SECTION 1: Product and Company Identification

1.1 Product identifier

Product name	:	Nitrogen, Cryogenic Liquid
Trade name	:	No information.

1.2 Other means of identification

Chemical Name	:	Nitrogen
Chemical Formula	:	N2

1.3 Recommended use and restrictions on use

Product use	:	Semiconductor Processes Industrial & Professional use Synthetic/Analytical chemistry Photovoltaic Processes

1.4 Details of supplier of the safety data sheet

Company identification	:	Iwatani Corporation (Singapore) Pte. Ltd.
Address	:	6 Shenton Way, OUE Downtown 2 #13-11, Singapore 068809
Phone	:	+65 6862 2111

1.5 Emergency contact

Emergency phone number	:	+65 6220 8347

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Physical hazards	:	Gases under pressure- liquefied gas (Simply asphyxiants).
Characteristic	:	Non-flammable.
Acute toxicity (inhalation)	:	Not classified.
Skin corrosion/irritation	:	Not classified.
Serious eye damage/eye irritation	:	Not classified.
Acute aquatic toxicity	:	Not classified.

2.2 GHS label elements, including precautionary statements

Pictogram(s) :

Signal word(s)	:	Warning
Hazard statement(s)	:	H281: Contains refrigerated gas; may cause cryogenic burns or injury H380 - May displace oxygen and cause rapid suffocation

Precautionary statements

Prevention	:	P282 - Wear cold insulating gloves and either face shield or eye protection.
Response	:	P336 + P315 - Thaw frosted parts with lukewarm water. Do not rub affected area.

Get immediate medical advice/attention.

Storage : P403 – Store in a well-ventilated place.

Disposal : None.

2.3 Other hazards which do not result in classification

Inhalation hazard : Respiratory tract irritation: nausea, vomiting, headache, drowsiness, tingling sensation, loss of coordination, suffocation, convulsions, coma.

SECTION 3. Composition/Information on ingredients

3.1 Substances / 3.2. Mixture

Substance name	Contents	CAS No.
Nitrogen	100 %	7727-37-9

SECTION 4. First-aid measures

4.1 Description of first aid measures

Inhalation : Immediately move to fresh air. If breathing has stopped, give artificial respiration.
If breathing is difficult, give oxygen. Use oxygen as required, provided a qualified operator is available.
Get medical attention immediately.
DO NOT give epinephrine (adrenaline).

Skin contact : Promptly flush skin with water until all chemical is removed. If water is not available, cover with a clean, soft cloth or similar covering.
For dermal contact or suspected frostbite, remove contaminated clothing and flush affected areas with lukewarm water. DO NOT USE HOT WATER.
Get medical attention if symptoms persist. A physician should see the patient promptly if contact with the product has resulted in blistering of the dermal surface or in deep tissue freezing.

Eye contact : Immediately flush eyes with large amounts of water for at least 15 minutes (in case of frostbite, water should be lukewarm, not hot) lifting eyelids occasionally to facilitate irrigation.
Remove contact lenses if present and easy to do. Continue rinsing. Flush thoroughly with water for at least 15 minutes.
Get immediate medical assistance. If medical assistance is not immediately available, flush an additional 15 minutes.

Ingestion : Seek immediate medical attention.

4.2 Most important symptoms/effect, acute and delayed

High concentrations may cause asphyxia from lack of oxygen or act as a narcotic causing central nervous system depression. May cause nausea, dizziness, headaches, shortness of breath, lethargy, narcosis, unconsciousness and possibly cardiac arrhythmias. Contact with evaporating liquid may cause cold burns/frostbite.

4.3 Indication of immediate medical attention and special treatment needed, if necessary

Note to physicians : Thaw frosted parts with lukewarm water. Do not rub affected area.
Get immediate medical advice/attention.

SECTION 5. Fire-fighting measures

5.1 Extinguishing media

Suitable extinguishing media : Carbon Dioxide, regular dry chemical.

Unsuitable extinguishing media : None.

5.2 Special hazards arising from the substance or mixture

Specific hazards : Negligible fire hazard.
Container may rupture or explode if exposed to sufficient heat.

Hazardous combustion products : None.

5.3 Advice for fire-fighters

Special fire fighting procedures : Move container away or cool with water from a protected position. If possible, stop flow of product.

Special protective equipment for fire-fighters : Wear self-contained breathing apparatus for firefighting if necessary.
Firefighters must use standard protective equipment including flame retardant coat, helmet with face shield, gloves, rubber boots, and in enclosed spaces, SCBA.
Guideline:
EN 469 - Protective clothing for firefighters. Performance requirements for protective clothing for firefighting.
EN 15090 - Footwear for firefighters.
EN 659 - Protective gloves for firefighters.
EN 443 - Helmets for fire fighting in buildings and other structures.
EN 137 - Respiratory protective devices - Self-contained open circuit compressed air breathing apparatus with full face mask - Requirements, testing, marking.

SECTION 6. Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Uncontrolled releases should be responded to by trained personnel using pre-planned procedures.
Use proper protective equipment in the event of a significant release from cylinder.
Stop leak, if possible, without personal risk. Keep unnecessary people away, isolate hazard area and deny entry.
Stay upwind and keep out of low areas.
When in contact with refrigerated/cryogenic liquids, many materials become brittle and are likely to break without warning.

6.2 Environmental precautions

Prevent further leakage or spillage if safe to do so.

6.3 Methods and materials for containment and cleaning up

Methods for containment	:	Stop the flow of gas or remove cylinder to outdoor location if this can be done without risk. Provide adequate ventilation.
Methods for cleaning up	:	Spills and releases may have to be reported to Federal and/or local authorities. Return cylinder to Iwatani or an authorized distributor.

6.4 Reference to other sections

See Section 15 regarding reporting requirements.

SECTION 7. Handling and storage

7.1 Precautions for safe handling

Operators should wear protective clothing while handling this gas. If ventilation controls are not adequate to provide sufficient oxygen content, proper respiratory protection equipment should be provided.

7.2 Conditions for safe storage, including any incompatibilities

Storage Conditions	:	Cylinders should be stored upright and be secured firmly to prevent falling. Protect cylinders against extreme weather and from dampness from ground to prevent rusting. Stored cylinders in well-ventilated area, away from direct heat and ignition source. Do not allow area where cylinders are stored to exceed 52°C.
Incompatible materials	:	None known.

SECTION 8. Exposure controls/personal protection

8.1 Control parameters/Occupational exposure limits

None of the components have assigned exposure limits.

8.2 Appropriate engineering control measures

Ventilation systems. Local exhaust ventilation to prevent accumulation of high concentrations and maintain air-oxygen levels at or above 19.5%.

Oxygen detectors should be used when asphyxiating gases may be released.

8.3 Personal protection

Individual protection measures, such as personal protective equipment (PPE)		A risk assessment should be conducted and documented in each work area to assess the risks related to the use of the product and to select the PPE that matches the relevant risk. The following recommendations should be considered: Protect eyes, face and skin from liquid splashes. PPE compliant to the recommended EN/ISO standards should be selected
Hand protection	:	Sturdy work gloves are recommended for handling cylinders. Loose fitting thermal insulated or leather gloves. Standard EN 388 – Protective gloves against mechanical risk. Wear cold insulating gloves when transfilling or breaking transfer connections.

		Standard EN 511 – Cold insulting gloves.
Eye/face protection	:	Safety eyewear, goggles or face-shield to EN166 should be used to avoid exposure to liquid splashes. Wear eye protection to EN 166 when using gases. Where there is reasonable probability of liquid contact, wear chemical safety goggles. EN 166 - Personal Eye Protection.
Skin or Body protection	:	Work gloves and safety shoes are recommended when handling cylinders. Wear cold insulating gloves when handling liquid. Wear safety shoes while handling containers. ISO 20345 - Personal protective equipment - Safety footwear.
Respiratory protection	:	Under conditions of frequent use or exposure, respiratory protection may be needed.
Hygiene measures	:	Ensure adequate ventilation. Handle in accordance with good industrial hygiene and safety practice.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Appearance

Physical state	:	Gas
Colour	:	Colourless.
Odour	:	Odourless.
Odour threshold	:	Not established.
pH	:	Not applicable.
Melting point	:	-210 °C (-346 °F)
Boiling point	:	-196 °C (-320.8 °F)
Flash point	:	Not combustible.
Critical Temperature	:	-147 °C (-232.6 °F)
Flammability (solid, gas)	:	This product is not flammable.
Lower explosive limit	:	Not applicable.
Upper explosive limit	:	Not applicable.
Vapour pressure	:	760 mmHg @ -196 °C
Vapour density (air=1)	:	0.967
Relative density, liquid	:	0.8
Density	:	1.2506 g/L
Molecular mass	:	28.01 g/mol
Specific gravity (water=1)	:	0.8081 @ -196 °C
Solubility	:	Water 1.6% @ 20°C
Viscosity	:	No data available.
Partition coefficient: n-octanol/water	:	No data available.
Evaporation rate	:	Not applicable.
Decomposition temperature	:	Not applicable.
Autoignition temperature	:	Not applicable.
Other data	:	Gas/vapour heavier than air. May accumulate in confined spaces, particularly at

or below ground level.

Section 10. Stability and reactivity

10.1 Reactivity
No reactivity hazard other than the effects described in sub-section below.

10.2 Chemical stability
Stable under normal conditions.

10.3 Possibility of hazardous reactions
None.

10.4 Conditions to avoid
Cylinders exposed to high temperatures or direct flame can rupture or burst.

10.5 Incompatible materials
None known.

10.6 Hazardous decomposition products
None known.

SECTION 11. Toxicology information

11.1 Information on toxicological effects
No toxicity data is available.

SECTION 12. Ecological information

12.1 Ecotoxicity
No ecological damage caused by this product.

12.2 Persistence and degradability
Not applicable.

12.3 Other adverse effects
Can cause frost damage to vegetation.

SECTION 13. Disposal information

13.1 Disposal methods
Disposal methods : Discharge, treatment, or disposal may be subject to national, state, or local laws.

Never attempt to dispose off residual locally, return cylinders with residual to gas suppliers.

Contaminated packaging : Return in the shipping container PROPERLY LABELED WITH ANY VALVE OUTLET PLUGS OR CAPS SECURED AND VALVE PROTECTION CAP IN PLACE to Iwatani for proper disposal.

SECTION 14. Transport information

14.1 UN number

: UN1977

14.2 UN proper shipping name

: NITROGEN, LIQUEFIED GAS

14.3 Transport Hazard Class(es)

UNRTDG (United Nations Recommendations Transport Dangerous Goods)

Class : 2.2
Subsidiary risk : Not classified.

IATA-DGR (International Air Transport Association – Dangerous Goods)

Class : 2.2
Subsidiary risk : Not classified.

IMDG (International Maritime Dangerous Goods) – Code

Class : 2.2
Subsidiary risk : Not classified.

14.4 Packing group

Not assigned by regulation.

14.5 Environmental hazards

None.

14.6 Special precaution for user

Avoid transport on vehicles where the load space is not separated from the driver's compartment.
Ensure vehicle driver is aware of the potential hazards of the load and knows what to do in the event of an accident or an emergency.
Before transporting product containers:

- Ensure there is adequate ventilation.
- Ensure that containers are firmly secured.
- Ensure valve is closed and not leaking.
- Ensure valve outlet cap nut or plug (where provided) is correctly fitted.
- Ensure valve protection device (where provided) is correctly fitted.

SECTION 15. Regulatory information

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

Restrictions on use	:	None.
Other information, restriction and prohibition regulations	:	Ensure all national/local regulations are observed.
Applicable national regulations	:	Safety, health and environmental regulations/legislation specific for the substance or mixture are observed.

SECTION 16. Other information

16.1 Other information

Indication of changes	:	Ensure all national/local regulations are observed.
Disclaimer of liability	:	Before using this product in any new process or experiment, a thorough material combability and safety study should be carried out. Details given in this document are believed to be correct at the time of going to press. Whilst proper care has been taken in the preparation of this document, no liability for injury or damage resulting from its use ca be accepted.

End of Safety Data Sheet