Bioaccumulative potential

Does not bioaccumulate.

12.4. Mobility in soil

Log Koc: 1,57

Henry's constant at 25 °C: 102 hPa.m³/mol

Because of its high volatility, the product is unlikely to cause ground or water pollution.

Transport between environmental compartments

Medium: Water.: 0,07 %

Medium: Air: 99,93 %

Method: Calculated

Volatization Half life: 8,6 - 16,7 Years

Method: Calculated

12.5. Results of PBT and vPvB assessment

Not classified as PBT or vPvB.

12.6. Other adverse effects

Global Warming Potential GWP

Contains fluorinated greenhouse gases covered by the Kyoto protocol.

1.300

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Avoid discharge to atmosphere. Do not discharge into any place where its accumulation could be dangerous. Contact supplier if guidance is required. Gases in pressure containers excluding those, which are mentioned under 16 05 04

EWC Nr. 16 05 05

SECTION 14: Transport information

ADR/RID

14.1. UN number

3159

14.2. UN proper shipping name

1,1,1,2-TETRAFLUOROETHANE (REFRIGERANT GAS R 134a)

14.3. Transport hazard class(es)

Class: 2

Classification Code: 2A

Labels: 2.2

Hazard number: 20

Tunnel restriction code: (C/E)

Emergency Action Code: 2TE

14.4. Packing group (Packing Instruction)

P200

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14.5. Environmental hazards

None.

14.6. Special precautions for user

None.

IMDG

14.1. UN number

3159

14.2. UN proper shipping name

1,1,1,2-TETRAFLUOROETHANE (REFRIGERANT GAS R 134a)

14.3. Transport hazard class(es)

Class: 2.2

Labels: 2.2

EmS: FC,SV,

14.4. Packing group (Packing Instruction)

P200

14.5. Environmental hazards

None.

14.6. Special precautions for user

None.

14.7. Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code

Not applicable.

IATA

14.1. UN number

3159

14.2. UN proper shipping name

1,1,1,2-TETRAFLUOROETHANE (REFRIGERANT GAS R 134a)

14.3. Transport hazard class(es)

Class: 2.2

Labels: 2.2

14.4. Packing group (Packing Instruction)

P200

14.5. Environmental hazards

None.

14.6. Special precautions for user

None.

Other transport information

Avoid transport on vehicles where the load space is not separated from the driver's compartment. Ensure vehicle driver is aware of the potential hazards of the load and knows what to do in the event of an accident or an emergency. Before transporting product containers ensure that they are firmly secured. Ensure that the container valve is closed and not leaking. Ensure that the valve outlet cap nut or plug (where provided) is correctly fitted. Ensure that the valve protection device (where provided) is correctly fitted. Ensure adequate ventilation. Ensure compliance with applicable regulations.

SECTION 15: Regulatory information

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

Seveso Directive 96/82/EC: Not covered.

Other regulations

Regulation on Fluorinated greenhouse gases 842/2006/EC: Listed. Management of Health and Safety at Work Regulations (1999 No. 3242)

The Regulatory Reform (Fire Safety) Order 2005 (2005 No. 1541) Control of Substances Hazardous to Health Regulations (COSHH, 2002 No. 2677)

Provision and Use of Work Equipment Regulations (PUWER, 1998 No. 2306)

Personal Protective Equipment Regulations (1992 No. 2966) Control of Major Accident Hazards Regulations (COMAH, 1999 No. 743)

Chemical Hazards Information and Packaging for Supply (CHIP, 1994 No. 3247)

Pressure Systems Safety Regulations (PER, 2000 No. 128)

This Safety Data Sheet has been produced to comply with Regulation (EU) 453/2010.

15.2. Chemical safety assessment

A CSA does not need to be carried out for this product.

SECTION 16: Other information

Ensure all national/local regulations are observed. The hazard of asphyxiation is often overlooked and must be stressed during operator training. Before using this product in any new process or experiment, a thorough material compatibility and safety study should be carried out.

Advice

Whilst proper care has been taken in the preparation of this document, no liability for injury or damage resulting from its use can be accepted. Details given in this document are believed to be correct at the time of going to press.

Further information

Note:

When using this document care should be taken, as the decimal sign and its position complies with rules for the structure and drafting of international standards, and is a comma on the line.

As an example 2,000 is two (to three decimal places) and not two thousand, whilst 1.000 is one thousand and not one (to three decimal places).

References

Various sources of data have been used in the compilation of this SDS, they include but are not exclusive to:

Agency for Toxic Substances and Diseases Registry (ATSDR) (<http://www.atsdr.cdc.gov/>)

European Chemical Agency: Guidance on the Compilation of Safety Data Sheets.

European Chemical Agency: Information on Registered Substances <http://apps.echa.europa.eu/registered/registered-sub.aspx#search>

European Industrial Gases Association (EIGA) Doc. 169/11 Classification and Labelling guide.

ISO 10156:2010 Gases and gas mixtures -- Determination of fire potential and oxidizing ability for the selection of cylinder valve outlets.

International Programme on Chemical Safety (<http://www.inchem.org/>)

Matheson Gas Data Book, 7th Edition.

National Institute for Standards and Technology (NIST) Standard Reference Database Number 69

Substance specific information from suppliers.

The ESIS (European chemical Substances 5 Information System) platform of the former European Chemicals Bureau (ECB) ESIS (<http://ecb.jrc.ec.europa.eu/esis/>).

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The European Chemical Industry Council (CEFIC) ERICards.
United States of America's National Library of Medicine's toxicology
data network TOXNET (<http://toxnet.nlm.nih.gov/index.html>)
EH40 (as ammended) Workplace exposure limits.

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