



SDS NUMBER : OCI-00227  
ISSUED DATE : OCTOBER 18, 2018

**SAFETY DATA SHEET**  
**1,1,1,2,3,3,3-HEPTAFLUOROPROPANE**

**SECTION 1 – IDENTIFICATION OF SUBSTANCE**

**PRODUCT IDENTIFIER**

Trade Name : **ORIENT 227**<sup>®</sup>

Chemical Name : 1,1,1,2,3,3,3-heptafluoropropane

Synonyms : F7C3H; HFC-227ea; Propane, 1,1,1,2,3,3,3-heptafluoro-HFC-227eaHP

Chemical formula : C<sub>3</sub>HF<sub>7</sub>

CAS number : 431-89-0

**RELEVANT IDENTIFIED USES OF THE SUBSTANCE**

Relevant identified uses : Fire extinguishing agent for use in total flooding application

**DETAILS OF THE SUPPLIER OF THE SAFETY DATA SHEET**

Registered company name : Orient Corporation Pte Ltd

Address : 29 Loyang Drive, Singapore, 508944

Email : [corporate@orientcorporation.com](mailto:corporate@orientcorporation.com)

Phone Number : +65 6543-0070 (Singapore)

Emergency Phone Number : 1-800-424-9300 (within USA and Canada)  
1-703-527-3887 (outside USA and Canada)

**SECTION 2 – HAZARDS IDENTIFICATION**

**CLASSIFICATION OF THE SUBSTANCE**

| Gas under Pressure (Liquefied gas)

**NFPA 704 HAZARD CLASSIFICATION**

HEALTH = 1

FLAMMABILITY = 0

REACTIVITY = 1

SPECIAL HAZARD = None

National Fire Protection Association (NFPA) hazard ratings are designed for use by emergency response personnel to address the hazards that are presented by short-term, acute exposure to materials under conditions of fire, spill or similar emergencies. Hazard ratings are primarily based

on the inherent physical and toxic properties of the material but also include the toxic properties of combustion or decomposition products that are known to be generated in significant quantities.

### HMIS HAZARD CLASSIFICATION


HEALTH = 1  
FLAMMABILITY = 0  
REACTIVITY = 0  
PROTECTION = x (*Section 8*)

Hazardous Material Identification System (HMIS) hazard ratings are designed to inform employees of chemical hazard in the workplace. The provided ratings are based on the inherent properties of the material under expected conditions of normal use and are not intended for use in emergency situations. HMIS ratings are to be used with a fully implemented HMIS program.

### NFPA/ HMIS HAZARD INDEX

0 = MINIMAL HAZARD, 1 = SLIGHT HAZARD, 2 = MODERATE HAZARD, 3 = SERIOUS HAZARD, 4 = SEVERE HAZARD, x = DEPENDING ON THE USE CONDITIONS

### Label elements

Hazard pictogram(s) : 

Signal word : Warning

### Hazard statement(s)

**AUH044** : Risk of explosion if heated under confinement.

**H280** : Contains gas under pressure; may explode if heated.

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

## SECTION 3 – COMPOSITION/ INFORMATION ON INGREDIENTS

### Substances

INGREDIENT NAME	CAS NUMBER	% w/w
1,1,1,2,3,3,3-Heptafluoropropane	431-89-0	≥ 99.96

## SECTION 4 – FIRST AID MEASURES

### Description of first aid measures

- Eye Contact**
- Gently rinse the affected eye(s) with clean, cool water for at least 15 minutes;
  - Seek medical advice. Even when no pain persists and vision is good, a doctor should examine the eye as delayed damage may occur.

- Skin Contact**
- If skin contacts occur:
- Immediately remove all contaminated clothing, including footwear;
  - Flush skin and hair with running water (and soap if available);
  - Seek medication attention in event of irritation.
- In case of cold burns (frost-bite):
- move casualty into warmth before thawing the affected part;
  - Bathe the affected area immediately with warm water for 15 minutes, immersing if possible and without rubbing;
  - Do not apply hot water or radiant heat.
  - Seek mediation advice.

- Inhalation**
- Remove the person from the gas source or contaminated area;
  - Seek medical attention;
  - Keep the person warm, comfortable and at rest while awaiting for medical care.

- Ingestion**
- Not considered a normal route of entry;
  - For advice, contact a Poisons Information Center or a doctor.

### Most important symptoms and effects, both acute and delayed

No applicable information

### Indication of any immediate medical attention and special treatment needed

Treat symptomatically.

#### *EMERGENCY CARE FOR HAZARDOUS MATERIALS EXPOSURE:*

Vapourising liquid causes rapid cooling and contact may cause cold burns, frostbite, even through normal gloves. Frozen skin tissues are painless and appear waxy and yellow. Signs and symptoms of frost-bite may include “pins and needles”, paleness followed by numbness, a hardening a stiffening of the skin, a progression of color changes in the affected area, (first white, then mottled and blue and eventually black; on recovery, red, hot, painful and blistered).

## SECTION 5 – FIRE FIGHTING MEASURES

### Extinguishing media

- 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

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**Fire Incompatibility** : Avoid contamination with oxidizing agents, such as nitrates, oxidizing acids, chlorine bleaches, pool chlorine etc. as ignition may occur.

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### Special protective equipment and precautions for fire-fighters

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**Fire Fighting**

- Alert fire Brigade and tell them location and nature of hazard.
- Wear breathing apparatus plus protective gloves in the event of a fire.
- Fight fire from a safe distance.
- Use water delivered as a fine spray to control fire and cool adjacent area.
- Do not approach cylinders suspected to be hot.
- Cool fire exposed cylinders with water spray from a protected location.
- If safe to do so, remove cylinders from path of fire.
- Excessive pressures may develop in a gas cylinder exposed in a fire, this may result in explosion.
- Fire fighting requirements: the need for proximity, entry and special protective clothing should be determined for each incident, by a competent fire-fighting safety professional.

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**Fire/Explosion Hazard**

- Containers may explode when heated.
- Fire exposed containers may vent contents through pressure relief devices.
- High concentration of gas cause asphyxiation without warning.
- May decompose explosively when heated or involved in fire.
- Contact with gas may cause burns, severe injury and/or frostbite.
- Decomposition may produce toxic fumes of: carbon monoxide (CO), carbon dioxide (CO<sub>2</sub>), hydrogen fluoride and other pyrolysis products typical of burning organic material.

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## SECTION 6 – ACCIDENTAL RELEASE MEASURES

### Personal precautions, protective equipment and emergency procedures

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See section 8

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### Environmental precautions

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See section 12

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### Methods and material for containment and cleaning up

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**Minor Spills**

- Avoid breathing vapour and any contact with liquid or gas. Protective equipment should be used.
- Do not enter confined area where gas may have accumulated.
- Increase ventilation.
- Stop leak only if safe to do so.
- Remove leaking cylinders to safe place. Release pressure under safe controlled conditions by opening valve.
- Do not exert excessive pressure on the valve and do not attempt to operate a damaged valve.
- Orientate cylinder so that the leak is gas, not liquid, to minimize rate of leakage.
- Keep area clear of personnel until gas has dispersed.

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**Major Spills**

- Clear area of personnel.
  - Alert Emergency Authority and advise them of the location and nature of hazard.
  - Wear breathing apparatus and protective gloves.
  - Prevent spillage from entering drains and water-courses by any means available.
  - Increase ventilation.
  - No smoking or naked lights within area.
  - Stop leak if safety to do so.
  - Water spray or fog may be used to disperse vapour.
  - Do not enter confined area where gas may have collected.
  - Keep area clear until gas has dispersed.
  - Remove leaking cylinders to a safe place.
  - Release pressure under safe and controlled conditions.
  - Do not exert excessive pressure on valve and do not attempt to operate damaged valve.
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## **SECTION 7 – HANDLING AND STORAGE**

### **Precautions for safe handling**

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**Safe handling**

- Consider use in closed pressurized 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.
  - When connecting or replacing cylinders take care to avoid airborne particulates violently ejected when system pressurizes.
  - Use a check-valve or trap in the discharge line to prevent hazardous back-flow into the cylinder.
  - Check regularly for spills or leaks. Keep valve tightly closed but do not apply extra leverage to hand wheels or cylinder keys.
  - Open valve slowly.
  - Suck back of water into the container should be avoided.
  - Do not drag, slide or roll cylinders. Use a suitable hand truck for cylinder movement.
  - Test for leakage with brush and detergent. Never use a naked flame.
  - Do not heat cylinder by any means to increase the discharge rate of product from cylinder.
  - If a cylinder valve will not close completely, remove the cylinder to a well ventilated location and, when empty, tag as FAULTY and return to supplier.
  - Do not attempt to repair work on lines, vessels under pressure.
  - Atmosphere must be tested and O.K. before work resumes after leakage.
  - Do not transfer gas from one cylinder to another.
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<b>Other Information</b>	<ul style="list-style-type: none"><li>• Store below 38 °C.</li><li>• Cylinder should be stored in a well-ventilated location, preferably in the open.</li><li>• Cylinders stored in the open should be protected against rust and extremes of weather.</li><li>• Cylinder in storage should be properly secured to prevent toppling or rolling.</li><li>• Cylinder valve should be closed when not in use.</li><li>• Where cylinders are fitted with valve protection, this should be in place and properly secured.</li><li>• Preferably store full and empty cylinders separately.</li><li>• Cylinders in storage should be checked periodically for general condition and leakage.</li><li>• Protect cylinders against physical damage. Move and store cylinders correctly as instructed by their manual handling.</li></ul>
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**Conditions for safe storage, including any incompatibilities**

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<b>Suitable container</b>	<ul style="list-style-type: none"><li>• Do not use aluminum or galvanized containers.</li><li>• Cylinder.</li><li>• Ensure the use of equipment rated for cylinder pressure.</li><li>• Valve protection cap to be in place until cylinder is secured and connected.</li><li>• Cylinder must be properly secured either in use or in storage.</li><li>• Cylinder valve must be closed when not in use or when empty.</li><li>• Suckback into cylinder may result in rupture. Use back-flow preventive device in piping.</li></ul>
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<b>Storage incompatibility</b>	<p>As a general rule, <u>haloalkanes</u>:</p> <ul style="list-style-type: none"><li>• The more highly substituted ones may be used as fire suppressants;</li><li>• May react on contact with potassium or its alloys;</li><li>• May produce explosive compounds following prolonged contact with metallic or other azides;</li><li>• May react with the lighter divalent metals to give more reactive compounds analogous to Grignard reagents;</li></ul> <p>Bretherick L., <u>Handbook of reactive chemical hazards</u>:</p> <ul style="list-style-type: none"><li>• React with metal halides and active metals, such as sodium, potassium, lithium, calcium, zinc, powdered aluminium, aluminium alloys, magnesium and magnesium alloys;</li><li>• May react with brass and steel;</li><li>• May react with strong oxidisers;</li><li>• May degrade rubber and plastic.</li></ul>
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## SECTION 8 – EXPOSURE CONTROLS / PERSONAL PROTECTION

### Control parameters

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#### EXPOSURE LIMIT:

Chemical Name	TWA Limit
1,1,1,2,3,3,3-Heptafluoropropane	1000 ppm

TWA: Time-Weighted-Average

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### Exposure Controls

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#### Appropriate engineering controls

- Areas where cylinders are stored require good ventilation and, if closed, need discrete/ controlled exhaust ventilation.
  - Local exhaust ventilation may be required in work areas.
  - Automatic alerting systems with automatic shutdown of gas-flow may be appropriate and may in fact be mandatory in certain jurisdictions.
  - Respiratory protection in the form of air-supplied or self-contained breathing equipment must be worn if the oxygen concentration in the workplace air is less than 19%.
  - Cartridge respirators do not give protection and may result in rapid suffocation.
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### Personal Protection

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#### Eye and face protection

- Safety glasses with side shields.
  - Chemical goggles if wearing contact lenses.
  - Full face shield may be required for supplementary but never for primary protection of eyes.
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#### Skin protection

- See hand section below.
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#### Hands/ feet protection

- Gloves must be worn on clean hands. After using gloves, hands should be washed and dried thoroughly.
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#### Body protection

- See other section below.
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#### Other protection

- Eye-wash unit.
  - Ensure availability of lifeline in confined spaces.
  - Staff should be trained in all aspects of rescue work.
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#### Respiratory protection

- Full face respiratory with supplied air. The wearer must be warned to leave the contaminated area immediately on detecting any odours through the respirator. The odour may indicate that the mask is not functioning properly or not properly fitted.
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## SECTION 9 – PHYSICAL AND CHEMICAL CHARACTERISTICS

### Information on basic physical and chemical properties:

APPEARANCE	:	Colorless, odorless liquefied gas
MOLECULAR WEIGHT (G/MOL)	:	170.03
BOILING POINT	:	-16.4°C / 2.48°F
VAPOR PRESSURE @ 21°C/70°F	:	58.8 psia
VAPOR DENSITY (AIR=1)	:	6.04
WATER REACTIVE	:	NO
SPECIFIC GRAVITY (H <sub>2</sub> O=1)	:	1.46
PERCENT VOLATILE (by volume)	:	No information available.
EVAPORATION RATE (Butyl acetate = 1)	:	No information available.
VISCOSITY @ 20°C/68°F	:	No information available.
MELTING POINT	:	-131°C / -203.8°F
WATER SOLUBILITY @20°C/68°F	:	260 mg/L
CRITICAL TEMPERATURE	:	101.7°C / 215.1°F
CRITICAL PRESSURE	:	422.3 psia

## SECTION 10 – STABILITY AND REACTIVITY

Reactivity	• See section 7
Chemical stability	• Product is considered stable. • Unstable in the presence of incompatible materials. • Hazardous polymerization will not occur.
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/ Routes and Symptoms of Exposure

Inhaled	• This material is not considered to produce respiratory irritation, as classified by EC Directives using animal models. Nevertheless, inhalation of the material, especially for prolonged periods, may produce respiratory discomfort and occasionally, distress. • The material is highly volatile and may quickly form a concentrated
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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.

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- 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.
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- Skin contact**
- Limited evidence exists that the material either produce inflammation of the skin in a large number of individuals following direct contact.  
In common with other halogenated aliphatic,
  - skin contact of fluorocarbons may cause dermal problems due to a tendency to remove natural oils from the skin, giving rise to irritation and the development of dry and sensitive skin.
  - Open cuts or irritated skin should not be exposed to this material.
  - Entry into blood-stream via cuts, wounds or lesions, may produce systemic injury with harmful effects.
  - Material on the skin evaporates quickly. Vapourising liquid causes rapid cooling and contact may cause cold burns, frostbite, and even through normal gloves.
  - Prolonged skin contact with the liquid may cause the absorption of harmful amounts of material.
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- Eye**
- Although the material is not considered to be an irritant as classified by EU Directives, direct eye contact with the material may produce transient discomfort characterized by tearing or conjunctival redness.
  - Vapourising liquid causes rapid cooling and contact may cause cold burns, frostbite, and even through normal gloves.
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- Chronic**
- Limited evidence suggests that repeated or prolonged 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 fluorocarbons are less toxic than the corresponding halogenated aliphatic based on chlorine.
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### Toxicological Data

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Remark: If a component is disclosed in the other sections but does not appear in a table below, either no data are available for that endpoint or the data are not sufficient for classification.

Chemical name	Species	Toxicity	Irritation
1,1,1,2,3,3,3- Heptafluoropropane	rat	Inhalation 4 hours, LC50: > 788,698 ppm	Not available

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Please contact the address listed on the first page of the SDS for additional toxicological information on this material and/or its components.

## SECTION 12 – ECOLOGICAL INFORMATION

<b>Ecotoxicity</b>	<ul style="list-style-type: none"><li>No applicable information</li></ul>
<b>Persistence and degradation</b>	<ul style="list-style-type: none"><li>Photolytic half-life is 34.2 years</li></ul>
<b>Bio-accumulative potential</b>	<ul style="list-style-type: none"><li>No applicable information</li></ul>
<b>Others</b>	<ul style="list-style-type: none"><li>Ozone Depletion Potential: 0</li><li>Global Warming Potential: 3,220 for a 100-year time horizon</li></ul>

## SECTION 13 – DISPOSAL CONSIDERATIONS

### Waste treatment methods

<b>Product/ Packaging disposal</b>	<ul style="list-style-type: none"><li>Evaporate residue at an approved site.</li><li>Ensure damaged or non-returnable cylinders are gas-free before disposal.</li><li>Legislation addressing waste disposal requirements may differ by country, state and/ or territory. Each user must refer to laws operating in their area.</li><li>Disposal of waste product in a permitted industrial waste facility. Combustion products could include HF. Facility must be capable of handling halogenated materials.</li></ul>
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## SECTION 14 – TRANSPORT INFORMATION

### Labels required



### U.S.DOT

PROPER SHIPPING NAME	:	Heptafluoropropane or refrigerant gas R-227
HAZARD CLASS	:	2.2 Non-flammable gas
UN NUMBER	:	UN3296

### AIR TRANSPORT - ICAO OR IATA

PROPER SHIPPING NAME	:	Heptafluoropropane or refrigerant gas R-227
HAZARD CLASS	:	2.2 Non-flammable gas
UN NUMBER	:	UN3296

## WATER - IMDG

PROPER SHIPPING NAME : Heptafluoropropane or refrigerant gas R-227  
HAZARD CLASS : 2.2 Non-flammable gas  
UN NUMBER : UN3296

## SECTION 15 – REGULATORY INFORMATION

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

1,1,1,2,3,3,3-Heptafluoropropane (CAS 431-89-0) is found on the following regulatory lists:

National Inventory	Status
Australia - AICS	All ingredients are on the inventory
Canada - DSL	All ingredients are on the inventory
Canada - NDSL	Not determined or not on the inventory and are not exempt from listing
China - IECSC	All ingredients are on the inventory
Europe – EINEC/ ELINCS/ NLP	All ingredients are on the inventory
Japan - ENCS	All ingredients are on the inventory
Korea - KECI	All ingredients are on the inventory
New Zealand - NZIoC	All ingredients are on the inventory
Philippines - PICCS	All ingredients are on the inventory
USA - TSCA	All ingredients are on the inventory

## SECTION 16 – OTHER INFORMATION

### Other Information

Orient Corporation urges each customer or recipient of this SDS to study it carefully and consult appropriate expertise, as necessary or appropriate, to become aware of and understand the data contained in this SDS and any hazards associated with the product. The above information is provided in good faith and believed to be accurate, but does not claim to be all inclusive. Since conditions for use of the product are not under the control of the company, it is the buyer's/user's duty to determine the conditions necessary for the safe use of this product. Users should consider these data only as a guide to the appropriate precautionary and emergency handling of the product. Regulatory requirements are subject to change and may differ between various locations. It is the buyer's/user's responsibility to ensure that his activities comply with all federal, state, provincial or local laws. The information presented here is based on data available at the time of shipping, is subject to change without notice as new information is obtained, and may not be valid for such material used in

combination with any other material or in any process. However, no warranty of any kind, express or implied, is given.

**Revision date:** 18/10/2018

**Definitions and abbreviations:**

- TWA: Time-Weighted-Average;
- AICS: Australia Inventory of Chemical Substances;
- DSL: Domestic Substances List in Canada;
- NDSL: Non-Domestic Substance List in Canada;
- IECSC: Inventory of Existing Chemical Substances Produced or Imported in China;
- EINEC/ ELINCS/ NLP: European Inventory of Existing Commercial Chemical Substances/ European List of Notified Chemical Substances/ No-longer Polymers List;
- ENCS: Existing and New Chemical Substances in Japan;
- KECI: Korea Existing Chemicals Inventory;
- NZIoC: New Zealand's Inventory of Chemicals;
- PICCS: Philippine Inventory of Chemicals and Chemical Substances;
- TSCA: Toxic Substances Control Act Chemical Substance Inventory in USA.