2,2-DICHLORO-1,1,1-TRIFLUOROETHANE

A-Gas (South Africa) (Pty) Ltd

Chemwatch Hazard Alert Code: **2**

Chemwatch: **45366**
Version No: **9.1**
Safety Data Sheet

Initial Date: **20/02/2001**
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Print Date: **06/11/2026**
L.GHS.ZAF.EN

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

Product Identifier

Product name	2,2-DICHLORO-1,1,1-TRIFLUOROETHANE
Synonyms	CHCl2-CF3; C2-H-Cl2-F3; ethane, 2,2-dichloro-1,1-trifluoroethane; 2,2-dichloro-1,1,1-trifluoroethane; 1,1-dichloro-2,2,2-trifluoroethane; dichlorotrifluoroethane; dichloro(trifluoromethyl)methane; trifluorodichloroethane; FC 123; Freon 123; R 123; R-123; HCFC-123; HCFC 123; hydrochloro fluorocarbon; 1,1,1-trifluoro-2,2-dichloroethane hydro chloro fluoro carbon; halogenated hydrocarbon fluorocarbon; dichlorotrifluorocarbon; Du Pont Suva Centri-LP; Refrigerant R-123 R123; Forane 123; Genetron 123; DuPont Registry Number: DP137-37-5
Chemical formula	CF3CHCl2
Other means of identification	Not Available
CAS number	306-83-2

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

Relevant identified uses	Component of electrical cleaning, degreasing solvents; also dry-cleaning. Replacement of CFC's as air conditioning refrigerants. Ozone depletion potential 0.02/1.00 - low. HCFCs are used in a variety of applications because of their low toxicity, reactivity and flammability. Every permutation of fluorine, chlorine and hydrogen based on methane and ethane has been examined and most have been commercialized. Furthermore, many examples are known for higher numbers of carbon as well as related compounds containing bromine. Uses include refrigerants, blowing agents, propellants in medicinal applications and degreasing solvents.

Details of the manufacturer or importer of the safety data sheet

Registered company name	**A-Gas (South Africa) (Pty) Ltd**
Address	8 Railway Road, Montague Gardens Cape Town 7441 South Africa
Telephone	+27 (0) 21 551 8790
Fax	+27 (0) 21 551 8758
Website	www.agas.com
Email	info.sa@agas.com

Emergency telephone number

Association / Organisation	**A-Gas (South Africa) (Pty) Ltd**	**CHEMWATCH EMERGENCY RESPONSE (24/7)**
Emergency telephone number(s)	**0800 00 5817**	**0800 296456 (ID#: 45366)**
Other emergency telephone number(s)	**Not Available**	**+61 3 9573 3188**

SECTION 2 Hazards identification

Classification of the substance or mixture

Classification	Carcinogenicity Category 2, Reproductive Toxicity Effects on or via Lactation, Specific Target Organ Toxicity - Repeated Exposure Category 2, Hazardous to the Ozone Layer Category 1

Label elements

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Hazard pictogram(s)	
Signal word	**Warning**

Hazard statement(s)

H351	Suspected of causing cancer.
H362	May cause harm to breast-fed children.
H373	May cause damage to organs through prolonged or repeated exposure.
H420	Harms public health and the environment by destroying ozone in the upper atmosphere.

Precautionary statement(s) General

P101	If medical advice is needed, have product container or label at hand.
P102	Keep out of reach of children.
P103	Read label before use.

Precautionary statement(s) Prevention

P260	Do not breathe mist/vapours/spray.
P263	Avoid contact during pregnancy/while nursing.
P280	Wear protective gloves and protective clothing.
P270	Do not eat, drink or smoke when using this product.
P202	Do not handle until all safety precautions have been read and understood.
P264	Wash all exposed external body areas thoroughly after handling.

Precautionary statement(s) Response

P308+P313	IF exposed or concerned: Get medical advice/ attention.
P314	Get medical advice/attention if you feel unwell.

Precautionary statement(s) Storage

P405	Store locked up.

Precautionary statement(s) Disposal

P501	Dispose of contents/container to authorised hazardous or special waste collection point in accordance with any local regulation.
P502	Refer to manufacturer/supplier for information on recovery/recycling.

No further product hazard information.

SECTION 3 Composition / information on ingredients

Substances

CAS No	%[weight]	Name
306-83-2	>99	2,2-dichloro-1,1,1-trifluoroethane

Mixtures

See section above for composition of Substances

SECTION 4 First aid measures

Description of first aid measures

Eye Contact	If this product comes in contact with the eyes: • Wash out immediately with fresh running water. • Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.

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	‣ Seek medical attention without delay; if pain persists or recurs seek medical attention. ‣ Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.
Skin Contact	If skin contact occurs: ‣ Immediately remove all contaminated clothing, including footwear. ‣ Flush skin and hair with running water (and soap if available). ‣ Seek medical attention in event of irritation.
Inhalation	‣ If fumes or combustion products are inhaled remove from contaminated area. ‣ Lay patient down. Keep warm and rested. ‣ Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures. ‣ Apply artificial respiration if not breathing, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary. ‣ Transport to hospital, or doctor.
Ingestion	‣ For advice, contact a Poisons Information Centre or a doctor. ‣ Avoid giving milk or oils. ‣ Avoid giving alcohol. ‣ If swallowed do **NOT** induce vomiting. ‣ If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration. ‣ Observe the patient carefully. ‣ Never give liquid to a person showing signs of being sleepy or with reduced awareness; i.e. becoming unconscious. ‣ Give water to rinse out mouth, then provide liquid slowly and as much as casualty can comfortably drink. ‣ Seek medical advice.

Indication of any immediate medical attention and special treatment needed

Treat symptomatically.
for intoxication due to Freons/ Halons;
A: Emergency and Supportive Measures
- Maintain an open airway and assist ventilation if necessary
- Treat coma and arrhythmias if they occur. Avoid (adrenaline) epinephrine or other sympathomimetic amines that may precipitate ventricular arrhythmias. Tachyarrhythmias caused by increased myocardial sensitisation may be treated with propranolol, 1-2 mg IV or esmolol 25-100 microgm/kg/min IV.
- Monitor the ECG for 4-6 hours

B: Specific drugs and antidotes:
- There is no specific antidote

C: Decontamination
- Inhalation; remove victim from exposure, and give supplemental oxygen if available.
- Ingestion; (a) Prehospital: Administer activated charcoal, if available. **DO NOT** induce vomiting because of rapid absorption and the risk of abrupt onset CNS depression. (b) Hospital: Administer activated charcoal, although the efficacy of charcoal is unknown. Perform gastric lavage only if the ingestion was very large and recent (less than 30 minutes)

D: Enhanced elimination:
- There is no documented efficacy for diuresis, haemodialysis, haemoperfusion, or repeat-dose charcoal.

POISONING and DRUG OVERDOSE, Californian Poison Control System Ed. Kent R Olson; 3rd Edition
- Do not administer sympathomimetic drugs unless absolutely necessary as material may increase myocardial irritability.
- No specific antidote.
- Because rapid absorption may occur through lungs if aspirated and cause systematic effects, the decision of whether to induce vomiting or not should be made by an attending physician.
- If lavage is performed, suggest endotracheal and/or esophageal control.
- Danger from lung aspiration must be weighed against toxicity when considering emptying the stomach.
- Treatment based on judgment of the physician in response to reactions of the patient

SECTION 5 Firefighting measures

Extinguishing media

- There is no restriction on the type of extinguisher which may be used.
- Use extinguishing media suitable for surrounding area.

Special hazards arising from the substance or mixture

Fire Incompatibility	‣ Avoid contamination with oxidising agents i.e. nitrates, oxidising acids, chlorine bleaches, pool chlorine etc. as ignition may result

Advice for firefighters

Fire Fighting	‣ Alert Fire Brigade and tell them location and nature of hazard. ‣ Wear breathing apparatus plus protective gloves in the event of a fire. ‣ Prevent, by any means available, spillage from entering drains or water courses. ‣ Use fire fighting procedures suitable for surrounding area.
Fire/Explosion Hazard	‣ carbon dioxide (CO_2) hydrogen chloride phosgene hydrogen fluoride

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- other pyrolysis products typical of burning organic material.

Contains low boiling substance: Closed containers may rupture due to pressure buildup under fire conditions.

- Non combustible.
- Not considered to be a significant fire risk.
- Heating may cause expansion or decomposition leading to violent rupture of containers.
- May emit corrosive, poisonous fumes.

SECTION 6 Accidental release measures

Personal precautions, protective equipment and emergency procedures

See section 8

Environmental precautions

See section 12

Methods and material for containment and cleaning up

Minor Spills

Environmental hazard - contain spillage.

- Clean up all spills immediately.
- Avoid breathing vapours and contact with skin and eyes.
- Control personal contact with the substance, by using protective equipment.
- Contain and absorb spill with sand, earth, inert material or vermiculite.

Major Spills

Environmental hazard - contain spillage.
Chemical Class: aliphatics, halogenated
For release onto land: recommended sorbents listed in order of priority.

SORBENT TYPE	RANK	APPLICATION	COLLECTION	LIMITATIONS
LAND SPILL - SMALL				
cross-linked polymer - particulate	1	shovel	shovel	R, W, SS
cross-linked polymer - pillow	1	throw	pitchfork	R, DGC, RT
wood fiber - pillow	2	throw	pitchfork	R, P, DGC, RT
treated wood fibre - particulate	2	shovel	shovel	R, W, DGC
sorbent clay - particulate	3	shovel	shovel	R, I, P
foamed glass - pillow	3	throw	pitchfork	R, P, DGC, RT
LAND SPILL - MEDIUM				
cross-linked polymer - particulate	1	blower	skiploader	R,W, SS
cross-linked polymer - pillow	2	throw	skiploader	R, DGC, RT
sorbent clay - particulate	3	blower	skiploader	R, I, P
polypropylene - particulate	3	blower	skiploader	W, SS, DGC
foamed glass - pillow	3	throw	skiploader	R, P, DGC, RT
expanded mineral - particulate	4	blower	skiploader	R, I, W, P, DGC

Legend
DGC: Not effective where ground cover is dense
R; Not reusable
I: Not incinerable
P: Effectiveness reduced when rainy
RT:Not effective where terrain is rugged
SS: Not for use within environmentally sensitive sites
W: Effectiveness reduced when windy
Reference: Sorbents for Liquid Hazardous Substance Cleanup and Control;
R.W Melvold et al: Pollution Technology Review No. 150: Noyes Data Corporation 1988
Moderate hazard.

- Clear area of personnel and move upwind.
- Alert Fire Brigade and tell them location and nature of hazard.
- Wear breathing apparatus plus protective gloves.

Personal Protective Equipment advice is contained in Section 8 of the SDS.

SECTION 7 Handling and storage

Precautions for safe handling

Safe handling

Contains low boiling substance:
Storage in sealed containers may result in pressure buildup causing violent rupture of containers not rated appropriately.

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	‣ Check for bulging containers. ‣ Vent periodically ‣ Always release caps or seals slowly to ensure slow dissipation of vapours ‣ **DO NOT** allow clothing wet with material to stay in contact with skin ‣ Avoid skin contact, including inhalation. ‣ Wear protective clothing when risk of exposure occurs. ‣ Use in a well-ventilated area. ‣ Avoid contact with moisture.
Other information	‣ Store in original containers. ‣ Keep containers securely sealed. ‣ Store in a cool, dry area protected from environmental extremes. ‣ Store away from incompatible materials and foodstuff containers. · Do NOT store halogenated aliphatics in areas containing alkali or alkaline earth metals such as powdered aluminum, zinc, or beryllium

Conditions for safe storage, including any incompatibilities

Suitable container	‣ **DO NOT** use aluminium or galvanised containers ‣ Polyethylene or polypropylene container. ‣ Packing as recommended by manufacturer. ‣ Check all containers are clearly labelled and free from leaks.
Storage incompatibility	Haloalkanes: ‣ are highly reactive:some of the more lightly substituted lower members are highly flammable; the more highly substituted may be used as fire suppressants, not always with the anticipated results. ‣ may react with the lighter divalent metals to produce more reactive compounds analogous to Grignard reagents. ‣ may produce explosive compounds following prolonged contact with metallic or other azides ‣ may react on contact with potassium or its alloys - although apparently stable on contact with a wide rage of halocarbons, reaction products may be shock-sensitive and may explode with great violence on light impact; severity generally increases with the degree of halocarbon substitution and potassium-sodium alloys give extremely sensitive mixtures . BRETHERICK L.: Handbook of Reactive Chemical Hazards ‣ react with metal halides and active metals, eg. sodium (Na), potassium (K), lithium (Li),calcium (Ca), zinc (Zn), powdered aluminium (Al) and aluminium alloys, magnesium (Mg) and magnesium alloys.



+	x	+	o	+	+	+

X — *Must not be stored together*
0 — *May be stored together with specific preventions*
+ — *May be stored together*

Note: Depending on other risk factors, compatibility assessment based on the table above may not be relevant to storage situations, particularly where large volumes of dangerous goods are stored and handled. Reference should be made to the Safety Data Sheets for each substance or article and risks assessed accordingly.

SECTION 8 Exposure controls / personal protection

Control parameters

Occupational Exposure Limits (OEL)

INGREDIENT DATA

Not Available

MATERIAL DATA

ES TWA: 10 ppm, 62.5 mg/m3 Carcinogen Category 3b CEL TWA: 10 ppm, 62.5 mg/m3 [Du Pont] Emergency Exposure Limit: 1000 ppm for up to 60 mins 2500 ppm not-to-exceed ceiling for 1 minute* * Established to facilitate site and plant emergency evacuation and to specify airborne concentrations of brief durations which should not result in permanent adverse health effects or interfere with escape. These limits are used in conjunction with engineering controls/monitoring and as an aid in planning for episodic releases and spills. [Du Pont]
Sensory irritants are chemicals that produce temporary and undesirable side-effects on the eyes, nose or throat. Historically occupational exposure standards for these irritants have been based on observation of workers' responses to various airborne concentrations. Present day expectations require that nearly every individual should be protected against even minor sensory irritation and exposure standards are established using uncertainty factors or safety factors of 5 to 10 or more. On occasion animal no-observable-effect-levels (NOEL) are used to determine these limits where human results are unavailable.

CAUTION: This substance is classified by the NOHSC as Category 3 Suspected of having carcinogenic potential
MAK IIIB: Substances suspected of having carcinogenic potential
MAK values, and categories and groups are those recommended within the Federal Republic of Germany

Exposure controls

Appropriate engineering controls	Engineering controls are used to remove a hazard or place a barrier between the worker and the hazard. Well-designed engineering controls can be highly effective in protecting workers and will typically be independent of worker interactions to provide this high level of protection.

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	The basic types of engineering controls are: Process controls which involve changing the way a job activity or process is done to reduce the risk. Enclosure and/or isolation of emission source which keeps a selected hazard "physically" away from the worker and ventilation that strategically "adds" and "removes" air in the work environment.
Individual protection measures, such as personal protective equipment	
Eye and face protection	‣ Safety glasses with side shields. ‣ Chemical goggles.[AS/NZS 1337.1, EN166 or national equivalent] ‣ Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lenses or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience.
Skin protection	See Hand protection below
Hands/feet protection	‣ Butyl rubber gloves · Butyl rubber gloves should be used when handling halogenated aliphatics . · Nitrile, PVC-coated nitrile, and PVC protective equipment are not recommended The selection of suitable gloves does not only depend on the material, but also on further marks of quality which vary from manufacturer to manufacturer. Where the chemical is a preparation of several substances, the resistance of the glove material can not be calculated in advance and has therefore to be checked prior to the application. The exact break through time for substances has to be obtained from the manufacturer of the protective gloves and has to be observed when making a final choice. Personal hygiene is a key element of effective hand care. ‣ Protective gloves eg. Leather gloves or gloves with Leather facing
Body protection	See Other protection below
Other protection	· Halogen-selective detectors use a specialized sensor that allows the monitor to detect compounds containing fluorine, chlorine, bromine, and iodine with-out interference from other species.These detectors are typically easy to use, feature higher sensitivity than the nonselective detectors (detection limits are typically <5 ppm when used as an area monitor and <1.4 gm/yr [<0.05 oz/yr] when used as a leak pinpointer). · Compound-Specific Detectors are typically capable of detecting the presence of a single compound without interference from other compounds. ‣ Overalls. ‣ P.V.C apron. ‣ Barrier cream. ‣ Skin cleansing cream.

Respiratory protection

Type AX Filter of sufficient capacity. (AS/NZS 1716 & 1715, EN 143:2000 & 149:2001, ANSI Z88 or national equivalent)

- Cartridge respirators should never be used for emergency ingress or in areas of unknown vapour concentrations or oxygen content.
- The wearer must be warned to leave the contaminated area immediately on detecting any odours through the respirator. The odour may indicate that the mask is not functioning properly, that the vapour concentration is too high, or that the mask is not properly fitted. Because of these limitations, only restricted use of cartridge respirators is considered appropriate.
- Cartridge performance is affected by humidity. Cartridges should be changed after 2 hr of continuous use unless it is determined that the humidity is less than 75%, in which case, cartridges can be used for 4 hr. Used cartridges should be discarded daily, regardless of the length of time used

Selection of the Class and Type of respirator will depend upon the level of breathing zone contaminant and the chemical nature of the contaminant. Protection Factors (defined as the ratio of contaminant outside and inside the mask) may also be important.

Required minimum protection factor	Maximum gas/vapour concentration present in air p.p.m. (by volume)	Half-face Respirator	Full-Face Respirator
up to 10	1000	AX-AUS / Class 1	-
up to 50	1000	-	AX-AUS / Class 1
up to 50	5000	Airline *	-
up to 100	5000	-	AX-2
up to 100	10000	-	AX-3
100+		-	Airline**

** - Continuous-flow or positive pressure demand.
A(All classes) = Organic vapours, B AUS or B1 = Acid gases, B2 = Acid gas or hydrogen cyanide(HCN), B3 = Acid gas or hydrogen cyanide(HCN), E = Sulfur dioxide(SO2), G = Agricultural chemicals, K = Ammonia(NH3), Hg = Mercury, NO = Oxides of nitrogen, MB = Methyl bromide, AX = Low boiling point organic compounds(below 65 deg C)

SECTION 9 Physical and chemical properties

Information on basic physical and chemical properties

Appearance	Clear colourless highly volatile liquid which boils on a warm day; i.e. at temperatures above 23 C.. Solubility in water = 0.4% @ 25 C. Ethereal odour. Soluble in ether, alcohol and benzene. The physical properties of HCFCs are tunable by changes in the number and identity of the halogen atoms. In general, they are volatile but less so than their parent alkanes. The decreased volatility is attributed to the molecular polarity induced by the halides, which induces

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	intermolecular interactions.

Physical state	Liquid	**Relative density (Water = 1)**	1.46 @ 25 deg C
Odour	Not Available	**Partition coefficient n-octanol / water**	Not Available
Odour threshold	Not Available	**Auto-ignition temperature (°C)**	Not Available
pH (as supplied)	Not Applicable	**Decomposition temperature (°C)**	Not Available
Melting point / freezing point (°C)	-107	**Viscosity (mm2/s)**	Not Available
Initial boiling point and boiling range (°C)	27.6 (26-29)	**Molecular weight (g/mol)**	152.93
Flash point (°C)	Not Applicable	**Taste**	Not Available
Evaporation rate	<1 (CCl4=1)	**Explosive properties**	Not Available
Flammability	Not Applicable	**Oxidising properties**	Not Available
Upper Explosive Limit (%)	Not Available	**Surface Tension (dyn/cm or mN/m)**	Not Available
Lower Explosive Limit (%)	Not Available	**Volatile Component (%vol)**	100
Vapour pressure (kPa)	89.6 @ 25 deg C	**Gas group**	Not Available
Solubility in water	Partly miscible	**pH as a solution (1%)**	Not Applicable
Vapour density (Air = 1)	5.3	**VOC g/L**	1460
Heat of Combustion (kJ/g)	Not Available	**Ignition Distance (cm)**	Not Available
Flame Height (cm)	Not Available	**Flame Duration (s)**	Not Available
Enclosed Space Ignition Time Equivalent (s/m3)	Not Available	**Enclosed Space Ignition Deflagration Density (g/m3)**	Not Available

SECTION 10 Stability and reactivity

Reactivity	See section 7
Chemical stability	‣ Unstable in the presence of incompatible materials. ‣ Product is considered stable. ‣ Hazardous polymerisation will not occur.
Possibility of hazardous reactions	See section 7
Conditions to avoid	See section 7
Incompatible materials	See section 7
Hazardous decomposition products	See section 5

SECTION 11 Toxicological information

Information on toxicological effects

a) Acute Toxicity	Based on available data, the classification criteria are not met.
b) Skin Irritation/Corrosion	Based on available data, the classification criteria are not met.
c) Serious Eye Damage/Irritation	Based on available data, the classification criteria are not met.
d) Respiratory or Skin sensitisation	Based on available data, the classification criteria are not met.
e) Mutagenicity	Based on available data, the classification criteria are not met.
f) Carcinogenicity	There is sufficient evidence to classify this material as carcinogenic
g) Reproductivity	There is sufficient evidence to classify this material as toxic to reproductivity
h) STOT - Single Exposure	Based on available data, the classification criteria are not met.
i) STOT - Repeated Exposure	There is sufficient evidence to classify this material as toxic to specific organs through repeated exposure
j) Aspiration Hazard	Based on available data, the classification criteria are not met.

Inhaled	Toxic effects noted in animals from a single exposure by inhalation of 5000 ppm or greater include effects on unconditioned reflexes, locomotor activity and co-ordination suggesting anaesthetic effects. Single inhalation exposure above 18000 ppm caused central nervous system effects such as anaesthesia and non-specific effects associated with lethality. Cardiac sensitisation occurred in dogs at concentrations of 20000 ppm or greater. Repeated exposure to 300 ppm resulted in alterations to blood chemistry; higher doses produced anaesthesia,

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	reduced lymphocyte counts, increased liver weight and enzyme alterations and decreased body weight. Rats exhibited altered clinical chemistry and increased urinary fluoride concentrations. Dogs exhibited slight liver damage. Inhalation of vapours may cause drowsiness and dizziness. This may be accompanied by narcosis, reduced alertness, loss of reflexes, lack of coordination and vertigo. Inhalation of vapours or aerosols (mists, fumes), generated by the material during the course of normal handling, may be damaging to the health of the individual. Limited evidence or practical experience suggests that the material may produce irritation of the respiratory system, in a significant number of individuals, following inhalation. In contrast to most organs, the lung is able to respond to a chemical insult by first removing or neutralising the irritant and then repairing the damage. The repair process, which initially evolved to protect mammalian lungs from foreign matter and antigens, may however, produce further lung damage resulting in the impairment of gas exchange, the primary function of the lungs. Respiratory tract irritation often results in an inflammatory response involving the recruitment and activation of many cell types, mainly derived from the vascular system. Exposure to high concentrations of fluorocarbons may produce cardiac arrhythmias or cardiac arrest due sensitisation of the heart to adrenalin or noradrenalin. Deaths associated with exposures to fluorocarbons (specifically halogenated aliphatics) have occurred in occupational settings and in inhalation of bronchodilator drugs. Bronchospasm consistently occurs in human subjects inhaling fluorocarbons. At a measured concentration of 1700 ppm of one of the commercially available aerosols there is a biphasic change in ventilatory capacity, the first reduction occurring within a few minutes and the second delayed up to 30 minutes. Acute intoxication by halogenated aliphatic hydrocarbons appears to take place over two stages. Signs of a reversible narcosis are evident in the first stage and in the second stage signs of injury to organs may become evident, a single organ alone is (almost) never involved. Material is highly volatile and may quickly form a concentrated atmosphere in confined or unventilated areas. The vapour may displace and replace air in breathing zone, acting as a simple asphyxiant. This may happen with little warning of overexposure. Depression of the central nervous system is the most outstanding effect of most halogenated aliphatic hydrocarbons. Inebriation and excitation, passing into narcosis, is a typical reaction. In severe acute exposures there is always a danger of death from respiratory failure or cardiac arrest due to a tendency to make the heart more susceptible to catecholamines (adrenalin)
Ingestion	Ingestion is not expected to produce harmful effects based on the available information. However, the material may still cause adverse health effects following ingestion, particularly in individuals with pre-existing organ damage (e.g. liver or kidney impairment).
Skin Contact	Single application of high doses to the skin cause non-specific effects such as weight loss and irritation. Skin contact is not expected to result in harmful health effects and the material is not classified as hazardous by the dermal route under Regulation (EC) No 1272/2008 (CLP), as amended. However, the material may cause harm following entry through wounds, lesions or abrasions. Repeated exposure may cause skin cracking, flaking or drying following normal handling and use. Limited evidence exists, or practical experience predicts, that the material either produces inflammation of the skin in a substantial number of individuals following direct contact, and/or produces significant inflammation when applied to the healthy intact skin of animals, for up to four hours, such inflammation being present twenty-four hours or more after the end of the exposure period. Skin irritation may also be present after prolonged or repeated exposure; this may result in a form of contact dermatitis (nonallergic). The dermatitis is often characterised by skin redness (erythema) and swelling (oedema) which may progress to blistering (vesiculation), scaling and thickening of the epidermis. At the microscopic level there may be intercellular oedema of the spongy layer of the skin (spongiosis) and intracellular oedema of the epidermis. In common with other halogenated aliphatics, fluorocarbons may cause dermal problems due to a tendency to remove natural oils from the skin causing irritation and the development of dry, sensitive skin. They do not appear to be appreciably absorbed. Open cuts, abraded or irritated skin should not be exposed to this material Material on the skin evaporates rapidly and may cause tingling, chilling and even temporary numbness Entry into the blood-stream through, for example, cuts, abrasions, puncture wounds or lesions, may produce systemic injury with harmful effects. Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.
Eye	Although the liquid is not classified as an eye irritant under Regulation (EC) No 1272/2008 (CLP), as amended, direct contact with the eye may produce transient discomfort characterised by tearing or conjunctival redness (as with windburn).
Chronic	Inhalation of up to 5000 ppm for two years caused benign testicular and benign pancreatic tumours in male rats; benign pancreatic tumours were observed in female rats exposed to 5000 ppm. Both sexes exhibited an increase in benign liver tumours when exposed to 5000 ppm over two years. It should be concluded * that until further data becomes available about the mechanism of HCFC-123 induced tumours, particularly in respect of cholangiofibroma and pancreatic adenoma induction, that the carcinogenicity findings in rats may have relevance for humans. * [Commonwealth of Australia Gazette September 1997] No genotoxic or adverse reproductive effects were apparent in animal studies; one study indicated mammalian cell culture genetic damage.* [DuPont] On the basis, primarily, of animal experiments, concern has been expressed that the material may produce carcinogenic or mutagenic effects; in respect of the available information, however, there presently exists inadequate data for making a satisfactory assessment. Harmful: danger of serious damage to health by prolonged exposure through inhalation. Serious damage (clear functional disturbance or morphological change which may have toxicological significance) is likely to be caused by repeated or prolonged exposure. As a rule the material produces, or contains a substance which produces severe lesions. Such damage may become apparent following direct application in subchronic (90 day) toxicity studies or following sub-acute (28 day) or chronic (two-year) toxicity tests. Limited evidence suggests that repeated or long-term occupational exposure may produce cumulative health effects involving organs or biochemical systems. It is generally accepted that the fluorocarbons are less toxic than the corresponding halogenated aliphatic based on chlorine. Repeated inhalation exposure to the fluorocarbon FC-11 does not produce pathologic lesions of the liver and other visceral organs in experimental animals. There has been conjecture in non-scientific publications that fluorocarbons may cause leukemia, cancer, sterility and birth defects; these have not been verified by current research. The high incidence of cancer, spontaneous abortion and congenital anomalies amongst hospital personnel, repeatedly exposed to fluorine-containing general anaesthetics, has caused some scientists to call for a lowering of the fluorocarbon exposure standard to 5 ppm since some are mutagens.

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	TOXICITY	IRRITATION
2,2-DICHLORO-1,1,1-TRIFLUOROETHANE	Dermal (rabbit) LD50: >2000 mg/kg[2]	Eye (Rodent - rabbit): 0.1mL - Moderate
	Inhalation (Rat) LC50: 32000 ppm4h[2]	Eye (Rodent - rabbit): 100uL - Mild
		Eye: no adverse effect observed (not irritating)[1]
		Skin: no adverse effect observed (not irritating)[1]

Legend:	*1. Value obtained from Europe ECHA Registered Substances - Acute toxicity 2. Value obtained from manufacturer's SDS. Unless otherwise specified data extracted from RTECS - Register of Toxic Effect of chemical Substances*

2,2-DICHLORO-1,1,1-TRIFLUOROETHANE	Chlorofluorocarbons may enter the human organism by inhalation, ingestion, or dermal contact. Inhalation is the most common and important route of entry, and exhalation is the most significant route of elimination from the body. Controlled studies with volunteer subjects and experimental animals have provided substantial data from exposures to a number of the chlorofluorocarbons. CFCs and HCFCs are known to sensitise the heart to adrenalin-induced arrhythmias. CFCs: · can be absorbed across the alveolar membrane, gastro- intestinal tract, or the skin; · are absorbed rapidly into the blood, following inhalation; · are absorbed into the blood at a decreasing rate as blood concentration increases; · once in the blood, are absorbed by various tissues; · will reach a stable blood level if exposure is sufficiently long, indicating an equilibrium between the air containing the chlorofluorocarbons and the blood; · are still absorbed by body tissue, after the initial blood level stabilization, and continue to enter the body. Studies with animals indicate that chlorofluorocarbons are rapidly absorbed after inhalation and are distributed by blood into practically all tissues of the body. The highest concentrations are usually found in fatty or lipid-containing tissues. For dichlorotrifloroethane (HCFC -123) and dichloropentafluoropropane (HCFC-225) Prolonged inhalation of high concentrations of HCFC-123 vapour may cause temporary nervous system depression with anesthetic effects such as dizziness, headache, confusion, incoordination, and loss of consciousness. With gross overexposure (greater than 20% concentration), a temporary alteration of the heart s electrical activity with irregular pulse, palpitations, or inadequate circulation may occur. Similar effects are observed in overexposure to CFC-11. Inhalation may cause liver effects with extended high-level exposures. Disinfection by products (DBPs) re formed when disinfectants such as chlorine, chloramine, and ozone react with organic and inorganic matter in water. The observations that some DBPs such as trihalomethanes (THMs), di-/trichloroacetic acids, and 3-chloro-4-(dichloromethyl)-5-hydroxy-2(5H)-furanone (MX) are carcinogenic in animal studies have raised public concern over the possible adverse health effects of DBPs. To date, several hundred DBPs have been identified. Numerous haloalkanes and haloalkenes have been tested for carcinogenic and mutagenic activities. n general, the genotoxic potential is dependent on the nature, number, and position of halogen(s) and the molecular size of the compound.

Acute Toxicity	✗	**Carcinogenicity**	✓
Skin Irritation/Corrosion	✗	**Reproductivity**	✗
Serious Eye Damage/Irritation	✗	**STOT - Single Exposure**	✗
Respiratory or Skin sensitisation	✗	**STOT - Repeated Exposure**	✓
Mutagenicity	✗	**Aspiration Hazard**	✗

Legend: ✗ *– Data either not available or does not fill the criteria for classification*
✓ *– Data available to make classification*

SECTION 12 Ecological information

Toxicity

	Endpoint	Test Duration (hr)	Species	Value	Source
2,2-DICHLORO-1,1,1-TRIFLUOROETHANE	BCF	1008h	Fish	<4.7-36	7
	EC50	48h	Crustacea	17mg/L	5
	EC50	96h	Algae or other aquatic plants	67.8mg/l	2
	NOEC(ECx)	48h	Crustacea	<2.24mg/l	2
	LC50	96h	Fish	55.5mg/l	2

Legend:	*Extracted from 1. IUCLID Toxicity Data 2. Europe ECHA Registered Substances - Ecotoxicological Information - Aquatic Toxicity 3. US EPA, Ecotox database - Aquatic Toxicity Data 4. ECETOC Aquatic Hazard Assessment Data 5. NITE (Japan) - Bioconcentration Data 6. METI (Japan) - Bioconcentration Data 7. Vendor Data 8. User defined data*

controlled ozone depleting gases: phase out by 2030 (C)
Harmful to aquatic organisms.
May cause long-term adverse effects in the aquatic environment.

Continued...

Do NOT allow product to come in contact with surface waters or to intertidal areas below the mean high water mark. Do not contaminate water when cleaning equipment or disposing of equipment wash-waters.
Wastes resulting from use of the product must be disposed of on site or at approved waste sites.
On the basis of the available evidence concerning properties and predicted or observed environmental fate and behavior, the material may present a danger to the structure and/ or functioning of the stratospheric ozone layer.
For haloalkanes and haloalkenes:
Environmental fate:
Certain haloalkane gases in the atmosphere can also contribute to the greenhouse effect by restricting heat loss from the Earth's atmosphere through absorbing infrared emissions from the surface. Generally haloalkanes contributing to the greenhouse effect consist of a fully or partly fluorinated carbon backbone.
Gas-phase reactions with OH radicals are the major tropospheric loss process for the haloalkanes. In addition photooxidation reactions with O3 and NO3 radicals can result in transformation.
For HCFCs:
Hydrochlorofluorocarbons (HCFCs) are Class II Ozone Depletion Substances (ODSs). They deplete stratospheric ozone, but to a lesser extent than most Class I ODSs. HCFCs generally have Ozone depleting Potentials (ODPs) of 0.1 or less.
The stratospheric ozone layer shields the Earth from the sun s harmful ultraviolet radiation.
DO NOT discharge into sewer or waterways.

Persistence and degradability

Ingredient	Persistence: Water/Soil	Persistence: Air
2,2-dichloro-1,1,1-trifluoroethane	HIGH	HIGH

Bioaccumulative potential

Ingredient	Bioaccumulation
2,2-dichloro-1,1,1-trifluoroethane	LOW (BCF = 36)

Mobility in soil

Ingredient	Mobility
2,2-dichloro-1,1,1-trifluoroethane	LOW (Log KOC = 154.4)

SECTION 13 Disposal considerations

Waste treatment methods

Product / Packaging disposal	▸ Containers may still present a chemical hazard/ danger when empty. ▸ Return to supplier for reuse/ recycling if possible. Otherwise: ▸ If container can not be cleaned sufficiently well to ensure that residuals do not remain or if the container cannot be used to store the same product, then puncture containers, to prevent re-use, and bury at an authorised landfill. ▸ Where possible retain label warnings and SDS and observe all notices pertaining to the product. Legislation addressing waste disposal requirements may differ by country, state and/ or territory. Each user must refer to laws operating in their area. In some areas, certain wastes must be tracked. A Hierarchy of Controls seems to be common - the user should investigate: ▸ Reduction ▸ Reuse ▸ Recycling ▸ Disposal (if all else fails) This material may be recycled if unused, or if it has not been contaminated so as to make it unsuitable for its intended use. ▸ **DO NOT** allow wash water from cleaning or process equipment to enter drains. ▸ It may be necessary to collect all wash water for treatment before disposal. ▸ In all cases disposal to sewer may be subject to local laws and regulations and these should be considered first. ▸ Where in doubt contact the responsible authority. ▸ Recycle wherever possible. ▸ Consult manufacturer for recycling options or consult local or regional waste management authority for disposal if no suitable treatment or disposal facility can be identified. ▸ Dispose of by: burial in a land-fill specifically licensed to accept chemical and / or pharmaceutical wastes or incineration in a licensed apparatus (after admixture with suitable combustible material). ▸ Decontaminate empty containers.

SECTION 14 Transport information

Labels Required

Continued...

Marine Pollutant	NO

Land transport (UN): NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS

Air transport (ICAO-IATA / DGR): NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS

Sea transport (IMDG-Code / GGVSee): NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS

14.7. Maritime transport in bulk according to IMO instruments

14.7.1. Transport in bulk according to Annex II of MARPOL and the IBC code

Not Applicable

14.7.2. Transport in bulk in accordance with MARPOL Annex V and the IMSBC Code

Product name	Group
2,2-dichloro-1,1,1-trifluoroethane	Not Applicable

14.7.3. Transport in bulk in accordance with the IGC Code

Product name	Ship Type
2,2-dichloro-1,1,1-trifluoroethane	Not Applicable

SECTION 15 Regulatory information

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

2,2-dichloro-1,1,1-trifluoroethane is found on the following regulatory lists

EAEU Ozone-Depleting Substances Subject to Permit/Licensing for Import/Export - List C (Russian)

Additional Regulatory Information

Not Applicable

National Inventory Status

National Inventory	Status
Australia - AIIC / Australia Non-Industrial Use	Yes
Canada - DSL	Yes
Canada - NDSL	No (2,2-dichloro-1,1,1-trifluoroethane)
China - IECSC	Yes
Colombia - Colombia National Industrial Chemicals Inventory	No (2,2-dichloro-1,1,1-trifluoroethane)
Europe - EINEC / ELINCS / NLP	Yes
Japan - ENCS	Yes
Korea - KECI	Yes
New Zealand - NZIoC	Yes
Philippines - PICCS	Yes
USA - TSCA	All chemical substances in this product have been designated as TSCA Inventory 'Active'
Taiwan - TCSI	Yes
Mexico - INSQ	Yes
Vietnam - NCI	Yes
Russia - FBEPH	Yes
UAE - Control List (Banned/Restricted Substances)	Yes
Legend:	*Yes = All CAS declared ingredients are on the inventory* *No = One or more of the CAS listed ingredients are not on the inventory. These ingredients may be exempt or will require registration.*

Continued...

SECTION 16 Other information

Revision Date	02/06/2023
Initial Date	20/02/2001

SDS Version Summary

Version	Date of Update	Sections Updated
8.1	20/09/2018	Hazards identification - Classification, Ecological Information - Environmental, Accidental release measures - Spills (major), Accidental release measures - Spills (minor)
9.1	02/06/2023	Expiration. Review and Update

Other information

Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references.

The SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

Definitions and abbreviations

- PC—TWA: Permissible Concentration-Time Weighted Average
- PC—STEL: Permissible Concentration-Short Term Exposure Limit
- IARC: International Agency for Research on Cancer
- ACGIH: American Conference of Governmental Industrial Hygienists
- STEL: Short Term Exposure Limit
- TEEL: Temporary Emergency Exposure Limit。
- IDLH: Immediately Dangerous to Life or Health Concentrations
- ES: Exposure Standard
- OSF: Odour Safety Factor
- NOAEL: No Observed Adverse Effect Level
- LOAEL: Lowest Observed Adverse Effect Level
- TLV: Threshold Limit Value
- LOD: Limit Of Detection
- OTV: Odour Threshold Value
- BCF: BioConcentration Factors
- BEI: Biological Exposure Index
- DNEL: Derived No-Effect Level
- PNEC: Predicted no-effect concentration
- MARPOL: International Convention for the Prevention of Pollution from Ships
- IMSBC: International Maritime Solid Bulk Cargoes Code
- IGC: International Gas Carrier Code
- IBC: International Bulk Chemical Code

- AIIC: Australian Inventory of Industrial Chemicals
- DSL: Domestic Substances List
- NDSL: Non-Domestic Substances List
- IECSC: Inventory of Existing Chemical Substance in China
- EINECS: European INventory of Existing Commercial chemical Substances
- ELINCS: European List of Notified Chemical Substances
- NLP: No-Longer Polymers
- ENCS: Existing and New Chemical Substances Inventory
- KECI: Korea Existing Chemicals Inventory
- NZIoC: New Zealand Inventory of Chemicals
- PICCS: Philippine Inventory of Chemicals and Chemical Substances
- TSCA: Toxic Substances Control Act
- TCSI: Taiwan Chemical Substance Inventory
- INSQ: Inventario Nacional de Sustancias Químicas
- NCI: National Chemical Inventory
- FBEPH: Russian Register of Potentially Hazardous Chemical and Biological Substances

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