R23

A-Gas (South Africa) (Pty) Ltd

Chemwatch Hazard Alert Code: **1**

Chemwatch: **1984**
Version No: **10.1**
Safety Data Sheet

Initial Date: **18/04/2002**
Revision Date: **20/06/2022**
Print Date: **16/10/2026**
L.GHS.ZAF.EN

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

Product Identifier

Product name	R23
Synonyms	C-H-F3; carbon trifluoride; methane, trifluoro -; fluoroform; methyl trifluoride; fluoryl; Amerfrost A-23; Freon R-23; Genetron 23; Arcton 1; Arcton; Propellant 23; Refrigerant 23; halocarbon 23
Proper shipping name	TRIFLUOROMETHANE; REFRIGERANT GAS R 23
Chemical formula	CHF3
Other means of identification	Not Available
CAS number	75-46-7

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

Relevant identified uses	Refrigerant, intermediate in organic synthesis; direct coolant for infrared detector cells; blowing agent for urethane foams.

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#: 1984)**
Other emergency telephone number(s)	**Not Available**	**+61 3 9573 3188**

SECTION 2 Hazards identification

Classification of the substance or mixture

Classification	Gases Under Pressure (Compressed Gas)

Label elements

Hazard pictogram(s)	
Signal word	Warning

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Hazard statement(s)

H280	Contains gas under pressure; may explode if heated.

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

Not Applicable

Precautionary statement(s) Response

Not Applicable

Precautionary statement(s) Storage

P410+P403	Protect from sunlight. Store in a well-ventilated place.

Precautionary statement(s) Disposal

Not Applicable

No further product hazard information.

SECTION 3 Composition / information on ingredients

Substances

CAS No	%[weight]	Name
75-46-7	>98	trifluoromethane

Mixtures

See section above for composition of Substances

SECTION 4 First aid measures

Description of first aid measures

Eye Contact	‣ If product comes in contact with eyes remove the patient from gas source or contaminated area. ‣ Take the patient to the nearest eye wash, shower or other source of clean water. ‣ Open the eyelid(s) wide to allow the material to evaporate. ‣ Gently rinse the affected eye(s) with clean, cool water for at least 15 minutes. Have the patient lie or sit down and tilt the head back. Hold the eyelid(s) open and pour water slowly over the eyeball(s) at the inner corners, letting the water run out of the outer corners. ‣ The patient may be in great pain and wish to keep the eyes closed. It is important that the material is rinsed from the eyes to prevent further damage. ‣ Ensure that the patient looks up, and side to side as the eye is rinsed in order to better reach all parts of the eye(s) ‣ Transport to hospital or doctor. ‣ Even when no pain persists and vision is good, a doctor should examine the eye as delayed damage may occur. ‣ If the patient cannot tolerate light, protect the eyes with a clean, loosely tied bandage. ‣ Ensure verbal communication and physical contact with the patient. **DO NOT** allow the patient to rub the eyes **DO NOT** allow the patient to tightly shut the eyes **DO NOT** introduce oil or ointment into the eye(s) without medical advice **DO NOT** use hot or tepid water.
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	‣ Following exposure to gas, remove the patient from the gas source or contaminated area. ‣ NOTE: Personal Protective Equipment (PPE), including positive pressure self-contained breathing apparatus may be required to assure the safety of the rescuer. ‣ Prostheses such as false teeth, which may block the airway, should be removed, where possible, prior to initiating first aid procedures. ‣ If the patient is not breathing spontaneously, administer rescue breathing. ‣ If the patient does not have a pulse, administer CPR. ‣ If medical oxygen and appropriately trained personnel are available, administer 100% oxygen. ‣ Summon an emergency ambulance. If an ambulance is not available, contact a physician, hospital, or Poison Control Centre for further instruction.

Continued...

	‣ Keep the patient warm, comfortable and at rest while awaiting medical care. ‣ **MONITOR THE BREATHING AND PULSE, CONTINUOUSLY.** ‣ Administer rescue breathing (preferably with a demand-valve resuscitator, bag-valve mask-device, or pocket mask as trained) or CPR if necessary.
Ingestion	‣ Not considered a normal route of entry. ‣ Avoid giving milk or oils. ‣ Avoid giving alcohol.

Indication of any immediate medical attention and special treatment needed

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

For frost-bite caused by liquefied petroleum gas:
- If part has not thawed, place in warm water bath (41-46 C) for 15-20 minutes, until the skin turns pink or red.
- Analgesia may be necessary while thawing.
- If there has been a massive exposure, the general body temperature must be depressed, and the patient must be immediately rewarmed by whole-body immersion, in a bath at the above temperature.
- Shock may occur during rewarming.
- Administer tetanus toxoid booster after hospitalization.
- Prophylactic antibiotics may be useful.
- The patient may require anticoagulants and oxygen.

[Shell Australia 22/12/87]
For gas exposures:

BASIC TREATMENT

- Establish a patent airway with suction where necessary.
- Watch for signs of respiratory insufficiency and assist ventilation as necessary.
- Administer oxygen by non-rebreather mask at 10 to 15 l/min.
- Monitor and treat, where necessary, for pulmonary oedema .
- Monitor and treat, where necessary, for shock.
- Anticipate seizures.

ADVANCED TREATMENT

- Consider orotracheal or nasotracheal intubation for airway control in unconscious patient or where respiratory arrest has occurred.
- Positive-pressure ventilation using a bag-valve mask might be of use.
- Monitor and treat, where necessary, for arrhythmias.
- Start an IV D5W TKO. If signs of hypovolaemia are present use lactated Ringers solution. Fluid overload might create complications.
- Drug therapy should be considered for pulmonary oedema.
- Hypotension with signs of hypovolaemia requires the cautious administration of fluids. Fluid overload might create complications.
- Treat seizures with diazepam.
- Proparacaine hydrochloride should be used to assist eye irrigation.

BRONSTEIN, A.C. and CURRANCE, P.L.
EMERGENCY CARE FOR HAZARDOUS MATERIALS EXPOSURE: 2nd Ed. 1994

SECTION 5 Firefighting measures

Extinguishing media

Continued...

SMALL FIRE: Use extinguishing agent suitable for type of surrounding fire.
LARGE FIRE: Cool cylinder.
DO NOT direct water at source of leak or venting safety devices as icing may occur.

Special hazards arising from the substance or mixture

Fire Incompatibility	None known.

Advice for firefighters

Fire Fighting	--- GENERAL --- ‣ Alert Fire Brigade and tell them location and nature of hazard. ‣ Wear breathing apparatus and protective gloves. ‣ Fight fire from a safe distance, with adequate cover. ‣ Use water delivered as a fine spray to control fire and cool adjacent area.
Fire/Explosion Hazard	‣ Non combustible. ‣ Not considered a significant fire risk, however containers may burn. Decomposition may produce toxic fumes of: hydrogen fluoride **Contains low boiling substance:** Closed containers may rupture due to pressure buildup under fire conditions. ‣ Vented gas is more dense than air and may collect in pits, basements.

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	‣ Avoid breathing vapour and any contact with liquid or gas. Protective equipment including respirator should be used. ‣ **DO NOT** enter confined spaces where gas may have accumulated. ‣ Increase ventilation.
Major Spills	‣ Clear area of all unprotected personnel and move upwind. ‣ Alert Emergency Authority and advise them of the location and nature of hazard. ‣ Wear breathing apparatus and protective gloves. ‣ Prevent by any means available, spillage from entering drains and water-courses. ‣ Remove leaking cylinders to a safe place. ‣ Fit vent pipes. Release pressure under safe, controlled conditions ‣ Burn issuing gas at vent pipes. ‣ DO NOT exert excessive pressure on valve; DO NOTattempt to operate damaged valve.

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

SECTION 7 Handling and storage

Precautions for safe handling

Safe handling	· Consider use in closed pressurised systems, fitted with temperature, pressure and safety relief valves which are vented for safe dispersal. Use only properly specified equipment which is suitable for this product, its supply pressure and temperature · The tubing network design connecting gas cylinders to the delivery system should include appropriate pressure indicators and vacuum or suction lines. · Fully-welded types of pressure gauges, where the bourdon tube sensing element is welded to the gauge body, are recommended. · Before connecting gas cylinders, ensure manifold is mechanically secure and does not containing another gas. ‣ **DO NOT** transfer gas from one cylinder to another.
Other information	‣ Cylinders should be stored in a purpose-built compound with good ventilation, preferably in the open. ‣ Such compounds should be sited and built in accordance with statutory requirements. ‣ The storage compound should be kept clear and access restricted to authorised personnel only. ‣ Cylinders stored in the open should be protected against rust and extremes of weather.

Conditions for safe storage, including any incompatibilities

Suitable container	Cylinder temperature should not exceed 52 deg C. ‣ Cylinder: ‣ Ensure the use of equipment rated for cylinder pressure. ‣ Ensure the use of compatible materials of construction. ‣ Valve protection cap to be in place until cylinder is secured, connected.

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	‣ Cylinder must be properly secured either in use or in storage.
Storage incompatibility	Trifluoromethane: ‣ reacts violently with alkaline earth and alkali metals ‣ reacts violently with aluminium oxide at elevated temperatures producing hydrogen chloride and phosgene vapours ‣ is incompatible with beryllium, decaborane, diborane, difluoromethylene, dihypofluorite, fluorine, lithium, magnesium, potassium, acetylene-1,2-dioxide, potassium acetylene-1,2-dioxide, potassium-sodium alloy, sodium amide, titanium, uranium hydride, zinc ‣ attacks aluminium, magnesium, zinc and their alloys As a general rule, hydrofluorocarbons tend to be flammable unless they contain more fluorine atoms than hydrogen atoms. 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. ‣ Compressed gases may contain a large amount of kinetic energy over and above that potentially available from the energy of reaction produced by the gas in chemical reaction with other substances

+	+	+	+	+	+	+

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

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.
May act as a simple asphyxiants; these are gases which, when present in high concentrations, reduce the oxygen content in air below that required to support breathing, consciousness and life; loss of consciousness, with death by suffocation may rapidly occur in an oxygen deficient atmosphere.
CARE: Most simple asphyxiants are odourless or possess low odour and there is no warning on entry into an oxygen deficient atmosphere. If there is any doubt, oxygen content can be checked simply and quickly. It may not be appropriate to only recommend an exposure standard for simple asphyxiants rather it is essential that sufficient oxygen be maintained.

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. 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.

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Skin protection	See Hand protection below
Hands/feet protection	‣ When handling sealed and suitably insulated cylinders wear cloth or leather gloves.
Body protection	See Other protection below
Other protection	‣ Protective overalls, closely fitted at neck and wrist. ‣ Eye-wash unit. ‣ Ensure availability of lifeline in confined spaces. ‣ Staff should be trained in all aspects of rescue work.

Respiratory protection

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

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)

- Positive pressure, full face, air-supplied breathing apparatus should be used for work in enclosed spaces if a leak is suspected or the primary containment is to be opened (e.g. for a cylinder change)
- Air-supplied breathing apparatus is required where release of gas from primary containment is either suspected or demonstrated.

SECTION 9 Physical and chemical properties

Information on basic physical and chemical properties

Appearance	Colourless, liquefiable, gas with slight ethereal odour; slightly soluble in water. Soluble in alcohol, acetone, benzene, hydrocarbons, chlorinated solvents, ketones, esters and organic acids. Vapour heavier than air.

Physical state	Compressed Gas	**Relative density (Water = 1)**	1.52 @ -100 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)	-160	**Viscosity (mm2/s)**	Not Applicable
Initial boiling point and boiling range (°C)	-82.2	**Molecular weight (g/mol)**	70.02
Flash point (°C)	Not Available	**Taste**	Not Available
Evaporation rate	Fast	**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)	4210 @ 21 deg C	**Gas group**	Not Available
Solubility in water	Partly miscible	**pH as a solution (1%)**	Not Applicable
Vapour density (Air = 1)	2.43	**VOC g/L**	Not Available
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

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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. ‣ Presence of elevated temperatures.
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	Based on available data, the classification criteria are not met.
g) Reproductivity	Based on available data, the classification criteria are not met.
h) STOT - Single Exposure	Based on available data, the classification criteria are not met.
i) STOT - Repeated Exposure	Based on available data, the classification criteria are not met.
j) Aspiration Hazard	Based on available data, the classification criteria are not met.

Inhaled	The material is not classified as causing respiratory irritation under Regulation (EC) No 1272/2008 (CLP), as amended. Nevertheless, inhalation of the material, particularly following prolonged exposure, may cause respiratory discomfort and, occasionally, respiratory distress. 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. 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. Symptoms of asphyxia (suffocation) may include headache, dizziness, shortness of breath, muscular weakness, drowsiness and ringing in the ears. If the asphyxia is allowed to progress, there may be nausea and vomiting, further physical weakness and unconsciousness and, finally, convulsions, coma and death. Significant concentrations of the non-toxic gas reduce the oxygen level in the air. As the amount of oxygen is reduced from 21 to 14 volume %, the pulse rate accelerates and the rate and volume of breathing increase. 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.
Ingestion	Overexposure is unlikely in this form. Not normally a hazard due to physical form of product. Considered an unlikely route of entry in commercial/industrial environments
Skin Contact	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. 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.

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	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	Persons with potential for exposure should not wear contact lenses. Although the material 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). Direct contact with the eye may not cause irritation because of the extreme volatility of the gas; however concentrated atmospheres may produce irritation after brief exposures..
Chronic	Limited evidence suggests that repeated or long-term occupational exposure may produce cumulative health effects involving organs or biochemical systems. Principal route of occupational exposure to the gas is by inhalation. 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.

R23	**TOXICITY**	**IRRITATION**
	Inhalation (Rat) LC50: >663000 ppm4h[1]	Not Available

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*

TRIFLUOROMETHANE	Repeated exposure of dogs to 5000 ppm and rats to 1000 ppm resulted in no toxic effects. No significant acute toxicological data identified in literature search.

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

R23	**Endpoint**	**Test Duration (hr)**	**Species**	**Value**	**Source**
	EC50(ECx)	96h	Algae or other aquatic plants	154.54mg/l	2
	EC50	96h	Algae or other aquatic plants	154.54mg/l	2
	LC50	96h	Fish	633.26mg/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*

For trifluoromethane:
Environmental Fate
TERRESTRIAL FATE: An estimated Koc value of 53 determined from a log Kow of 0.64 and a regression-derived equation, indicates that trifluoromethane is expected to have high mobility in soil. Volatilization of trifluoromethane from moist soil surfaces is expected to be an important fate process given a Henry's Law constant of 9.52x10-2 atm-cu m/mole. The potential for volatilization of trifluoromethane from dry soil surfaces may exist based on a vapor pressure of 3.53x10+4 mm Hg. Highly fluorinated compounds such as trifluoromethane are not expected to biodegrade rapidly.
In addition to carbon dioxide (CO2), methane (CH4) and nitrous oxide (N2O), the greenhouse gases mentioned in the Kyoto Protocol include synthetic substances that share the common feature of being highly persistent in the atmosphere and exhibiting very high specific radiative forcing (radiative forcing is the change in the balance between radiation coming into the atmosphere and radiation out; a positive radiative forcing tends on average to warm the surface of the earth). These synthetic substances include hydrocarbons that are partially fluorinated (HCFs) or totally fluorinated (PFCs) as well as sulfur hexafluoride (SF6).
The greenhouse potential of these substances, expressed as multiples of that of CO2, are within the range of 140 to 11,700 for HFCs, from 6500 to 9,200 for PFCs and 23,900 for SF6. Once emitted into the atmosphere, these substances have an impact on the environment for decades, centuries, or in certain instances, for thousands of years.

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DO NOT discharge into sewer or waterways.

Persistence and degradability

Ingredient	Persistence: Water/Soil	Persistence: Air
trifluoromethane	LOW	LOW

Bioaccumulative potential

Ingredient	Bioaccumulation
trifluoromethane	LOW (LogKOW = 0.64)

Mobility in soil

Ingredient	Mobility
trifluoromethane	LOW (Log KOC = 35.04)

SECTION 13 Disposal considerations

Waste treatment methods

Product / Packaging disposal	‣ Evaporate residue at an approved site. ‣ Return empty containers to supplier. If containers are marked non-returnable establish means of disposal with manufacturer prior to purchase. ‣ Ensure damaged or non-returnable cylinders are gas-free before disposal.

SECTION 14 Transport information

Labels Required

Marine Pollutant	NO

Land transport (UN)

14.1. **UN number or ID number**	1984
14.2. **UN proper shipping name**	TRIFLUOROMETHANE; REFRIGERANT GAS R 23
14.3. **Transport hazard class(es)**	Class: 2.2 Subsidiary Hazard: Not Applicable
14.4. **Packing group**	Not Applicable
14.5. **Environmental hazard**	Not Applicable
14.6. **Special precautions for user**	Special provisions: Not Applicable Limited quantity: 120 ml

Air transport (ICAO-IATA / DGR)

14.1. **UN number**	1984
14.2. **UN proper shipping name**	Trifluoromethane (R23); Refrigerant gas R 23
14.3. **Transport hazard class(es)**	ICAO/IATA Class: 2.2 ICAO / IATA Subsidiary Hazard: Not Applicable ERG Code: 2A
14.4. **Packing group**	Not Applicable
14.5. **Environmental hazard**	Not Applicable

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14.6. **Special precautions for user**	Special provisions	Not Applicable
	Cargo Only Packing Instructions	200
	Cargo Only Maximum Qty / Pack	150 kg
	Passenger and Cargo Packing Instructions	200
	Passenger and Cargo Maximum Qty / Pack	75 kg
	Passenger and Cargo Limited Quantity Packing Instructions	Forbidden
	Passenger and Cargo Limited Maximum Qty / Pack	Forbidden

Sea transport (IMDG-Code / GGVSee)

14.1. **UN number**	1984	
14.2. **UN proper shipping name**	TRIFLUOROMETHANE; REFRIGERANT GAS R 23	
14.3. **Transport hazard class(es)**	IMDG Class	2.2
	IMDG Subsidiary Hazard	Not Applicable
14.4. **Packing group**	Not Applicable	
14.5 **Environmental hazard**	Not Applicable	
14.6. **Special precautions for user**	EMS Number	F-C, S-V
	Special provisions	Not Applicable
	Limited Quantities	120 mL

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
trifluoromethane	Not Applicable

14.7.3. Transport in bulk in accordance with the IGC Code

Product name	Ship Type
trifluoromethane	Not Applicable

SECTION 15 Regulatory information

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

trifluoromethane is found on the following regulatory lists

EAEU Ozone-Depleting Substances Subject to Permit/Licensing for Import/Export - List F (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 (trifluoromethane)
China - IECSC	Yes
Colombia - Colombia National Industrial Chemicals Inventory	No (trifluoromethane)
Europe - EINEC / ELINCS / NLP	Yes

Continued...

National Inventory	Status
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)	No (trifluoromethane)
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.*

SECTION 16 Other information

Revision Date	20/06/2022
Initial Date	18/04/2002

SDS Version Summary

Version	Date of Update	Sections Updated
9.1	27/06/2017	Identification of the substance / mixture and of the company / undertaking - Supplier Information, Identification of the substance / mixture and of the company / undertaking - Synonyms
10.1	20/06/2022	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

Continued...

- 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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