

SAFETY DATA SHEET

According to Regulation (EC) No.1907/2006



BRITON® R22 (Reclaimed)

Version: CLP02

Date: Nov 2013

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1. Identification of the substance / preparation and company / undertaking

Product name	R22
REACH registration number	01-2119517587-31
Company	Rhodia Chemicals Ltd. 19 St. Christophers Way. Patriot Way Business Park, Pride Park, DERBY. DE24 8JY UNITED KINGDOM
Emergency phone number	+44 1332 762547 (24 hour)
Use	Refrigerant

2. Hazards identification

Classification according to Directives 67/548/EEC (DSD) and 1999/45/EC (DPD):



	N	Dangerous for the environment
R-phrases:	R59	Dangerous for the ozone layer
S-phrases	S57	Use appropriate container to avoid environmental contamination
	S59	Refer to manufacturer/supplier for information on recovery/recycling
	S60	This material and its container must be disposed of as hazardous waste
	S61	Avoid release to the environment. Refer to special instructions/safety data sheets

This classification complies with the requirement on classification and labelling according to the Directives 67/548/EEC (DSD) and 1999/45/EC (DPD).

Classification according to Regulation (EC) No. 1272/2008 (CLP):



Signal word:	Warning	
H-statement:	H280	Contains gas under pressure; may explode if heated.
	H420	Harms public health and the environment by destroying ozone in the upper atmosphere
P-statement:	P234	Keep only in original container
	P273	Avoid release to the environment
	P410+	Protect from sunlight. Store in a well-ventilated place
	P403	
	P502	Refer to manufacturer/supplier information on recovery/recycling

This classification complies with the requirement on classification and labelling according to the Regulation (EC) No. 1272/2008 (CLP).

Other hazards:

Asphyxiation on inhalation of high concentration by oxygen deficiency, narcotic effects on inhalation of low concentration, frostbites or cryogenic burns on contact with liquefied gas.

Additional human and environmental hazard information:

Potential adverse physiochemical effects:

On heating release of toxic and corrosive pyrolysis products: hydrogen chloride HCl, hydrogen fluoride HF, carbon monoxide CO, carbonyl chloride COCl₂, carbonyl fluoride COF₂, chlorine Cl₂.

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Potential adverse effects on humans and possible symptoms:

Exposure to liquid or concentrated vapour may cause skin, mucosa and eye irritation. Inhalations of high vapour concentrations may cause light-headedness, giddiness, disorientation, nausea, vomiting, narcosis, cardiac dysrhythmia, hypotension and death.

Potential adverse effects on the environment:


Ozone depleting potential (ODP): 0,055; global warming potential (GWP): 1900.


3. Composition / information on ingredients

Chemical characterisation:

Description: Pressurised gas, organic halide

Ingredient(s)

EC Name	EC no.	CAS no.	Amount	EC classification
Chlorodifluoromethane*	200-871-9	75-45-6	>99%	 N; R59

EC Name	EC no.	CAS no.	Amount	GHS classification
Chlorodifluoromethane*	200-871-9	75-45-6	>99%	 Compr. Gas; H280 Ozone 1; H420

*Other names:

R22, HCFC-22, monochlorodifluoromethane, Algeon 22, Algofrene 22, Frigen 22, Solkane 22.

Molecular formula: CHClF₂
Molecular mass: 86,47 g/mol
SMILES notation: C(F)(F)Cl
InChI: InChI=1/CHClF2/c2-1(3)4/h1H

For wordings of the R-phrases and H-statements see chapter 16.

4. First aid measures



Inhalation

Remove patient from exposure, keep warm and at rest. Administer oxygen if necessary. Apply artificial respiration if breathing has ceased or shows signs of failing. Obtain immediate medical attention.

Skin contact

Thaw affected areas with water. Remove contaminated clothing. Caution: clothing may adhere to the skin in the case of freeze burns. After contact with skin, wash immediately with plenty of warm water. If irritation or blistering occur obtain medical attention.

Eye contact

Immediately irrigate with eyewash solution or clean water, holding the eyelids apart for at least 10 minutes. Obtain immediate medical attention.

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Ingestion

Ingestion is not considered a potential route of exposure.

Medical advice

Symptomatic treatment and supportive therapy as indicated. Adrenaline and similar sympathomimetic drugs should be avoided following exposure as cardiac arrhythmia may result with possible subsequent cardiac arrest.

5. Fire-fighting measures



Suitable extinguishing agents

No restriction. All known extinguishing means can be used: water spray, carbon dioxide, extinguishing foam or powder. Product itself doesn't burn but packaging may be flammable. Extinguishing agents should be oriented to the fire surroundings.

For safety reasons unsuitable extinguishing agents

Water jet

Specific hazards by-product, combustion products or formed gases

Exposure to fire may cause containers to rupture/explode. Non flammable, but on heating release of toxic and corrosive fumes possible: hydrogen chloride HCl, hydrogen fluoride HF, carbon monoxide CO, carbonyl chloride COCl₂, carbonyl fluoride COF₂, chlorine Cl₂.



Specific protective equipment on fire-fighting

Use pressure air respirator at low aeration and in closed rooms. In extreme conditions a chemical protection suit might be necessary.

6. Accidental release measures

Personal protection

Evacuate area, wear protective equipment, especially self-contained breathing apparatus when entering area unless atmosphere has been proved to be safe (also see section 8). Ensure adequate air ventilation.

Environmental protection

Try to stop release. Prevent from entering sewers, basements and workpits, or any place where accumulation can be dangerous.

Clean-up methods

Ventilate area.

7. Handling and storage

Information for safe handling

Avoid release, inhalation of gas, contact with eyes, skin and clothes, long term or repeated exposure.

Technical protection measures

Ensure very good ventilation of the work room to maintain exposures within occupational exposure limits.

Rules on handling

Prevent suck-back of water and don't allow back feed into the container. Use only properly specified equipment which is suitable for this product, its supply pressure and temperature. Contact your gas supplier if in doubt and refer to suppliers container handling instructions.

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Fire and explosion protection

Product is not inflammable and explosive. Avoid naked flames and hot surfaces (pressurised gas bottle).

Storage group according to the VCI (Association of Chemical Industries) cumulative storage concept

2A: pressurised, liquefied and pressure dissolved gases

Storage conditions

Prevent containers / gas bottles from falling down. Keep container below 50°C in a well-ventilated place.

Packing materials

Packing materials are to be proved on resistance before use.

Storage requirements

Don't store in gateways, passages, stairways, hallways open to the public, roofs, attics and workrooms. Label receptacles clearly and durably. Preferably store in original receptacles.

Cumulative storage

Only substances of similar properties should be cumulatively stored. Cumulative storage with the following substances is prohibited.

- Medicinal products, food and feeding stuffs including additives
- Infective, radioactive and explosive substances
- High reactive organic peroxides and other oxidising substances

Cumulative storage with the following substances may be allowed under special conditions.

- Flammable and non-flammable solids and liquids
- Low reactive organic peroxides and other substances of low reactivity
- Other pressurised, liquefied and pressure dissolved gases and aerosol packages

The substance should not be cumulatively stored with substances where dangerous chemical reactions are possible e.g. alkali metals.

8. Exposure controls / personal protection

Occupational exposure limits

EC name	EC No.	CAS No.	Type of limit value	8 hr TWA	15 min short term exposure
Chlorodifluoromethane	200-871-9	75-45-6	OEL (European Union)	1000 ppm 3600 mg/m ³	Not available
			AGW – TRGS 900 (Germany)	3600 mg/m ³	Not available
			MAK - OEL (Austria)	500 ppm 1800 mg/m ³	1000 ppm 3600 mg/m ³
			TWA (USA / NIOSH)	1000 ppm 3500 mg/m ³	1250 ppm 4375 mg/m ³

Measurement methods: Analytical Methods for Proof on health Hazardous Occupational Substances, Part 1 – Air Analysis, German Research Community (DFG), Method: Analysis on Fluorohydrocarbons; VCH Wiley, Weinheim, 1996.

PNEC values:

PNEC (water):	250 ug/l	PNEC (sediment):	416 ug/kg	PNEC (soil)	239 ug/kg
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Calculated values for information only cited from the European Union Risk assessment Report (RAR) on Chlorodifluoromethane (2007) calculated on base of the toxicities in chapter 12.

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Technical measures to avoid exposure

Preferably handle in closed containers. Provide very good ventilation of the workroom, local exhaust necessary to maintain exposures within occupational exposure limits.

Personal protection



Body protection

Regular work clothing is generally sufficient.



Respiratory protection

Required on release of the gaseous substance. Use half mask to EN 140 or full mask to EN 136 fitted with filter to EN 143-P1. Be aware of time limits. If concentrations are above limitations of filter devices, if oxygen concentrations are below 17% or if conditions are ambiguous, use self-contained respiratory protective devices.



Eye Protection

Sideward closed goggles to EN 166 are required.



Hand protection

Gloves should comply with specifications of EU directive 89/686/EEC and EN 374. For example, on full contact 0.3mm thick butyl rubber gloves should be worn.



Foot protection

Foot protection is required when handling gas containers

Skin protection

Skin protection products are not as effective as gloves. If gloves cannot be worn, apply a water insoluble skin protection substance to clean skin before the start of work and after each break. Before breaks and at the end of shift, clean skin with soap and water.

Occupational hygiene

Avoid breathing the gaseous substance. Remove contaminated clothing. Don't smoke, eat and drink in the workplace.

9. Physical and chemical properties

Form	Liquefied gas
Colour	Colourless
Odour	Ethereal; poor warning properties at low concentrations
pH value at 20°C	n/a
Melting point / range	-160°C
Boiling point / range	-40.8°C
Critical temperature	96.18°C
Flash point	Not applicable
Flammability	Not applicable (Not flammable)
Auto ignition temperature	632-635°C
Explosive properties	Not explosive
Oxidising properties	Not oxidising
Vapour pressure at 20°C	9081 hPa
Gas density at 1 atm / 20°C	0.0036 kg/dm ³
Fluid density at 9 atm / 20°C	1.210 kg/dm ³
Water solubility at 20°C	3625 mg/l
Solubility	Soluble in ether, acetone, chloroform
Distribution coefficient n-octanol/water _{10log P_{ow}}	1.13 (CSCL Japan 1992)
Dynamic viscosity at 10°C	0.22 mPa*s
Explosion limits (upper & lower)	Not determined

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10. Stability and reactivity

Reactivity

Not reactive under normal conditions of use and storage.

Conditions to be avoided

Stable under normal conditions. Avoid open flames, high temperatures, direct sun light.

Substances to be avoided

Alkali and earth alkali metals.

Dangerous decomposition products

Hydrogen chloride HCl, hydrogen fluoride HF, carbon monoxide CO, carbonyl chloride COCl₂, carbonyl fluoride COF₂, chlorine Cl₂.

Dangerous chemical reactions

Reacts violently with alkali and alkali earth metals. Catalytic decomposition in presence of powdery aluminium and zinc.

11. Toxicological information

Toxico-kinetics, metabolism and distribution

Main exposure path by inhalation, only small <2.7% but rapidly absorbed amounts. On 4 hour inhalation by volunteers of 320 resp. 1810 mg.m³ a blood concentration proportional equilibrium is adjusted within one hour. The blood concentrations approached plateaus of 0.25 ug/l and 1.36 ug/ml. The absorbed amount was relatively rapid elimination by exhalation in a three phase kinetic with half-lives of 18 sec, 12 min and 2.6 h. A small amount was excreted unchanged by the kidneys. Based on fluoride measurements in urine only very low or no metabolism was deduced (0.1-1.06%). No bioaccumulation at all was observed by any study.

Acute effects (toxicological tests)

Acute toxicity:

Parameter	Value	Species	Method	Remarks
LC ₅₀ inhal. / 4 h	220,000 ppm	rat	-	-
LC ₅₀ inhal. / 2 h	390,540 ppm	mouse	-	-

As chlorodifluoromethane is a gas, skin and eye administrations are not feasible.

Corrosive and irritative effects

Intake path	Result	Species	Method	Remarks
Belly skin	Redness/swelling	Rat	-	10-sec-spray application
Eye	Slight irritant	Rabbit (albino)	-	5-10-sec exposure to liquefied gas
Skin	Slight irritant	Rabbit	-	Polypropylene capsule of the liquefied gas
Respiratory tract	No effects	Animal/human	-	No indication or case study available

As chlorodifluoromethane is a gas, skin and eye administrations are not feasible. The information above is based on the liquefied gas.

Sensitisation

No evidence for skin and respiratory tract sensitising potential.

Subacute to chronic toxicity

On 5h/day-5d/week-83/94 weeks-exposure of mice to 1, 1000, 10000 and 50000ppm no effects on mortality, body weight gain, haematology, biochemistry or histopathology were found. On 5h/day-5d/week-117/131 week exposure of rats to 0, 1000, 10000 and 50000 ppm no clinical effects, and no effects on mortality, haematology or biochemistry were found. At the 50000 ppm level decrease in body weight gain in males, and increased liver, kidney, adrenal and pituitary weights in females were found. Histologically non-neoplastic lesions were observed. In this study the No Observed Effect Concentration (NOAEC) was ascertained to 10000ppm.

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Carcinogenicity, mutagenicity and reproductive toxicity

Mutagenicity

Bacterial mutagenicity:	<i>Salmonella typhimurium</i>	positive
Bacterial mutagenicity:	<i>Scgizosaccharomyces pombe/cerevisiae</i>	negative
HGPRT mutation induction:	<i>Chinese hamster cells</i>	negative
Unscheduled DNA synthesis	<i>Human EUE cell line</i>	negative

In-vivo studies on rats and mice showed no evidence of genotoxic activity.

Carcinogenicity

On 5h/day-5d/week-117/131 week-exposure of rats to 0, 1000, 10000 and 50000ppm, a slight increase was found in the incidence of fibrosarcomas in male rats to 50000 ppm. The same exposures of mice to 50000 ppm showed no significant increase in the incidence of benign or malignant tumours. The studies with male rats demonstrated a No Observed Adverse Effect Concentration (NOAEC) of 1000 ppm.

Reproductive toxicity

Repeated dose studies showed no significant changes in gonadal organ weights and on histopathological examinations no effects in male and female reproductive organs were observed. Also determination of follicle stimulating hormone (FSH) and luteinising hormone (LH) in blood exhibited no significant difference between exposed and control animals.

In a rabbit terogenicity assay no significant effects on dams and litters were seen in the low (100 ppm) and high (5000 ppm) exposure level groups. Three rat teratogenicity studies on 100 ppm to 20000 ppm exposures showed no evidence of maternal or foetal toxicity. The No Observed Adverse Effect Concentration (NOAEC) for maternal and development toxicity were determined 10000 ppm (two of three studies) and 20000 ppm (third study).

In litters from rat dams exposed to 50000 ppm a significant increase of anophthalmia and combined anophthalmia/micropthalmia was observed. By this study the No Observed Adverse Effect Concentration (NOAEC) for rat development toxicity was considered 1000 ppm.

Experience from practice

Exposures were evaluated only for workers using chlorodifluoromethane as a refrigerant and as a chemical intermediate. In over 50 years of use only a few reports on adverse health effects due to accidental exposure to extremely high inhaled levels are known.

12. Ecological information

Aquatic toxicity

No durably damaging effects expected as chlorodifluoromethane rapidly partitions from water into air.

Effects on sewage plants

Concentrations in water or in sludge considered negligible and no effect on microorganisms expected. No inhibition effects observed at 180 and 400 mg/l on 24 hr exposure.

Water damaging effects

Fish toxicity	96h-LC ₅₀	<i>Brachydanio rerio</i>	777 mg/l
Crustacean toxicity	48h-EC ₅₀	<i>Daphnia magna</i>	433 mg/l
Algae toxicity	96h-EC ₅₀	Calculation*	250 mg/l

*Predicted with the ECOSAR v0.99g program by read-across.

Mobility

Distribution on environmental compartments; $_{10}\log P_{o/w} = 1.13$

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Persistence and degradability

Biotic degradation:

Not rapidly biodegradable / 0% BOD after 28 days

Abiotic degradation:

Degradation initiated by reaction with hydroxyl radicals OH in troposphere, atmospheric lifetime 12 years / half-life 8.3 years.

Bioaccumulative potential

No experimental Bioconcentration Factor (BCF) available. Estimation from the correlation equation

$${}_{10}\log BCF_{fish} = 0.85 * {}_{10}\log P_{o/w} - 0.70$$

using the distribution coefficient ${}_{10}\log P_{o/w} = 1.3$ leads to $BCF = 1.8$ indicating that chlorodifluoromethane does not concentrate significantly in aquatic organisms.

Result of the PBT and vPvB evaluation

Not classified PBT or vPvB acc. the criteria of REACH Annex XIII.

Other adverse effects

Ozone depleting potential: 0.055 (CFC₃ = 1)

Global warming potential: 1900 (CO₂ = 1)

13. Disposal considerations

Disposal of residues and wastes of the product

Do not discharge into any place where accumulation could be dangerous. Contact supplier if guidance is required. Preferably return unused product to vendor for recycling or destruction.

EWC code 14 06 01* Chlorofluorocarbons, HCFC, HFC

Disposal of contaminated packaging

Return cylinders to vendor, disposable cylinder is to be disposed according to local regulations

EWC code 15 01 10* Packaging containing residues of or contaminated by dangerous substances

Disposal of completely empty packaging

Return cylinders to vendor.

EWC code 15 01 04 Metallic packaging

14. Transport information

Transport by road / rail (ADR/RID) and by inner water ways (AND/ADNR)



UN number:	1018	Packing group:	-
Class:	2.2	Hazard number:	20
Label:	2.2	Packing instructions:	P200
Proper shipping name:	Chlorodifluoromethane (R22)	Special prescriptions:	-
Limited quantities:	LQ1 (120ml per inner package)		

Transport by sea (IMDG)

UN number:	1018	Packing group:	-
Class:	2.2	EmS:	FC-SV
Proper shipping name:	Chlorodifluoromethane (R22)	Marine pollutant:	No

Transport by air

UN number:	1018	Packing group:	-
Class:	2.2		
Proper shipping name:	Chlorodifluoromethane (R22)		

Remarks

Transport regulations are cited according to the international guidelines and to the form applied in Europe. Differences to other countries are not considered.

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15. Regulatory information

EU Guidelines

Chemical safety assessment according to EU Regulation No.1907/2006.

A chemical safety assessment (CSA) according to part 14, par.1 of Regulation (EC) No.1907/2006 (REACH) on chlorodifluoromethane is not available.

Classification and labelling according to Directive 67/548/EEC (DSD) & 1999/45/EC (DPD)

See section 2.

Classification and labelling according to Regulation (EC) No.1272/2008 (CLP)

See section 2.

Authorisation and/or use restrictions

Controlled substance according to Regulation (EC) No.1005/2009 on substances depleting the ozone layer (ODS). Manufacture, placing on the market and use is prohibited as of 01.01.2010, e.g. as cooling liquids and foaming agents. On maintenance and servicing of existing equipment recycled chlorodifluoromethane may be used until 31.12.2014. Exceptions from prohibition are manufacture, placing on the market and use as feedstock for chemical synthesis and R&D purposes.

Further EU provisions

None

Information on Directive 1999/13/EC (VOC Directive) for limitation of VOC emissions

Chlorodifluoromethane as a volatile organic compound comes under the provision of this Directive.

National Regulations

Classification and labelling

The product may be due to classification and labelling according to national regulations in each case.

Other regulation and guidances

The provisions of occupational, health, environment and consumer protection shall apply to the country where the chemical substance or mixture is placed on the market.

16. Other information

Wording of the R-phrases and H-statements from chapter 3

R59	Dangerous for the ozone layer
H280	Contains gas under pressure; may explode if heated
H420	Harms public health and the environment by destroying ozone in the upper atmosphere

Recommended restriction(s) of use

Not for private uses. Not for uses except as feedstock for chemical synthesis and for R&D purposes. Not for recycling purpose except for use in maintenance and servicing of existing cooling and refrigeration equipment as of 31.12.2010.

Amendment information

This data sheet contains changes from the previous version, CLP01 dated May 2011. Sections 2, 3, 8, 10 & 15 were updated.

Remarks

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