Hexafluoroisobutene

Safety Data Sheet 1300331

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

Date of issue: 08/24/2015 Version: 1.0

SECTION 1: Identification

1.1. Identification

Product form	:	Substance
Substance name	:	Hexafluoroisobutene
CAS No	:	382-10-5
Product code	:	1300-3-31
Formula	:	C4H2F6
Synonyms	:	Hexafluoroisobutylene; 3,3,3-Trifluoro-2-(trifluoromethyl)-1-propene; HFIB
Other means of identification	:	MFCD01631697

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

Use of the substance/mixture	:	Laboratory chemicals Manufacture of substances Scientific research and development

1.3. Details of the supplier of the safety data sheet

,

1.4. Emergency telephone number

No additional information available

SECTION 2: Hazard(s) identification

2.1. Classification of the substance or mixture

Classification (GHS-US)

Simple Asphy	H380 -	May displace oxygen and cause rapid suffocation
Liquefied gas	H280 -	Contains gas under pressure; may explode if heated
Acute Tox. 3 (Inhalation:gas)	H331 -	Toxic if inhaled
Skin Irrit. 2	H315 -	Causes skin irritation
Eye Irrit. 2A	H319 -	Causes serious eye irritation
STOT SE 3	H335 -	May cause respiratory irritation

Full text of H-phrases: see section 16

2.2. Label elements

GHS-US labeling

Hazard pictograms (GHS-US) :

GHS04 GHS06 GHS07

Signal word (GHS-US) : Danger

Hazard statements (GHS-US) :
H280 - Contains gas under pressure; may explode if heated
H315 - Causes skin irritation
H319 - Causes serious eye irritation
H331 - Toxic if inhaled
H335 - May cause respiratory irritation
H380 - May displace oxygen and cause rapid suffocation

Precautionary statements (GHS-US) :
P261 - Avoid breathing fumes, gas, mist, spray, vapors
P264 - Wash skin thoroughly after handling
P271 - Use only outdoors or in a well-ventilated area
P280 - Wear protective gloves/protective clothing/eye protection/face protection
P302+P352 - If on skin: Wash with plenty of soap and water
P304+P340 - If inhaled: Remove person to fresh air and keep comfortable for breathing
P305+P351+P338 - If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P311 - Call a POISON CENTER or doctor/physician
P312 - Call a POISON CENTER or doctor/physician if you feel unwell
P321 - Specific treatment (see supplemental first aid instructions on this label)
P332+P313 - If skin irritation occurs: Get medical advice/attention
P337+P313 - If eye irritation persists: Get medical advice/attention
P362+P364 - Take off contaminated clothing and wash it before reuse

P403+P233 - Store in a well-ventilated place. Keep container tightly closed
P405 - Store locked up
P410+P403 - Protect from sunlight. Store in a well-ventilated place
P501 - Dispose of contents/container to an approved waste disposal plant

2.3. Other hazards

No additional information available

2.4. Unknown acute toxicity (GHS US)

Not applicable

SECTION 3: Composition/information on ingredients

3.1. Substance

Substance type : Mono-constituent

Name	Product identifier	%	Classification (GHS-US)
Hexafluoroisobutene (Main constituent)	(CAS No) 382-10-5	<= 100	Simple Asphy, H380 Liquefied gas, H280 Acute Tox. 3 (Inhalation:gas), H331 Skin Irrit. 2, H315 Eye Irrit. 2A, H319 STOT SE 3, H335

Full text of H-phrases: see section 16

3.2. Mixture

Not applicable

SECTION 4: First aid measures

4.1. Description of first aid measures

First-aid measures general : In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). Move the affected personnel away from the contaminated area.

First-aid measures after inhalation : Remove person to fresh air and keep comfortable for breathing. If not breathing, give artificial respiration. Get immediate medical advice/attention.

First-aid measures after skin contact : Wash skin with plenty of water. Get medical advice/attention.

First-aid measures after eye contact : Remove contact lenses, if present and easy to do. Continue rinsing. Get medical advice/attention. Immediately flush eyes thoroughly with water for at least 15 minutes.

First-aid measures after ingestion : Due to its physical form, exposure to this chemical is not likely. Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth out with water. Get medical advice/attention.

4.2. Most important symptoms and effects, both acute and delayed

Symptoms/injuries : The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11.

Symptoms/injuries after inhalation : Depression of the central nervous system, headaches, dizziness, drowsiness, loss of coordination. Cardiac disorders (arrhythmia).

Symptoms/injuries after skin contact : Contact with the liquid the may cause cold burns/frostbite.

Symptoms/injuries after eye contact : Direct contact with the liquefied gas may cause severe and possibly permanent eye injury due to frostbite from rapid liquid evaporation.

4.3. Indication of any immediate medical attention and special treatment needed

Treat symptomatically.

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media : The product is not flammable. Alcohol resistant foam. Use extinguishing media appropriate for surrounding fire. Carbon dioxide. Dry powder. Water spray.

5.2. Special hazards arising from the substance or mixture

Fire hazard : Under certain temperature and pressure conditions may form a flammable mixture in the presence of air. Thermal decomposition generates: Carbon oxides. Hydrogen fluoride.

Explosion hazard : Contains gas under pressure; may explode if heated. Use water spray or fog for cooling exposed containers.

5.3. Advice for firefighters

Protection during firefighting : For further information refer to section 8: "Exposure controls/personal protection". Wear gas tight chemically protective clothing in combination with self contained breathing apparatus.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

General measures : Evacuate unnecessary personnel. Gas/vapor heavier than air. May accumulate in confined spaces, particularly at or below ground level. Ensure adequate air ventilation. Do not breathe gas, fumes, vapor or spray. May cause suffocation by reducing oxygen available for breathing. Gas/vapor explosive with air within explosion limits. Eliminate every possible source of ignition.

6.1.1. For non-emergency personnel

Emergency procedures : Only qualified personnel equipped with suitable protective equipment may intervene.

6.1.2. For emergency responders

Protective equipment : Do not attempt to take action without suitable protective equipment. For further information refer to section 8: "Exposure controls/personal protection".

6.2. Environmental precautions

Avoid release to the environment. Notify authorities if product enters sewers or public waters.

6.3. Methods and material for containment and cleaning up

For containment : Dike for recovery or absorb with appropriate material.

Methods for cleaning up : Take up large spills with pump or vacuum and finish with dry chemical absorbent. Use explosion-proof equipment. Take up small spills with dry chemical absorbent. Sweep or shovel spills into appropriate container for disposal.

Other information : For disposal of solid materials or residues refer to section 13 : "Disposal considerations".

6.4. Reference to other sections

For further information refer to section 13.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Precautions for safe handling : Do not breathe fumes, gas, mist, spray, vapors. Wear personal protective equipment. Avoid contact with skin and eyes. Ensure good ventilation of the work station.

Safe handling of the gas receptacle : Contents under pressure. Ensure cylinder valve is closed and not leaking after each use.

Hygiene measures : Wash contaminated clothing before reuse. Do not eat, drink or smoke when using this product. Always wash hands after handling the product.

7.2. Conditions for safe storage, including any incompatibilities

Technical measures : Securely chain cylinders when in use and protect against physical damage.

Storage conditions : Protect from sunlight. Do not expose to temperatures exceeding 50 °C.

Incompatible materials : Refer to Section 10 on Incompatible Materials.

Storage area : Store in dry, cool, well-ventilated area.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

No additional information available

8.2. Exposure controls

Appropriate engineering controls : Ensure good ventilation of the work station. Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure.

Hand protection : Protective gloves.

Eye protection : Chemical goggles or safety glasses. Face shield.

Skin and body protection : Wear suitable protective clothing.

Respiratory protection : In case of inadequate ventilation wear respiratory protection.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state : Gas

Color : No data available

Odor : No data available

Odor threshold : No data available

pH : No data available

Melting point	:	-111 °C
Freezing point	:	No data available
Boiling point	:	14.5 °C
Flash point	:	No data available
Relative evaporation rate (butyl acetate=1)	:	No data available
Flammability (solid, gas)	:	No data available
Explosion limits	:	No data available
Explosive properties	:	No data available
Oxidizing properties	:	No data available
Vapor pressure	:	1.2 bar (at 20 °C)
Relative density	:	No data available
Relative vapor density at 20 °C	:	No data available
Specific gravity / density	:	1.391 g/ml (at 20 °C)
Molecular mass	:	164.05 g/mol
Solubility	:	No data available
Log Pow	:	No data available
Auto-ignition temperature	:	No data available
Decomposition temperature	:	No data available
Viscosity	:	No data available
Viscosity, kinematic	:	No data available
Viscosity, dynamic	:	No data available

9.2. Other information

No additional information available

SECTION 10: Stability and reactivity

10.1. Reactivity

No additional information available

10.2. Chemical stability

The product is stable at normal handling and storage conditions.

10.3. Possibility of hazardous reactions

May polymerize.

10.4. Conditions to avoid

Protect from sunlight. Do not expose to temperatures exceeding 50 ℃.

10.5. Incompatible materials

Alkali metals. Strong oxidizing agents.

10.6. Hazardous decomposition products

Under normal conditions of storage and use, hazardous decomposition products should not be produced. Hazardous decomposition products in case of fire, see Section 5.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute toxicity : Inhalation:gas: Toxic if inhaled.

Hexafluoroisobutene (382-10-5)	
LC50 inhalation rat (ppm)	1425 ppm/4h
ATE US (gases)	1425.000 ppmV/4h

Skin corrosion/irritation	:	Causes skin irritation.
Serious eye damage/irritation	:	Causes serious eye irritation.
Respiratory or skin sensitization	:	Not classified
Germ cell mutagenicity	:	Not classified
Carcinogenicity	:	Not classified
Reproductive toxicity	:	Not classified

Specific target organ toxicity (single exposure)	:	May cause respiratory irritation.
Specific target organ toxicity (repeated exposure)	:	Not classified
Aspiration hazard	:	Not classified
Symptoms/injuries after inhalation	:	Depression of the central nervous system, headaches, dizziness, drowsiness, loss of coordination. Cardiac disorders (arrhythmia).
Symptoms/injuries after skin contact	:	Contact with the liquid the may cause cold burns/frostbite.
Symptoms/injuries after eye contact	:	Direct contact with the liquefied gas may cause severe and possibly permanent eye injury due to frostbite from rapid liquid evaporation.

SECTION 12: Ecological information

12.1. Toxicity

Ecology - general : The product is not considered harmful to aquatic organisms or to cause long-term adverse effects in the environment.

12.2. Persistence and degradability

No additional information available

12.3. Bioaccumulative potential

No additional information available

12.4. Mobility in soil

No additional information available

12.5. Other adverse effects

No additional information available

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Waste treatment methods	:	Remove to an authorized incinerator equipped with an afterburner and a flue gas scrubber.
Waste disposal recommendations	:	Dispose of contents/container in accordance with licensed collector's sorting instructions.
Additional information	:	Recycle the material as far as possible.

SECTION 14: Transport information

Department of Transportation (DOT)

In accordance with DOT

Transport document description	:	UN3162 Liquefied gas, toxic, n.o.s. Inhalation Hazard Zone C (Hexafluoroisobutene(382-10-5)), 2.3
UN-No.(DOT)	:	UN3162
Proper Shipping Name (DOT)	:	Liquefied gas, toxic, n.o.s. Inhalation Hazard Zone C Hexafluoroisobutene(382-10-5)
Transport hazard class(es) (DOT)	:	2.3 - Class 2.3 - Poisonous gas 49 CFR 173.115
Hazard labels (DOT)	:	2.3 - Poison gas

DOT Packaging Non Bulk (49 CFR 173.xxx)	:	304
DOT Packaging Bulk (49 CFR 173.xxx)	:	314;315
DOT Symbols	:	G - Identifies PSN requiring a technical name

DOT Special Provisions (49 CFR 172.102)	:	3 - This material is poisonous by inhalation (see 171.8 of this subchapter) in Hazard Zone C (see 173.116(a) of this subchapter), and must be described as an inhalation hazard under the provisions of this subchapter. B14 - Each bulk packaging, except a tank car or a multi-unit-tank car tank, must be insulated with an insulating material so that the overall thermal conductance at 15.5 C (60 F) is no more than 1.5333 kilojoules per hour per square meter per degree Celsius (0.075 Btu per hour per square foot per degree Fahrenheit) temperature differential. Insulating materials must not promote corrosion to steel when wet.
DOT Packaging Exceptions (49 CFR 173.xxx)	:	None
DOT Quantity Limitations Passenger aircraft/rail (49 CFR 173.27)	:	Forbidden
DOT Quantity Limitations Cargo aircraft only (49 CFR 175.75)	:	Forbidden
DOT Vessel Stowage Location	:	D - The material must be stowed ‘‘on deck only’’ on a cargo vessel and on a passenger vessel carrying a number of passengers limited to not more than the larger of 25 passengers or one passenger per each 3 m of overall vessel length, but the material is prohibited on passenger vessels in which the limiting number of passengers is exceeded.
DOT Vessel Stowage Other	:	40 - Stow ‘‘clear of living quarters’’
Other information	:	No supplementary information available.

TDG

No additional information available

Transport by sea

UN-No. (IMDG)	:	3162
Proper Shipping Name (IMDG)	:	LIQUEFIED GAS, TOXIC, N.O.S.
Class (IMDG)	:	2 - Gases

Air transport

UN-No. (IATA)	:	3162
Proper Shipping Name (IATA)	:	Liquefied gas, toxic, n.o.s.
Class (IATA)	:	2
Instruction "cargo" (ICAO)	:	Forbidden
Instruction "passenger" (ICAO)	:	Forbidden
Instruction "passenger" - Limited quantities (ICAO)	:	Forbidden

SECTION 15: Regulatory information

15.1. US Federal regulations

Hexafluoroisobutene (382-10-5)
Listed on the United States TSCA (Toxic Substances Control Act) inventory

All components of this product are listed, or excluded from listing, on the United States Environmental Protection Agency Toxic Substances Control Act (TSCA) inventory

This product or mixture does not contain a toxic chemical or chemicals in excess of the applicable de minimis concentration as specified in 40 CFR §372.38(a) subject to the reporting requirements of section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372.

15.2. International regulations

CANADA

Hexafluoroisobutene (382-10-5)	
Listed on the Canadian NDSL (Non-Domestic Substances List)	
WHMIS Classification	Class A - Compressed Gas Class D Division 1 Subdivision A - Very toxic material causing immediate and serious toxic effects

EU-Regulations

No additional information available

National regulations

Hexafluoroisobutene (382-10-5)
Listed on the AICS (Australian Inventory of Chemical Substances)
Listed on the Japanese ENCS (Existing & New Chemical Substances) inventory
Listed on the Japanese ISHL (Industrial Safety and Health Law)
Listed on the Korean ECL (Existing Chemicals List)
Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances)

15.3. US State regulations

California Proposition 65 - This product does not contain any substances known to the state of California to cause cancer and/or reproductive harm

SECTION 16: Other information

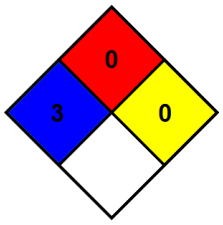
Full text of H-phrases:

Acute Tox. 3 (Inhalation:gas)	Acute toxicity (inhalation:gas) Category 3
Eye Irrit. 2A	Serious eye damage/eye irritation Category 2A
Liquefied gas	Gases under pressure Liquefied gas
Simple Asphy	Simple Asphyxiant
Skin Irrit. 2	Skin corrosion/irritation Category 2
STOT SE 3	Specific target organ toxicity (single exposure) Category 3
H280	Contains gas under pressure; may explode if heated
H315	Causes skin irritation
H319	Causes serious eye irritation
H331	Toxic if inhaled
H335	May cause respiratory irritation
H380	May displace oxygen and cause rapid suffocation

NFPA health hazard : 3 - Short exposure could cause serious temporary or residual injury even though prompt medical attention was given.

NFPA fire hazard : 0 - Materials that will not burn.

NFPA reactivity : 0 - Normally stable, even under fire exposure conditions, and are not reactive with water.



HMIS III Rating

Health : 3 Serious Hazard - Major injury likely unless prompt action is taken and medical treatment is given

Flammability : 0 Minimal Hazard - Materials that will not burn

Physical : 0 Minimal Hazard - Materials that are normally stable, even under fire conditions, and will NOT react with water, polymerize, decompose, condense, or self-react. Non-Explosives.

SDS US (GHS HazCom 2012)

This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product