SAFETY DATA SHEET

1. IDENTIFICATION OF THE SUBSTANCE / MIXTURE AND OF THE COMPANY / UNDERTAKING

Product Name:	Pharmaceutical Refrigerator (Model number : MPR-N200H) ※ ※ Suffix is added at the end of this model number in accordance with the destination. However, the content of SDS is same for all destinations.
Product Use:	Refrigeration of a sample
Alternate Names:	Pharmaceutical Refrigerator,
Manufacturer:	PHC Corporation 1-1-1 Sakada Oizumi-Machi Ora-Gun, Gunma Japan
Emergency Phone No.	Tel:+81 276 61 5362

For the SDS item below, it is a description of the low temperature refrigerant built in the above device.

2. HAZARD IDENTIFICATION

Classification of the substance or mixture

Physical hazards Not Classified

Health hazards Not Classified

Environmental hazards Not Classified

Label elements

This product does not contain any label elements.

Other hazards

This product does not contain any substances classified as PBT or vPvB.

3. COMPOSITION / INFORMATION ON INGREDIENTS

Alternative names	Refrigerants for low temperature refrigeration.
Product Description	This MSDS covers grades: R-600a
Charge:	60 g

Chemical Name	ISOBUTANE
Composition Range	98.00 wt% or more of isobutene
Chemical Formula	C_4H_{10} [$(CH_3)_2CHCH_3$]
Official Gazette Notice	Reference No. 2-4
CAS	#75-28-5

4.FIRST AID MEASURES

Inhalation: In case a large volume has been inhaled, take measures to remove the anoxic conditions, and call doctor for a medical treatment if necessary.

Eye Contact : Wash with a plenty of clean water

Skin Contact : Take immediate medical care against frostbite.
If it adheres to skin, it may cause frostbite.

Presumable Acute Symptom :
Liquid butane causes frostbite when it adheres to skin.

The Most Important Sign or Symptom :
Inhalation of highly-concentrated butane will cause unconsciousness with just a breath.
Continuation of the condition will result in death.

Protection of Persons for First Aid Measures :
It is necessary to wear protectors to prevent adhesion of butane to skin where liquid butane is leaking or jetting out.
Make adequate ventilation as there may be less concentration of oxygen in air where liquid butane is leaking or jetting out.
Should the concentration of leaked butane in air ranges somewhere between 1.8% and 8.4%, it is very likely to cause explosion if there is a source of fire around.
Adequate ventilation is absolutely required. In case of outdoors, you can spray water using atomizing nozzles to prevent spreading and explosion.

5.FIRE FIGHTING MEASURES

Fire Extinguishing Media :Water spray, Chemical powder, etc.

Particular Hazards When Fire Breaks Out :
Heavier than air, this gas spreads crawling on the surface of ground and may catch fire in a remote place.
When a tank or container is exposed to flame, internal pressure may rise up and activate the safety valve causing a blowout of gas. Should heat be applied to a container, it may cause destruction and explosion unless the safety device functions.

Fire Extinguishing Means:
Cut off the gas source. Cool down the surrounding with water using a spray nozzle in order to keep fire from spreading out.
While you spray water from windward side, extinguish fire around.
In case of an imminent fire around, remove the container to a safe area.
In case you can prevent gas from flowing out, extinguish fire with fire extinguishing agents.
Guide everybody other than those concerned to a safe area.
After fire is extinguished, there may be a case of explosion caused by leaked gas resulting in the expansion of damages.

Protection of Fire Fighting Persons
Use protective wears, respirator and leather gloves.

6. SPILL AND LEAK EMERGENCY PROCEDURES

Precautions for human health, protectors and emergency actions

Do not draw near to the leakage area unless you are sure of safety because there may be an explosion.
Wear protectors (respirator, chemical protective wear, gloves, boots, goggle, mask, etc.) to avoid inhalation or direct contacts, depending upon the situation.
In case that you cannot stop leakage, evacuate anybody leeward to a safe and well-ventilated area.
Put up a red flag and clarify the dangerous area with ropes.
Make sure of no fire around. Should there be any, ask to stop using fire.
As there is a possibility of suffocation, ventilate well.
Do not apply water directly to the leak area or safety device as it may cause freezing.

Precautions as to environment

Heavier than air, this gas may spread extensively through side ditches, etc.

Recovery, neutralization, containment, purification method and equipment/materials

Stop leak quickly, ventilate well to disperse gas out.
Inform people concerned for support and cut off the source of fire.
In case of a sealed building, do not extinguish fire but let fire burn out taking care not to spread the fire in order to avoid risk of any re-ignition and explosion of the unburned leaked gas.
Remove immediately anything around that may catch fire.
If leak lasts long, stretch a rope around to declare off-limits.

Prevention of Secondary Disaster

Remove immediately anything around that may catch fire and prepare a fire extinguisher.

7.HANDLING AND STORAGE

Handling

<Technical Measures>

Take measures to keep the container free from fall or drop, and avoid any rough handling.
Stop using a container keeping the condition with some pressure remaining inside and never make it less than the atmospheric pressure.
Take care not to leak gas for use. For leak test, use soap water and so on, but never use anything to cause fire.
Use appropriate protectors for handling.
In order to minimize leakage even if it has occurred, prepare a fire extinguisher or protector ready for use at all times.
When you repair, displace well with inert gas or air and make sure there is no gas.

Being careful of fire, use explosion-proof electric equipment.
Take anti-static arrangements for equipment and piping.

<Cautions>

Provide appropriate ventilation and keep the workplace under airy circumstances.
Keep away anything of high heat, sparks or flames.
Take anti-static arrangements and use working clothes and shoes of conductive materials.

Storage

<Technical Measures>

Do not place anything flammable or ignitable around containers.
Avoid a heat source and direct sunlight, and keep a temperature at 40℃ or less.
Avoid any sudden or abrupt discharging and make antistatic arrangements for storing equipment providing grounding on the pipes and containers.

<Cautions>

Store containers in a well-ventilated area at 40℃ or less and keep them free from corrosive atmosphere or continuous vibrations.
Do not place anything flammable or ignitable around containers.

8. EXPOSURE CONTROLSIPERSONAL PROTECTION

Facility Considerations:

The working place must be in a well-ventilated non-flammable building provided with a fire extinguisher near around.

The building must be equipped with a gas leak alarm which sounds warning at about 0.5% (about 1/4 of the lower limit of explosion) or less of gas concentration in air where gas may leak and stay deposited.

Tolerable Concentration:

Japan Society for Occupational Health : 500ppm
ACGIH : 1,000ppm (2006)
(as aliphatic hydrocarbon gas [alkanes C1 – C4])

Protective Gear:

Respiration Aid: Use an air respirator as is necessary.
Hand Protector: Use leather gloves as is necessary
Eye Protector: Use safety goggles as is necessary
Skin Protector: Wear working clothes and helmet depending on situation.

9,PHYSICAL AND CHEMICAL PROPERTIES

Appearance : Colorless Liquefied Gas
Odor : Slightly ethereal odor
pH (1% solution) : No data
Melting Point : -159.6℃
Boiling Point : -11.7℃
Ignition Point : -87℃
Flash Point : 460℃
Combustibility : No data
Explosion Range : 1.8 to 8.4 vol%
Vapor Pressure : 304 kPa (20℃)
Relative Gas Density: 2.01 (at 15.6℃, 0.1MPa, Air=1)
Liquid Density : 549.86 kg/m^3（25℃）
Vaporizing Speed : No data
Solubility : Insoluble in water (25℃, 101.3kPa)
Octanol-water Partition Coefficient : 2.76 (log Pow)
Solution Temperature: No data
Other data
Molecular Weight : 58.1

10.STABILITY AND REACTIVITY

Stability

Stable under normal condition of handling

Reactivity to Hazards and Toxicity

Intensely reactive to oxidized substances
Violently reactive with explosion to Chlorine Dioxide

Conditions to Avoid

If there is any source of fire within the explosion range, a combustion and explosion will occur. Avoid such a condition by all means.

Hazardous Decomposition Product

If sufficient air is not supplied for combustion, incomplete combustion will occur to cause emission of harmful carbon monoxide.

11. HAZARD INFORMATION

Acute Toxicity:

No applicable classification. (Inhalation: gas) Rat LC_{50} 277,374 ppm (4 hr value) (ACGHI 7th, 2001), DFGOT vol.20 (2003), PATTY (4th, 1994) and Recommendation by Japan Society for Occupational Health (1993)

Target Organ/Systemic Toxicity (single exposure) :

Inhalation of high concentration causes an anesthetic action stated in (ACGHI 7th, 2001), DFGOT vol.20 (2003), PATTY (4th, 1994) and the Recommendation by Japan Society for Occupational Health (1993)

Note: Any toxicity not stated above is exempted or unclassified.

12: Ecological information

Ecological Toxicity **:** No data
Persistence/Resolvability **:** No data
Bio-accumulation potential **:** No data
Mobility in Soil **:** No data

13.DISPOSAL CONSIDERATIONS

Disposal directly into the atmospheric is prohibited.
In case you have to dispose of isobutene in gaseous form, discharge it little by little under well-ventilated condition free from flame.
Do not discharge it into the atmosphere in a large volume of liquid.
After disposition, close the cylinder valve and take necessary measures to prevent fall or damage of the container.

14.TRANSPORT INFORMATION

Hazard label(s)

Road/Rail	
UN No.	3358
ADR/RID Class	2.1
ADR/RID Proper Shipping Name	REFRIGERATING MACHINEScontaining flammable, non- toxic, liquefied gas
SEA	
IMDG Class	2.1
Marine Pollutant	Not classified as a Marine Pollutant
	Refrigerating machines containing less than 12 kg of flammable, non-toxic liquefied gases are not subject to IMDG Code in accordance with Special Provision 291.
AIR	
ICAO/IATA Class	2.1
PASSENGER AIRCRAFT	Loading
AIRCRAFT	Loading
	Refrigerating machines containing less than 100 grams of flammable, non-toxic liquefied gases are not subject to IATA Dangerous Goods Regulations in accordance with Special Provision A103.

15. REGULATORY INFORMATION (OTHER THAN THE ABOVE) European Regulations

Industrial Safety and Health Act:
Article 57-2 (Publication of Document), Article 2, Article 3, Enforcement Order Article 1, 6 and 15, Appendix 15

High Pressure Gas Safety Act: Article 2 (Definition), 5 (Production), 15 (Storage), 20 (Sales), 23 (Removal), 24-2, 5 (Consumption) and 25 (Disposal)

16. Other information

Cited Reference

1) International Chemical Safety Cards (ICSC) : National Institute of Health Science (http:/www.nihs.go.jp/ICSC/)

2) GAS ENCYCLOPEDIA : L'Air Liquide

3) Industrial Poisoning List (Expanded Edition) : Ishiyaku Publishers, Inc.

4) RTECS : National Institute of Occupational Safety and Health (NIOSH) (http://www.cdc.gov/niosh/rtec)

5) High Pressure Gas Safety Technology : High Pressure Gas Safety Institute of Japan

6) High Pressure Gas Handbook: Japan Industrial Gas Association

7) Chemical Risk Information: National Institute of Technology and Evaluation (http://www.safe.nite.go.jp)

For Your Handling of Description in this MSDS

- This material safety data sheet has been prepared by us based on the data and information we received from sources outside our company, but any statement on data or evaluation contained in this sheet shall not be construed as a guarantee.
- All descriptions in this sheet are based on common ways of handling. In case of some special way of handling, first implement separately the safety measures applicable to such purposes and way of use before following this sheet.
- All chemical products should be handled with the consciousness that they may have unknown hazardousness and toxicity in themselves, which largely vary depending upon the circumstances of use, handling methods, handling conditions and term.
- From unpacking to storing and disposition, let alone using, it is recommended that the chemical products are handled by only those who have special knowledge and experiences or other persons under the instructions of such specialists.
- Unless otherwise specified, the indication of % and ppm is based on the volumetric ratio.
- Unless otherwise specified, the pressure indicated is based on the absolute pressure.