

## GPS Safety Summary

**Substance Name:**

**Trifluoromethane**

### 1. General Statement

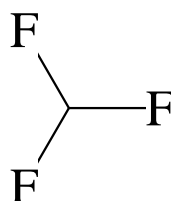
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Forane® 23 is a non-flammable HFC gas (HydroFluoroCarbon substance) which is mainly used as a refrigeration agent, but also as a fire extinguishing agent, a chemical intermediate and etching agent in electronics.

### 2. Chemical Identity

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<b>Name:</b>	Trifluoromethane
<b>Brand names:</b>	Forane® 23
<b>Chemical name (IUPAC):</b>	Trifluoromethane
<b>CAS number:</b>	75-46-7
<b>EC number:</b>	200-872-4
<b>Molecular formula:</b>	CHF <sub>3</sub>
<b>Structure:</b>	



### 3. Use and applications

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Trifluoromethane and its formulations are mainly used for refrigeration in closed systems. Applications include commercial refrigeration, food processing & cold storage, transport refrigeration, commercial or domestic air conditioning, air- or water-cooled chillers used in building and large systems for air conditioning.

It is also used as a fire extinguishing agent, a chemical intermediate (feedstock) and an etching agent in electronics.

Trifluoromethane itself is not sold to consumers.

### 4. Physical / Chemical properties

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Trifluoromethane is a non-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	Slightly ether-like
Molecular weight	70.0 g/mol
Liquid density	673 kg/m <sup>3</sup> at 25°C
Vapour density	2.86 kg/m <sup>3</sup> at 25 °C and 1013 hPa
Vapour pressure	4.71 MPa at 25°C
Freezing / boiling points	-160 to -155°C / -84 to -82°C at 1013 hPa
Flash point	Not applicable
Flammability	Non flammable
Self-ignition temperature	765°C
Explosive / oxidizing properties	Not expected based on structure
Water solubility	838 mg/L at 25°C
Octanol-water partition coefficient (Log K <sub>ow</sub> )	0.84 at 25°C

## 5. Health Effects

Trifluoromethane is expected to be rapidly eliminated from the body; therefore it will not accumulate in the bodies of humans or animals. Trifluoromethane is practically non-toxic. Adverse effects are limited to frostbite upon direct contact with the liquefied gas, and reversible headaches, dizziness and drowsiness at very high concentrations in air.

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.
Sensitization	No cardiac sensitization potential noted in dogs. Inhalation: no data. Dermal: not relevant for a gas.
Toxicity after repeated exposure Oral / inhalation / dermal	Inhalation: no toxic effects noted in animals exposed for up to 3 months. Dermal and oral: not relevant for a gas.
Genotoxicity / Mutagenicity	Negative and positive results in <i>in vitro</i> studies. Two <i>in vivo</i> mouse micronucleus studies showed different results: one showed an isolated positive result at 300 000 ppm, while another one was negative up to 500 000 ppm. These very high concentrations being above those recommended for repeat-dose toxicity studies, the substance is not considered to be a mutagen.
Carcinogenicity	No concern for carcinogenicity in the absence of subchronic toxicity and genotoxic properties.
Reproductive / Developmental Toxicity	A related substance did not impact fertility in animals. Trifluoromethane had no effects on <i>in utero</i> development and health of mother and fetus in animals.

## 6. Environmental Effects

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Testing of aquatic toxicity of gases is very difficult. Trifluoromethane was estimated, based on its structure, to be non-toxic to fish, aquatic invertebrates and algae.

As it is a gas, any emitted Trifluoromethane will quickly partition to the atmosphere, where it takes decades to photolyse. Due to its low lipophilicity and expected moderate adsorption potential (both based on  $\log K_{ow} = 0.84$ ), it is not expected to bioaccumulate in the food chain or to partition significantly to soil or sediment.

Trifluoromethane 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. Does not persist in water/soil/sediment.
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

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### 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 Trifluoromethane 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 Trifluoromethane via the environment is negligible.

#### **Workers:**

Trifluoromethane 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 Trifluoromethane in closed systems may also be exposed to small amounts. They are specialised personnel meeting specific qualifications and trained to avoid exposure.

The uses as a fire extinguishing agent or an etching agent involve low amounts and also mainly occur in closed systems. The use as a chemical intermediate occurs within closed systems and is designed to minimize losses.

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).

## 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 refrigeration equipment or fire extinguishers containing Trifluoromethane may involve release to the atmosphere. Due to its physicochemical properties (see section 6), any emitted Trifluoromethane will stay in the atmosphere.

The use as an etching agent involves low amounts and is unlikely to lead to significant emissions. The use as a chemical intermediate occurs within closed systems and is designed to minimize losses.

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	
<b>Organizational</b>	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.
<b>Engineering controls</b>	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.
<b>Protection</b>	<b>Eye/Face protection:</b> Safety glasses with side-shields
	<b>Skin protection:</b> Protective clothing
	<b>Hand protection:</b> Leather gloves
	<b>Respiratory protection:</b> Respirator if ventilation is insufficient
<b>Environment protective measures</b>	
Do not release into the environment.	

## 9. Regulatory Information / Classification and Labeling

### 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-23.

## 9.2 Classification and labeling

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	
Gases under pressure: Category Liquefied Gas	
Signal word	
Warning	
Pictogram	
GHS04: Gas cylinder	
Hazard statement	
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: 2013/10/16
- 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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