

GPS Safety Summary

Substance Name:

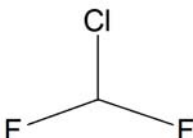
Chlorodifluoromethane

1. General Statement

Chlorodifluoromethane (Forane® 22) is an industrial gas which is used as a chemical intermediate in strictly controlled conditions for the synthesis of Tetrafluoroethylene (TFE).

2. Chemical Identity

Names:	HCFC-22; R-22; Chlorodifluoromethane
Brand name:	Forane® 22
Chemical name (IUPAC):	Chlorodifluoromethane
CAS number:	75-45-6
EC number:	200-871-9
Molecular formula:	CHClF ₂
Structure:	



3. Use and applications

Chlorodifluoromethane (Forane® 22) is industrially manufactured and used as a chemical intermediate under strictly controlled conditions for the synthesis of Tetrafluoroethylene (TFE), which is itself used to manufacture fluoropolymers.

Chlorodifluoromethane is not sold to consumers.

4. Physical / Chemical properties

Chlorodifluoromethane is 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	86.5 g/mol
Vapour pressure	0.914 MPa at 20°C
Freezing / boiling points	-160°C / -40.8°C
Flash point	Not applicable
Flammability	Non-flammable gas

Self-ignition temperature	630 – 635°C
Explosive / oxidizing properties	Not expected based on structure
Water solubility	3 g/L at 25°C
Octanol-water partition coefficient (Log K _{ow})	1.13 at 25°C

5. Health Effects

Chlorodifluoromethane is rapidly eliminated from the body; therefore it will not accumulate in the bodies of humans or animals. Chlorodifluoromethane is practically non-toxic.

Effect Assessment	Result
Acute Toxicity Oral / inhalation / dermal	Very low inhalation toxicity in animals. At extremely high vapour concentrations, it shows some anaesthetic-like effects and can act as an asphyxiant. Dermal and oral: not relevant for a gas.
Irritation / corrosion Skin / eye / respiratory tract	The gas is not irritating to the skin, eyes or respiratory tract. Frostbite can result from contact with liquefied gas.
Sensitisation	Cardiac sensitisation: may cause effects on heart function (cardiac arrhythmia). Inhalation: no data. Dermal: not relevant for a gas.
Toxicity after repeated exposure Oral / inhalation / dermal	Studies of prolonged inhalation in animals showed no specific chronic toxic effects. 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	The cancer risk of chlorodifluoromethane has not been fully agreed. Based on current data, the International Agency for Research on Cancer has concluded that chlorodifluoromethane is not classifiable as to its carcinogenicity to humans since there is inadequate evidence in humans and limited evidence in animals (slight increase in the incidence of fibrosarcomas in salivary glands of male rats exposed to 50000 ppm for 2 years). Overall, most of the available studies in animals support that chlorodifluoromethane presents no human cancer risk.
Reproductive / Developmental Toxicity	Testing has indicated that there were no serious adverse effects on fertility or reproduction upon repeated exposure to chlorodifluoromethane. A low incidence of eye malformations in pups was observed when pregnant rats were exposed to high levels. These effects were not observed in rabbits, and the risk to humans is considered low.

6. Environmental Effects

Chlorodifluoromethane is of very low toxicity to algae and aquatic invertebrates. For fish, no experimental data are available.

As it is a gas, any emitted Chlorodifluoromethane will quickly partition to the atmosphere, where it takes several years to photolyse. It will not partition significantly to soil or sediment due to its volatility and expected moderate adsorption. It is not expected to bioaccumulate in the food chain based on its volatility and low lipophilicity ($\log K_{ow} = 1.13$).

Chlorodifluoromethane is an ozone-depleting substance.

Effect Assessment	Result
Aquatic Toxicity	Acute: not toxic Chronic: no data
Effects on Atmosphere	Ozone-depleting

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.
PBT / vPvB conclusion	Not considered to be PBT* or vPvB**

*: Persistent, Bioaccumulative and Toxic (PBT)

** : very Persistent and very Bioaccumulative (vPvB)

7. Exposure

In accordance with the REACH Regulation, no exposure scenario is required as Chlorodifluoromethane is an intermediate in strictly controlled conditions.

7.1 Human health

Consumers:

Consumers are not directly exposed to Chlorodifluoromethane as this industrial gas is transformed into other substances, and not sold to consumers.

Indirect exposure via the environment is negligible due to the manufacture and use in strictly controlled conditions, the partition of any emission to the atmosphere and the low bioaccumulative potential.

Workers:

Chlorodifluoromethane is industrially manufactured and used within closed systems, under strictly controlled conditions, thus minimizing the occupational exposure potential.

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

When used under strictly controlled conditions as recommended in the Safety Data Sheet (see Chap. 8), exposure is negligible and thus risks are acceptable.

7.2 Environment

Chlorodifluoromethane is industrially manufactured and used in closed systems under strictly controlled conditions in a continuous process and consumed when used as an intermediate. Releases to the environment are therefore minimized.

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Procedures, controls and risk management measures are in place, which further limit the environmental exposure.

If accidentally released to the environment, Chlorodifluoromethane would quickly partition to the atmosphere as it is a gas.

When used under strictly controlled conditions as recommended in the Safety Data Sheet (see Chap. 8), exposure is negligible and thus risks are acceptable.

8. Risk Management recommendations

In accordance with the REACH Regulation, no risk assessment is required as Chlorodifluoromethane is an intermediate in strictly controlled conditions.

Human health measures									
Organizational	<p>Only use for the purpose of chemical transformation (intermediate).*</p> <p>Implement high standards of occupational hygiene.*</p> <p>Ensure operatives are well informed of the hazards and trained to minimise exposures.*</p> <p>Maintain clear and up-to-date handling procedures and control their application.*</p> <p>Collect the latest available Safety Data Sheet.</p> <p>Handle and store according to the indications of the Safety Data Sheet.</p>								
Engineering controls	<p>Manufacture and use in rigorously contained (closed) systems.*</p> <p>Use material of high integrity for loading and unloading.*</p> <p>Reduce exposures to a minimum and ensure their regular monitoring.*</p> <p>Provide sufficient ventilation and/or local exhaust ventilation in work areas.*</p> <p>Purge and ventilate systems before cleaning/maintenance worker entry.*</p> <p>Handle only in well ventilated areas.</p> <p>Prevent inflammation and explosion of the pressured container. Notably, do not expose the container to sunlight, heat or sources of ignition.</p> <p>Ensure that eye- and handwash stations and safety showers are close to workstation locations.</p>								
Protection	<table border="1"> <tr> <td style="background-color: #e0f7fa;">Eye/Face protection:</td> <td>Safety glasses with side-shields</td> </tr> <tr> <td style="background-color: #e0f7fa;">Skin protection:</td> <td>Protective suit (cotton)</td> </tr> <tr> <td style="background-color: #e0f7fa;">Hand protection:</td> <td>Leather gloves</td> </tr> <tr> <td style="background-color: #e0f7fa;">Respiratory protection:</td> <td>Respirator if ventilation is insufficient or when opening systems.*</td> </tr> </table>	Eye/Face protection:	Safety glasses with side-shields	Skin protection:	Protective suit (cotton)	Hand protection:	Leather gloves	Respiratory protection:	Respirator if ventilation is insufficient or when opening systems.*
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Environment protective measures									
<p>Do not release into the environment.</p> <p>Collect and recycle the used product: contact the manufacturer for further information.</p>									

*: Taken together, these specific risk management measures enable to respect strictly controlled conditions of manufacture and use along the whole life-cycle.

9. Regulatory Information / Classification and Labelling



9.1 Regulatory Information

This substance has notably been registered and/or assessed under:

- EU Regulation EC 1907/2006 (REACH)
- US EPA IRIS (Integrated Risk Information System)

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	
– Gases under pressure: Category Liquefied Gas. – Hazardous to the ozone layer, Category 1, H420	
Signal word	
– Warning	
Pictograms	
– GHS04: Gas cylinder	
– GHS07: Exclamation mark	
Hazard statements	
– H280: Contains gas under pressure; may explode if heated. – H420: Harms public health and the environment by destroying ozone in the upper atmosphere.	
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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