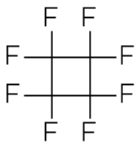


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1. IDENTIFICATION OF THE SUBSTANCE/COMPOUND AND COMPANY

1.1. Identification of the substance/compound	
Name	Octafluorocyclobutane
Chemical nomenclature	IUPAC name: Octafluorocyclobutane
Synonyms	Freon R318, khladon R318, Halocarbon R-318, Perfluorocyclobutane
Molecular formula	C ₄ F ₈
Structural formula	
Molar mass	200,0312 g/mol
REACH Pre-Registration	Reference number 05-2114096813-40-0000
C&L bulk notification	Reference number 02-2119708815-35-0000
CAS number	115-25-3
EC number	204-075-2
1.2. Applications	It is used for the production of fluorinated organic compounds, is used as the heat-carrier and extinguisher, is also used in aerosol as propellant, in food industry, in medicine.
1.3. Company identification	
1.3.1 Manufacturer	Joint Stock Company «HaloPolymer Perm» 614042, Russia, Perm, ul. Lasvinskaya 98 Telephone number +7(342) 250-61-50 Web site: www.halopolymer.ru
1.3.2 Only REACH representative in EU	JSC «HaloPolymer Perm» (Submitting legal entity URALCHEM Assist GmbH) Johannssenstrasse 10 30159, Hannover, Germany Tel: +49 511 45 99 444
1.4. Emergency telephone number	
Great Britain	+7-342-282-85-45 (24 hours)
USA	+44 (0) 203 394 9870 (24/7) 1-877 271 7077

2. HAZARDS IDENTIFICATION

2.1. Substance classification	
2.1.1. Classification in accordance with Regulation (EC) № 1272/2008 [CLP/GHS]	Liquefied gas, H 280
2.1.2. Classification in accordance with Directive 67/548/EEC	R 36/37/38
2.2 Label elements	
2.2.1 Labeling according to the Regulation (EC) No 1272/2008 [CLP/GHS]	Hazard pictograms  GHS04 Signal word: Warning Hazard statements: H 280 (Contains gas under pressure; may explode if heated). Precautionary statements:

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	P 403 Store in a well-ventilated place. P 410 Protect from sunlight.				
2.3. Other danger	Contact with liquid may cause frostbite. Asphyxiation. Thermal decomposition will evolve toxic and corrosive vapours.				
3. COPMOSITION/INFORMATION ON INGREDIENTS					
3.1.Composition and admixtures	Identification name	CAS number	EC number	Volume %	
	Octafluorocyclobutane	115-25-3	204-07-52	99.8 %	
3.2. Compounds (composition)	Does not contain any other components or foreign substances that may affect the product classification.				
4. FIRST AID MEASURE					
4.1. First Aid Measure					
Inhalation:	Free from clothes that hampers breathing, provide fresh air, rest, heat. Oxygen inhalation, hospitalization.				
Skin contact:	Rinse skin in plenty of warm water.				
Eye contact:	Immediately rinse in plenty of water, with the following injection of 1-2 drops of 1% novocaine or 30% sulfacetamide in a conjunctival sac. Get medical attention.				
4.2. The most important symptoms and effects (acute and late)	Inhalation: a short-term period of reflex excitability, flaccidity, hypodynamia, respiratory rate fall, clonic spasms. Skin contact with liquid freon may cause frostbite. Eye contact with liquid freon may cause frostbite.				
4.3. Medical aid measures (antidotes etc)	None known.				
5. FIRE-FIGHTING MEASURES					
	Firesafe and explosion-proof.				
- situational fire-fighting measures	Fire-fighting measures appropriate for the situation.				
- safety fire-fighting measures	Sprayed water.				
- specific danger, connected to the substance or compound, combustion products, produced gas	At the temperature above 400°C decomposes into high-toxic compounds: - Carbonyl fluoride COF2 (CAS 353-50-4) [500 °C (932 °F) - 600 °C (1110 °F)] - Hydrogen fluoride HF (CAS 7664-39-3) [400 °C (752 °F)] - Carbon dioxide CO2 (CAS 124-38-9) [above 650 °C (1200 °F)] - Carbon monoxide CO (CAS 630-08-0) [above 650 °C (1200 °F)]				
- recommended fire-fighting measures	Water				
- forbidden fire-fighting measures	No information available				
- special fire-fighting measures for firemen	Isolating respirator of “Drager”, protective suit BOP, L-1.				
6. ACCIDENTAL RELEASE MEASURES					
6.1. Personal precautions (gloves, respirators etc.)	Filter respirator with box of BKF type or with combined filter DOT 600 of A2B3E3P3 type. Personal precautions: cloth or cotton suit, rubber boots or leather shoes, rubber gloves.				
6.2. Environmental precautions	Ozone-safe, ozone-depleting potential (ODP) = 0, GWP- 9100. Avoid spreading freon to environment. Careful airtight packing of manufacturing equipment, package, venting pipping out equipment.				

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	Does not produce any toxic compounds in the air and in discharged waters with other additional substances.
6.3. Methods and materials used for localization and cleaning (adsorbents, neutralizers etc)	Waste products must be contained and neutralized. Overflow should be protected by the banks, and flushed off.

7. HANDLING AND STORAGE

7.1 Handling:	
7.1.1 General recommendations:	For industrial or professional use only. Usual safety precautions for handling chemicals should be observed: avoid inhalation of gas, avoid ingestion and contact with eyes and skin, keep container tightly closed. Store work clothes separately from other clothing, food and tobacco products. Do not smoke. Keep personal hygiene, take a shower after work.
7.1.2 Technical measures:	Closed design equipment for product handling and exhaust ventilation should be applied to insure limits set up in Section 8 of this MSDS. Routine measurement of substance content in the air of working area is necessary.
7.1.3 Fire prevention measures:	Prevention of flammable medium development, absence of ignition sources, prohibition of open flame usage.
7.2 Storage:	
7.2.1 Conditions of storage:	Store in a cold, dry, well-ventilated place. Cylinders should be in vertical position, effectively connected, and protected from fall. Use backflow preventive device in piping. Guaranteed shelf life - 2 years from the date of manufacturing.
7.2.2 Incompatible materials:	Store separately from flammable and explosive materials.
7.2.3 Packing materials:	Cylinders, intended for working pressure not less than 2,0 MPa. Freon R318 should be filled into steel cylinders with a capacity of up to 100 dm ³ containers and a capacity of 950 dm ³
7.2.4 Other information:	Per each 1 dm ³ of the container capacity no more than 1,2 kg of the product should be pour in.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

8.1 Exposure limit values:	
Maximum allowable concentration:	MAC working area = 3000 mg/m ³ , 4 th class of danger , MAC of atmospheric pollutant =90 mg/m ³ (for octadecafluorooctane), Approximate Safe Level of Impact in atmospheric air – 100 mg/m ³ (for octafluoropropane)
8.2 Exposure limits of decomposition products:	

ENGINEERING EXPOSURE – RECOMMENDATIONS

PRODUCT NAME	Molecular formula	CAS number	AREAS				
			CIS	USA			UK
			MAC	ACGIH, TLV	ASHA, PEL	NIOSH, REL	EH40, TLV/TWA
Hydrogen fluoride	HF	7664-39-3	0,5 mg/m ³	3 ppm 2,6 mg/m ³	3 ppm 2,6 mg/m ³	3 ppm 2,5 mg/m ³	1,8 ppm 1,5 mg/m ³
Carbonyl fluoride	COF ₂	353-50-4	Not available	2 ppm 5,4 mg/m ³	Not available	2 ppm 5,4 mg/m ³	Not available
Carbon monoxide	CO	630-08-0	20 mg/m ³	25 ppm 29 mg/m ³	50 ppm 55 mg/m ³	35 ppm 40 mg/m ³	30 ppm 35 mg/m ³
Carbon dioxide	CO ₂	124-38-9	5000 mg/m ³	5000 ppm 9000 mg/m ³	5000 ppm 9000 mg/m ³	5000 ppm 9000 mg/m ³	5000 ppm 9150 mg/m ³

MAC = Maximum acceptable concentration

TLV = Threshold limit value

REL = Recommended exposure limit

PEL = Permissible exposure limits

TLV/TWA = Threshold Limit Value-Time-Weighted Average

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NIOSH = National Institute for Occupational Safety and Health

8.3 Exposure controls:	
8.3.1. Necessary technical control (methods of safe handling, necessary or recommended equipment etc.)	Influx-and-extract ventilation of production area, local ventilation in a place of possible evaporation of the product, control over hazardous substances in the air in working area, airtight packing of the equipment. Avoid any contact with hot surfaces. Marking the danger by colors and signs of danger (National standard GOST 12.4.026-2001 meets the requirements of ISO 3461-88, ISO 4196-99, ISO 6309-87). Tasks and responsibilities of labor protection are defined in the OSH management system. (OSH management system designed in accordance with GOST 12.0.006-2002 is compatible with standard OHSAS 18001-99 and the leadership of the ILO-OSH 2001). Training of personnel safety system in accordance with GOST 12.0.004-90
8.4 Personal protection:	
Respiratory protection 	Respirator with the filter DOT for respirators A2B3E3P3 or with the BKF (GOST 12.4.121-83, GOST P 12.4.193-99, EN 141, GOST P 12.4.194-99, EN 143). In case of emergency – insulating respirator.
Hands protection 	Polymeric coating gauntlets (acid-resistance), rubber gloves (acid-base resistance) GOST 20010-93, GOST 12.4.124-83, GOST 12.4.010-75, GOST 12.4.183-91, EN407 EN388
Eye protection (protective goggles, masks) 	Protective goggles GOST 12.4.230-2007, EN166-2001
Skin protection (protective aprons, shoes, clothes) 	Working clothes (cloths or cotton suit) GOST 27653-88
Hygiene measures:	General industrial hygiene regulations are to be observed. Hygienic shower at the end of the working day. Eating, drinking and smoking should be prohibited in the working area.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 General information	
Appearance (physical state (solid, liquid, gas) and colour of the substance or compound)	Colourless liquefied gas under pressure
Odor (describe)	Slight ethereal
9.2 Important health, safety and environmental information:	
Boiling point/boiling interval	- 6 °C
Melting point	- 41,4 °C
Self-ignition temperature	632 °C
Oxidizability	Stable up to 400 °C
Specific weight (relative density)	1520 kg/m³ at 20 °C
Dissolubility	Soluble in fats
Dissolubility in water	140 mg/l at 20 °C
Viscosity	No information available
Evaporation rate	No information available

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10. STABILITY AND REACTIVITY

10.1. Reactivity	Renewable, may react with metallic sodium. Contact with fire and hot surfaces produces highly toxic substances.
10.2. Chemical stability	No information available
10.3. Possibility of hazardous reactions	No information available
10.4. Condition to avoid	Heat over 400°C
10.5. Incompatible materials	Oxidants, acids, alkali
10.6. Hazardous decomposition products	Thermal decomposition may produce: - Carbonyl fluoride - Hydrogen fluoride - Carbon dioxide - Carbon monoxide

11. TOXICOLOGICAL INFORMATION

11.1 Acute animal toxicity data:				
If swallowed:	DL₅₀, mg/m³	Route of exposure	Kind of animal	
	>10000	intra-abdominal	rats	
Inhalation:	CL₅₀, mg/m³	Exposure time, h	Kind of animal	
	CL ₁₀₀ 4000000	1	rats	
	CL ₆₀ 620000	2	mice	
11.2 Routes of exposure:	Inhalation, contact with eyes, skin contact, ingestion.			
11.3 Chronic effects	EC min - 8 61000 mg/m ³ , inhalation, 4 hours each day during 17 weeks, mice (acts on central nervous system).			
11.4 Sensitization, carcinogenicity, mutagenicity, reproductive toxicity	Embryogenic, teratogenic, gonadotropic, carcinogenic effects have not been examined.			

12. ECOLOGICAL INFORMATION

12.1. Toxicity	Avoid spreading freon to environment.
12.2. Stability and degradability	Extremely stable substance, decomposes at high temperatures.
	Transforming
12.3. Bioaccumulation potential	No information available Cumulativity: weak
12.4. Mobility in soil	No information available
12.5. Result of assess of PBT and vPvB	No information available
12.6. Other adverse effects	No information available

13. DISPOSAL CONSIDERATIONS

13.1. Waste disposal methods	Waste products must be leakproof contained and transported to neutralization.
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14. TRANSPORT INFORMATION

All special safety precautions needed for user must be

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indicated: IMDG (sea), ADR (Dir 94/55/EC dd 21.11.1994 – road), RID (Dir96/49/EC dd 23.07.1996 – railway), ICAO/IATA (air). Among others, the following items must be included:

- UN number
- class
- ship's name
- see pollutions

-other necessary information

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Octafluorocyclobutane (refrigerated gas RC 318)



15. REGULATORY INFORMATION

15.1. The Legislation of the Russian Federation:

The Regulations of the Russian Federation “About the Protection of Consumer”, “About Environment Protection”, “About the Sanitation and Epidemiological Control”, “About the Technical Regulation”.

16. OTHER INFORMATION

R-phrases (should correspond with §2 of this MSDS)

R 36/37/38– Irritates conjunctiva, respiratory tracts, and skin.
Only personnel acquainted with physicochemical and toxic properties of the product, and instructed about methods of work with the product are allowed to work with this product.

S-phrases

S 26 – in case of eye contact immediately rinse in plenty of water and call a physician.
S 36/37/39 – use an appropriate protective suit, gloves, and eye and face protection.
S 45 – in case of accident or disease immediately get a medical aid.

Sources of data contained in this SDS

1. Data card of Russian Register of Potentially Hazardous Chemical and Biological Substances. Certificate of state registry VT 002248 from 29.05.2002.
- 2 TU 2412-128-05807960-96 Octafluorocyclobutane (Khladon C318).
- 3 “Industrial fluoroorganic products”, Reference book /B.N. Maksimov, V.G. Barabanov/, Publishing house “Chimia”, Saint-Petersburg, 1996.
- 4 “Indexes of dangerous substances and materials“, editor V.K. Gusev, I.D. Sytin Foundation, Moscow, 2002.

ANNEX Exposure Scenario

Information item	Proposed ES1
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Product Identification	
Product name as it appears on SDS	Octafluorocyclobutane
Short title exposure scenario	
Internal name	Octafluorocyclobutane
Sector(s) of Use (SU)	SU 3 Industrial Manufacturing (all)
Process Category(ies) (PROC)	PROC 2 Use in closed, continuous PROC ess with occasional controlled exposure (e.g. sampling), Industrial setting
Product OR Article category	
Product Category(ies). (PC)	PC_16_n PC 16 Heat Transfer Fluids
Article Category(ies). (AC)	
Environmental Release Category(ies) (ERC)	ERC7 Industrial use of substances in closed systems
Processes and activities	
Life Cycle Stage	Use
Optional: Provide additional information on processes and activities if needed	Liquefied gas Incombustible
Max. process temperature.	500°C
Human health - Workers	
Type of use	Industrial
Physical form under conditions of use	Gas
Dustiness category for solid substances.	
Max. duration of inhalatory exposure.	15 minutes to 1 hour
Outdoor or indoor operation and application of Local Exhaust Ventilation (LEV)	Indoor with LEV
Use of respiratory protection equipment (RPE).	>90%
Use of dermal protective clothes and gloves.	Yes
Dilution factor of the product.	1
Consumer exposure	
Product Sub-category(ies)	
Article Sub-category(ies)	
Is the Product a spray?	No

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Maximum fraction of the product in the consumer product used per consumer per event	1
Max. dermal contact area with skin	2 inside hands / one hand / palm of hands
Max. oral contact area with mouth	1 some fingertips
Maximum amount used per consumer per event	Not applicable
Optional : provide risk management measures if needed	Avoid spraying directly into eyes or nose
Environmental exposure	
Maximum amount of product used per year. If the amount used is variable, use the higher value as the maximum tonnage to be covered.	10
Use of sewage/waste water treatment plant (STP) for selected ERC	No
Max. number of emission days per year	20
Industry sector for spERC	
Industry sector spERC - will overwrite ERC in risk assessment	
Treatment of waste air	Carbon Filter
Treatment of waste solids	Other (specify below)
	Not required
Treatment of waste liquids (not for waste water - see 6.2.4)	Other
Treatment of waste water	
Pre-treatment	None
Sewage/waste water treatment plant (STP) description:	
- give flow rates and describe capacity of STP	
- elimination rate in STP	
- dry weather river flow rate	
- describe sludge solids disposal	
Waste Management Measures	

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Information on measures to control risk during production and use stages of substance, preparation or article	This material and its container must be disposed of in a safe way
Information on measures to control risk at the end of service life of substance, preparation or article	This material and its container must be disposed of in a safe way
Exposure prediction	
Do you have relevant measurement data available (worker exposure, environmental release, consumer safety) for the applicable PROC's, ERC's and PC's/AC's.	Yes
If yes, please attach this information. Please indicate the conditions under which the measurements have been taken.	PDK (CIS) 3000 mg/m3
Boundaries set by Exposure Scenario	
Please provide additional information that you deem relevant for this use, Operational Conditions and Risk Management Measures	Harmful by inhalation. Do not breathe gas/fumes/vapour/spray (appropriate wording to be specified by the manufacturer). In case of insufficient ventilation, wear suitable respiratory equipment