

GPS Safety Summary

Substance Name:

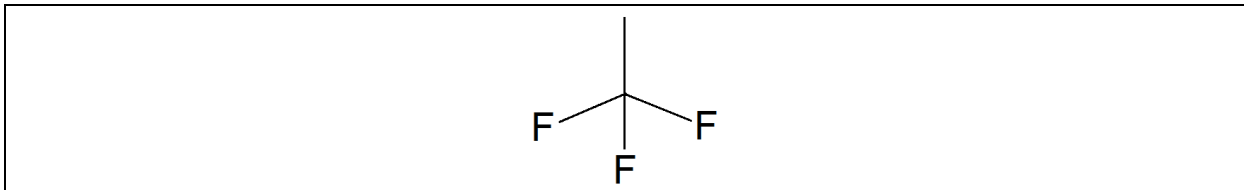
1,1,1-trifluoroethane

1. General Statement

1,1,1-trifluoroethane is an HFC gas (HydroFluoroCarbon substance) used for refrigeration and air conditioning.

2. Chemical Identity

Names: 1,1,1-trifluoroethane; HFC-143a
Brand names: Forane® 143a
Chemical name (IUPAC): 1,1,1-trifluoroethane
CAS number: 420-46-2
EC number: 206-996-5
Molecular formula: C₂H₃F₃
Structure:



3. Use and applications

1,1,1-trifluoroethane is a component of blends used for refrigeration in closed systems. It can be found in commercial refrigeration, food processing & cold storage, transport refrigeration, commercial or domestic air conditioning, air cooled chillers or water cooled chillers used in building and large systems for air conditioning.

1,1,1-trifluoroethane itself is not sold to consumers.

4. Physical / Chemical properties

1,1,1-trifluoroethane is an extremely flammable gas with the following physicochemical properties:

Property	Value
Physical state	Gas at 20°C and 1013 hPa
Form	Liquefied gas (under pressure)
Colour	Colourless
Odour	Odourless

Molecular weight	84.0 g/mol
Density	927 kg/m ³ at 25°C (for liquid)
Vapour pressure	1.26 MPa at 25°C
Freezing / boiling points	-113 °C / -47.4°C
Flash point	Not applicable
Flammability	Lower/Upper flammability Limits: 7 / 16-18% (v/v) Extremely flammable gas
Self-ignition temperature	750°C at 1013 hPa
Explosive / oxidizing properties	Not expected based on structure
Water solubility	0.761 g/L at 25°C (calculated)
Octanol-water partition coefficient (Log K _{ow})	1.74 at 20°C (calculated)

5. Health Effects

1,1,1-trifluoroethane is poorly absorbed and is nearly completely excreted unchanged via exhaled air. 1,1,1-trifluoroethane is non-toxic.

Effect Assessment	Result
Acute Toxicity Oral / inhalation / dermal	Very low acute toxicity by inhalation. High concentrations may cause headache, dizziness or drowsiness. Dermal and oral: not relevant for a gas.
Irritation / corrosion Skin / eye / respiratory tract	No signs of respiratory tract irritation observed in the animals exposed by inhalation on an acute or repeated basis. Skin and eye: frostbite can result from contact with the liquefied form.
Sensitisation	A cardiac sensitisation potential was noted in dogs at high concentrations. Inhalation: no data. Dermal: not relevant for a gas.
Toxicity after repeated exposure Oral / inhalation / dermal	Inhalation: no relevant toxic effects noted in animals exposed for up to 3 months. Dermal and oral: not relevant for a gas.
Genotoxicity / Mutagenicity	Not expected to cause genetic effects based on available test data, <i>in vitro</i> and in animals.
Carcinogenicity	No concern for carcinogenicity in the absence of relevant subchronic toxicity and of genotoxic properties, and based on a one-year oral study in animals.
Reproductive / Developmental Toxicity	No effects on reproductive organs after repeated exposure in animals. No effects on <i>in utero</i> development and health of mother and fetus in animals.

6. Environmental Effects

Based on calculated and experimental data and by comparison with others fluorocarbons, 1,1,1-trifluoroethane is non-toxic to fish, aquatic invertebrates and algae.

As it is a gas, any emitted 1,1,1-trifluoroethane will quickly partition to the atmosphere, where it takes years to photolyse. It will not partition significantly to soil or sediment due to its estimated moderate adsorption potential. It is not expected to bioaccumulate in the food chain based on its estimated low lipophilicity ($\log K_{ow} = 1.74$).

1,1,1-trifluoroethane is a greenhouse gas, *i.e.*, it contributes to global warming. It is not ozone-depleting.

Effect Assessment	Result
Aquatic Toxicity	Acute: not toxic Chronic: no data

Fate and behaviour	Result
Degradation/Persistence	Poorly degradable in water and air. Does not persist in water/soil/sediment as quickly partitioned to atmosphere.
Bioaccumulation potential	Not expected to bioaccumulate significantly
PBT / vPvB conclusion	Not considered to be PBT* or vPvB**

*: Persistent, Bioaccumulative and Toxic (PBT)

** : very Persistent and very Bioaccumulative (vPvB)

7. Exposure

7.1 Human health

In accordance with the REACH Regulation, no exposure scenario is required in the absence of classification for human health.

Consumers:

Consumers are not directly exposed to 1,1,1-trifluoroethane since they are not supposed to open closed receptacles of refrigeration/air conditioning equipment.

In view of its use in closed systems and absence of bioaccumulation, indirect exposure to 1,1,1-trifluoroethane via the environment is negligible.

Workers:

1,1,1-trifluoroethane is industrially manufactured and used (including formulation) in closed systems in a continuous or batch process, minimizing the occupational exposure potential. The final use consists in inclusion in closed receptacles in refrigeration/air conditioning equipment. Workers may be exposed during cleaning, maintenance, transfer, sampling and analysis.

Professionals installing, servicing and maintaining equipment containing 1,1,1-trifluoroethane in closed systems may also be exposed to small amounts. They are specialised personnel meeting specific qualifications and trained to avoid exposure.

Procedures, controls, collective and personal risk management measures are in place, which limit the occupational exposure during the manufacture and use of the substance. Workers who might accidentally come into contact with the substance should follow the safety measures recommended in the Safety Data Sheet.

Risks are controlled when activities are carried out under conditions recommended in the Safety Data Sheet (see Chap. 8).

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7.2 Environment

In accordance with the REACH Regulation, no exposure scenario is required in the absence of classification for the environment.

Industrial manufacture and use (including formulation) takes place in closed systems in a continuous or batch process, minimizing release to the atmosphere.

Professional work on equipment containing 1,1,1-trifluoroethane may involve a release to the atmosphere. Due to its physicochemical properties (see section 6), any emitted 1,1,1-trifluoroethane will stay in the atmosphere.

In accordance with EU Regulation EC 842/2006 on certain fluorinated greenhouse gases, procedures, controls and risk management measures are in place, which strictly limit the environmental exposure and specifically the emissions to the atmosphere.

8. Risk Management recommendations

In accordance with the REACH Regulation, no risk assessment is required in the absence of classification for human health and the environment.

Human health measures	
Organizational	Collect the latest available Safety Data Sheet. Implement good basic standards of occupational hygiene. Ensure operatives are well informed of the hazards. Handle and store according to the indications of the Safety Data Sheet.
Engineering controls	Keep away from open flames/hot surfaces. No smoking. Eliminate all ignition sources. Store protected from sunlight, in a well-ventilated place. Provide appropriate local exhaust ventilation at points of emission. Ensure that eye- and handwash stations and safety showers are close to workstation locations.
Protection	Eye/Face protection: Safety glasses with side-shields
	Skin protection: Protective clothing (cotton)
	Hand protection: Leather gloves
	Respiratory protection: Respirator if ventilation is insufficient
Environment protective measures	
Do not release into the environment.	

9. Regulatory Information / Classification and Labelling



9.1 Regulatory Information

This substance has notably been addressed in the following European Regulations:

- EU Regulation EC 1907/2006 (REACH): the substance has been registered
- EU Regulation EC 842/2006 on certain fluorinated greenhouse gases: the substance is listed under the name HFC-143a.

9.2 Classification and labelling

Under GHS, substances are classified according to their physical, health, and environmental hazards. The hazards are communicated via specific labels and the SDS. GHS attempts to standardize hazard communication so that the intended audience (workers, consumers, transport workers and emergency responders) can better understand the hazards of the chemicals in use. Substances registered for REACH are classified according to CLP (EC) 1272/2008, implementation of the GHS in the European Union.

Classification	
– Flammable gases: Category 1 – Gases under pressure: Category Liquefied Gas	
Signal word	
– Danger	
Pictograms	
– GHS02: Flame	
– GHS04: Gas cylinder	 (facultative due to above symbol)
Hazard statements	
– H220: Extremely flammable gas. – H280: Contains gas under pressure; may explode if heated.	
Additional classification according to Globally Harmonized System (GHS)	
– None	

10. Contact Information within Company

For further information on this substance or product safety summary in general, please contact:

- **ICCA portal where the GPS Safety Summary is posted:**
<http://www.icca-chem.org/en/Home/ICCA-initiatives/global-product-strategy/>

11. Date of Issues / Revision

- Date of issue: 2013/04/15
- Date of revision:

12. Disclaimer

The information contained in this paper is intended as advice only and whilst the information is provided in utmost good faith and has been based on the best information currently available, is to be relied upon at the user's own risk.

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