



	P321: Specific treatment (...).
	P332 + P313: If skin irritation occurs: Get medical advice/attention.
	P362+P384: Take off contaminated clothing and wash before reuse.
Storage	P410 + P403: Protect from sunlight. Store in a well-ventilated place.
Disposal	No Data available

C. Other hazards and maleficence not included in the standards of the category of hazards and maleficence (NFPA)

Sanitation	1
Fire	0
Reactivity	0

### 3. Title and content of the component

Name of the component	OCTOFLUOROCYCLOBUTANE
Nickname (Trivial name)	CYCLOBUTANE, OCTAFLUORO-
CAS no	115-25-3
Content (%)	100%

### 4. Emergency measures.

#### A. If in eyes

Take emergency medical measures.

Immediately wash the skin and eye with running water for more than 20 minutes.

#### B. If on skin

If contact with the liquefied gas, melt the area with lukewarm water.

Consult with the medical agency if there is skin irritation.

In case of a minor contact on the skin, prevent the spreading of the contaminated area.

Immediately wash the skin and eye with running water for more than 20 minutes.

Remove the contaminated clothes and shoes and quarantine the contaminated area.

Take off the contaminated clothes and wash before re-use.

In case of hot material, place the affected area in a large amount of cold water or wash to remove heat.

Take emergency medical measures.

#### C. If inhaled.

Move to a place with fresh air.

Keep warm and comfortable.

Provide air in case breathing is difficult.

Perform artificial respiration in case the breathing stops.

#### D. If swallowed.

Take emergency medical measures.

#### E. Other cautions to doctor

Make sure that the medical personnel is aware of the material and take protective measures.

## 5. Measures in case of explosion, fire.

### A. Appropriate (inappropriate) extinguisher.

Use dry sand or soil when extinguishment by smothering.

In the case of extinguishment concerned with this material, use alcohol foam, carbon dioxide or water spray.

### B. Specific hazard from the chemical component

The container may explode on heating.

Part of it may burn but not easily ignited.

Non-flammable: although the material does not burn, corrosive/toxic fume could be produced when exposed to heat by decomposition.

Pay attention as flammable remains are formed after vaporization.

### C. Protective equipment when fire-fighting and preventional measures.

Be careful as it could be transported melted.

Be careful as the liquid gas spreads on the ground as it is heavier than the air.

Fight fire away from the region from a reasonable distance.

The rescuer must wear appropriate protections.

Be careful as the damaged container may fly.

Use extinguisher that fits the type of fire.

The damaged cylinder must be handled by the specialist only.

In case of tank fire, if it a large-scale fire, use an unmanned extinguisher and if not possible, refrain and let it burn.

In case of tank fire, refrain from the fire-captured tank.

In case of tank fire, extinguish at the maximum distance or use an unmanned extinguisher.

In the case of tank fire, as there is a risk of freezing, do not wet the source of leakage or safety facility.

If not in danger, move the container from the area of the fire.

For the removal of the purification water, capture it by a ditch and make sure that the materials do not disperse,

## 6. Measures in case leakage.

### A. Required measures and protections to protect the body.

Wipe what is spilled immediately and follow the prevention measures of the protection clause.

If possible, turn the container of the leakage and let it release as a gas rather than liquid.

Pay attention to the conditions and materials to avoid.

Stop the dispersion by covering with a plastic sheet.

Do not touch the damaged container spillage without wearing an appropriate protections.

Be careful as some leaves flammable remains after vaporization.

Stop the spillage if it is not dangerous.

Ventilate the contaminated area.

Let the material disperse.

B. Measures and protections for the body.

Reduce the vapor using water spray, or avoid the contact of water with the spillage by disheveling the steam point.

Remove all the sources of ignition.

Do not wet the source of ignition directly.

C. Environmental measures.

Prevent entering the waterway, drainage, basement, confined area.

D. Methods of purification or removal.

Absorb the liquid and clean the contaminated area with water and soap.

Absorb the spillage with inert material (such as dry sand or soil) and place it in the container of chemical waste.

For fire fighting purposes, build embankment and collect water.

## 7. Handling and storage measures.

A. Safety measures.

Work with reference to engineering maintenance and personal protection.

Pay attention to the material and conditions to avoid.

Avoid long-term or repeated contact on skin.

As there could be remains of the material to the container after it has been emptied, hence follow all the MSDS/label preventional measures.

Wash the area of handling after use.

Do not pressurize, cut, weld, solder, connect, pierce, grind or expose to heat, fire, spark, static or other sources of ignition.

B. Safe storage measures.

Completely drain the empty drum and appropriately close and store back to the drum regulator or appropriately place it.

The pressure of the container could rise when exposed to heat hence refrain from exposure to heat.

Avoid direct sunlight and keep in a well-ventilated area.

## 8. Prevention of spillage and personal protection.

A. Exposure standards of the chemical material, biological exposure standards etc.

Domestic Regulations

No data available.

ACGIH Regulation	No data available.
Biological exposure standards	No data available.
B. Appropriate engineering maintenance.	Install the washing and showering facility for the facilities that stores or uses this material.
C. Personal protection	
Respiratory protection	Use the respiratory protection that has completed the inspection by the Korea Occupational Safety and Health Agency as per the physicochemical characteristics of the exposed material.
Eye protection	No data available.
Hand protection	No data available.
Body protection	No data available.

## 9. Physicochemical characteristic.

A. External	
Shape	Gas
Color	No color
B. Odor	Odorless
C. Odor threshold	No data available.
D. pH	No data available.
E. Melting point/ freezing point	-40 C
F. Initial boiling point and boiling point range	-6 C
G. Ignition point	No data available.
H. Vaporization speed	No data available.
I. Inflammability (solid, vapor)	No data available.
J. Upper limit or lower limit of the range of ignition or explosion	- / -
K. Steam pressure	2052 mmHg (at 21.1 C)
L. Solubility	23.6 mg/l
M. Vapor density	7.33
N. Specific gravity	No data available.
O. n-octanol-water partition coefficient	1.70
P. Auto-ignition temperature	No data available.
Q. Decomposition temperature	No data available.
R. Viscosity	0.012cP (at 25 C)
S. Molecular weight	162.033

## 10. Stability and reactivity

### A. Chemical stability and hazardous reactivity

Includes high-pressure gas: May explode on heating

Irritating, corrosive, toxic gas may form with fire.

Non-flammable. The material does not burn but may form corrosive/toxic hume when heated by decomposition.

It may burn partly but not easily ignited.

The container may explode on heating.

B. Conditions to avoid      Source of ignition such as heat, spark, flame, etc.

C. Materials to avoid      Flammable material, reducing material.

D. Harmful decomposed product      Highly irritating and toxic gas may form while burning by thermal decomposition or combustion.

Corrosive/toxic hume.

## 11. Toxicological information.

A. Information on routes of exposure of high possibility.

When exposed to respiratory system, vomit, nausea, dizziness, convulsion, etc., may be caused.

When exposed orally, frostbite may be caused.

It causes skin irritation on contact and may cause blister, frostbite.

B. Health hazards information.

Acute toxicity

Oral                                      No data available.

Skin                                      No data available.

Inhalation                              (Not applicable: GAS (existing MSDS)).

Skin corrosion or irritation      Probability of MLD=0.993 (TOPKAT 6.2)

Serious eye damage or irritation      Probability of MLD=1.000 (TOPKAT 6.2)

Respiratory sensitization      No data available.

Skin sensitizations                  No data available.

Carcinogenicity                      No data available.

Occupation safety and health acts      No Data Available.

Notice of Ministry of Employment and Labor      No Data Available.

IARC                                      No data available.

OSHA                                      No Data Available.

ACGIH                                      A4

NTP                                      No data available.

EU CLP                                      No data available.

Germ-cell mutagenicity              No data available.

Reproductive toxicity              No data available.

Specific target organ systemic toxicity (Single exposure)      No data available

Specific target organ systemic toxicity (Repeated exposure)      No data available.

Aspirations respiratory tract hazards      No data available.

Other maleficence effects              No data available.

## 12. Effects on the environment.

A. Ecotoxicity

Fish (As calculated L(E)C50 exceeds the accepted chart, it does not classify as acute toxicity)

Crustacean No data available.

Algae No data available.

B. Persistent and biodegradable.

Persistent log Kow 1.70

Degradability No data available.

C. Bio-accumulative potential

Condenasability BCF 6.147

Biodegradability (non-biodegradable (High probability of accumulating in body))

D. Mobility in soil No data available.

E. Other adverse effects No data available

### 13. Disposal considerations.

A. Methods of waste disposal

Dispose of the content and container as per regulation if stated in the waste control act.

B. Cautious measures when disposal.

Consider the regulations and cautions if stated in the waste control act.

### 14. Information required for transport.

A. UN No. 1976

B. Proper shipping name OCTAFLUOROCYCLOBUTANE  
(REFRIGERANT GAS RC 318))

C. Transportation hazard classification 2.2

D. If applied, the packing group Not applicable.

E. Marin pollution (Marine pollutant material) No data available.

F. Special transport measures to the transport or the transportation and precautionary conditions that the user should know.

Emergency measures in case of fire F-C

Emergency measures in case of spillage S-V

### 15. Legal regulatory status.

A. Regulations by occupation safety and health acts Not Applicable.

B. Regulations by Chemicals control Act Not Applicable.

- |   |                 |
|---|-----------------|
| C. Regulations by Safety Control of Dangerous Substances        | Not Applicable. |
| D. Regulations by waste control act                             | Not Applicable. |
| E. Regulations by domestic and foreign law.                     |                 |
| Other domestic regulations.                                     |                 |
| Persistent organic pollutants control act                       | Not Applicable. |
| Foreign regulations   |                 |
| The USA knowledge management (OSHA Regulations)                 | Not Applicable. |
| The USA knowledge management (CERCLA Regulations)               | Not Applicable. |
| The USA knowledge management (EPCRA 302 Regulations)            | Not Applicable. |
| The USA knowledge management (EPCRA 304 Regulations)            | Not Applicable. |
| The USA knowledge management (EPCRA 313 Regulations)            | Not Applicable. |
| The USA knowledge management (EPCRA 302 Regulations)            | Not Applicable. |
| The USA knowledge management (Materials of Rotterdam agreement) | Not Applicable. |
| The USA knowledge management (Materials of Stockholm agreement) | Not Applicable. |
| The USA knowledge management (Materials of Montreal protocol)   | Not Applicable. |
| EU Classification(result of definite classification)            | Not Applicable. |
| EU Classification (Hazard text)                                 | Not Applicable. |
| EU Classification (Safety text)                                 | Not Applicable. |

## 16. Other information.

### A. Source of reference.

BIOWIN (estimation) (biodegradability)  
 EPISUITE (estimation) (condensability)  
 EPISUITE. Experimental (n-octanol/water partition coefficient (Kow))  
 EPISUITE, experimental (persistent)  
 KoSHANET (odor)  
 KOSHANET (color)  
 KOSHANET (shape)  
 KOSHANET (viscosity)  
 KOSHANET (steam density)  
 KOSHANET (steam pressure)  
 NLM; chemODplus, experimental (melting point/freezing point)  
 NLM; chemODplus, experimental (solubility)  
 NLM; chemODplus, experimental (initial boiling point and boiling point range)  
 TOPKAT 6,2; (serious eye damage or irritation)  
 TOPJAT 6.2; (skin corrosiveness or irritation)

B. Initial date of preparation 1st August 2017

C. Number of revision and first date of issue

Number of revision times

Last date of revision 9th August 2018

D. Miscellaneous



The issued Material safety data sheet (MSDA) is document edited and partly amended by referencing the MSDS provided by Korea Occupational Safety and Health Agency