Safety Data Sheet
Carbon Dioxide, Solid (Dry Ice)

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier

Chemical name:	Carbon dioxide, solid (Dry ice)
Chemical formula:	CO2
Index-No.	-
CAS No:	124-38-9
EC No (from EINECS):	204-696-9
REACH Registration number:	Listed in Annex IV/V of Regulation (EC) No 1907/2006 (REACH), exempted from registration.

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

Relevant identified uses:
Industrial and professional. Perform risk assessment prior to use. Blast cleaning. Cooling applications. Food freezing. Freezing, Cooling and heat transfer. Laboratory use. Special effects (entertainment). Consumer use.

Uses advised against:
Industrial or technical grade unsuitable for medical and/or food applications or inhalation.

1.3. Details of the supplier of the safety data sheet

Company identification:
Polar Ice Ltd., Portarlington Ind. Est., Portarlington, Co. Laois, Ireland

Email: info@polarice.ie **Telephone:** (0)57 862 3860

1.4. Emergency telephone number:
+353 (0)57 862 3860

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification acc. to Directive 67/548/EEC or 1999/45/EC as amended
Not classified as hazardous to health.
Asphyxiant in high concentrations.

Classification acc. to Regulation (EC) No 1272/2008 as amended
Not classified as hazardous to health.
Asphyxiant in high concentrations.

2.2. Label Elements

- Labelling Pictograms

- Hazard Statements
EIGA-As Asphyxiant in high concentrations.

- Precautionary Statements

Precautionary Statement Storage
P403 Store in a well-ventilated place.

Precautionary Statement Disposal
None.

2.3. Other Hazards

Refrigerated solidified gas, exists at -78,5 °C. Contact with product may cause severe cold burns or frostbite. Asphyxiant in high concentrations.

SECTION 3: Composition/information on ingredients

3.1 Substances
Carbon Dioxide, solid (Dry ice)

Chemical name:	Carbon Dioxide
Index-No.	-
CAS No:	124-38-9
EC No:	204-696-9
REACH Registration number:	Listed in Annex IV/V of Regulation (EC) No 1907/2006 (REACH), exempted from registration.
Purity:	100% The purity of the substance in this section is used for classification only, and does not represent the actual purity of the substance as supplied, for which other documentation should be consulted.
Trade name:	-

SECTION 4: First Aid Measures

General:
In high concentrations may cause asphyxiation. Symptoms may include loss of mobility/consciousness. Victim may not be aware of asphyxiation. Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped.

4.1 Description of first aid measures

Inhalation:
Low concentrations of CO2 cause increased respiration and headache. In high concentrations may cause asphyxiation. Symptoms may include loss of mobility/consciousness. Victim may not be aware of asphyxiation. Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped.

Eye Contact:
In case of frostbite, spray with water for at least 15 minutes. Apply a sterile dressing. Get medical attention immediately.

Skin Contact:
In case of frostbite spray with water for at least 15 minutes. Apply a sterile dressing. Obtain medical assistance. Immediately flush eyes thoroughly with water for at least 15 minutes.

Ingestion:
Swallowing must be absolutely avoided, since coldness and developing pressure could be dangerous. Obtain medical attention and take along these instructions.

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

Respiratory arrest

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

Hazards: Respiratory arrest.

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

SECTION 5: Fire Fighting Measures

General Fire Hazards:
No specific recommendations

5.1 Extinguishing media

Suitable extinguishing media:
All known extinguishants can be used. Material will not burn. In case of fire in the surroundings: use appropriate extinguishing agent.

Unsuitable extinguishing media:
None.

5.2 Special hazards arising from the substance or mixture:

None

5.3 Advice for firefighters

Special fire fighting procedures:
No unusual fire or explosion hazards noted.

Special protective equipment for firefighters:
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 opencircuit 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:
Evacuate area. Provide adequate ventilation. Prevent from entering sewers, basements and workpits, or any place where its accumulation can be dangerous. Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe. EN 137 Respiratory protective devices - Self-contained open circuit compressed air breathing apparatus with full face mask - Requirements, testing, marking.

6.2 Environmental Precautions:
Prevent further leakage or spillage if safe to do so.

6.3 Methods and material for containment and cleaning up:
Provide adequate ventilation.

6.4 Reference to other sections:
Refer to sections 8 and 13.

SECTION 7: Identification of the substance/mixture and of the company/undertaking

7.1 Precautions for safe handling:
Do not use in confined spaces without adequate ventilation and/or respirator. Use only properly specified equipment which is suitable for this product, its supply pressure and temperature. Refer to supplier's handling instructions. The substance must be handled in accordance with good industrial hygiene and safety procedures. Protect containers from physical damage; do not drag, roll, slide or drop. Do not remove or deface labels provided by the supplier for the identification of the container contents. When moving containers, even for short distances, use appropriate equipment eg. trolley, hand truck, fork truck etc. Provide adequate ventilation. When using do not eat, drink or smoke.

7.2 Conditions for safe storage, including any incompatibilities:
Keep container below 50°C in a well ventilated place. Observe all regulations and local requirements regarding storage of containers.

7.3 Specific end use(s):
None.

SECTION 8: Exposure Controls/Personal Protection

8.1 Control Parameters

Occupational Exposure Limits

Chemical name
Carbon Dioxide

Type	Exposure Limit Values		Source
TWA	5,000 ppm	9,150 mg/m3	UK. EH40 Workplace Exposure Limits (WELs) (12 2011)
STEL	15,000 ppm	27,400 mg/m3	UK. EH40 Workplace Exposure Limits (WELs) (12 2011)
TWA		9,000 mg/m3	EU. Indicative Exposure Limit Values in Directives 91/322/EEC, 2000/39/EC, 2006/15/EC, 2009/161/EU (12 2009)

8.2 Exposure controls

Appropriate engineering controls:
Consider a work permit system e.g. for maintenance activities. Ensure adequate air ventilation. Oxygen detectors should be used when asphyxiating gases may be released. Provide adequate ventilation, including appropriate local extraction, to ensure that the defined occupational exposure limit is not exceeded. Systems under pressure should be regularly checked for leakages. Preferably use permanent leak tight connections (eg. welded pipes). Do not eat, drink or smoke when using the product.

Individual protection measures, such as personal protective equipment
General information: 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. Keep self contained breathing apparatus readily available for emergency use. Personal protective equipment for the body should be selected based on the task being performed and the risks involved.

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. Guideline: EN 166 Personal Eye Protection.

Skin protection

Hand Protection: Wear cold insulating gloves. Guideline: EN 511 Protective gloves against cold.

Body protection: Wear apron or protective clothing in case of contact.

Other: Wear safety shoes while handling containers Guideline: ISO 20345 Personal protective equipment - Safety footwear.

Respiratory Protection: Not required.

Thermal hazards: not applicable.

Hygiene measures:
Specific risk management measures are not required beyond good industrial hygiene and safety procedures. Do not eat, drink or smoke when using the product.

Environmental exposure controls:
For waste disposal, see section 13.

SECTION 9: Physical And Chemical Properties

9.1 Information on basic physical and chemical properties

Appearance

Physical state: Solid
Form: Solid
Colour: Colorless
Odour: Odorless

Odour Threshold: Odour threshold is subjective and is inadequate to warn of over exposure.

pH: 3.2 - 3.7 The pH of saturated CO2 solutions varies from 3.7 at 101 kPa (1 atm) to 3.2 at 2370 kPa (23.4 atm)

Melting Point: -56.6 °C
Boiling Point: -78.5 °C
Sublimation Point: -78.5 °C
Critical Temp. (°C): 31.0 °C

Flash Point:
Not applicable to gases and gas mixtures.

Evaporation Rate:
Not applicable to gases and gas mixtures.

Flammability (solid, gas):
Nonflammable Gas

Flammability limit - upper (%): not applicable.
Flammability limit -lower(%): not applicable.
Vapour pressure: 45.1 bar (10 °C)
Vapour density (air=1): 1.522 (21 °C)
Relative density: 1.512

Solubility(ies)

Solubility in Water: 2.900 mg/l (25 °C)
Partition coefficient (n-octanol/water): 0.83
Autoignition Temperature: not applicable.
Decomposition Temperature: Not known.

Viscosity

Kinematic viscosity: No data available.
Dynamic viscosity: 0.07 mPa.s (20 °C)
Explosive properties: Not applicable.
Oxidising Properties: not applicable

9.2 Other information: Gas/vapour heavier than air. May accumulate in confined spaces, particularly at or below ground level.

Molecular weight: 44.01 g/mol (CO2)

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:
None.

10.5 Incompatible Materials:
No reaction with any common materials in dry or wet conditions.

10.6 Hazardous Decomposition Products:
Under normal conditions of storage and use, hazardous decomposition products should not be produced.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

General
In high concentrations may cause rapid circulatory insufficiency even at normal levels of oxygen concentration. Symptoms are headache, nausea and vomiting, which may lead to unconsciousness and even death.

SECTION 12: Ecological information

12.1. Toxicity

Acute Toxicity
Product: No ecological damage caused by this product.

12.2 Persistence and Degradability
Product: Not applicable to gases and gas mixtures.

12.3 Bioaccumulative Potential
Product: The product is expected to biodegrade and is not expected to persist for long periods in an aquatic environment.

12.4 Mobility in Soil
Product: Because of its high volatility, the product is unlikely to cause ground or water pollution.

12.5 Results of PBT and vPvB assessment
Product: Not classified as PBT or vPvB

12.6 Other Adverse Effects:

Global Warming Potential
Global warming potential: 1
When discharged in large quantities may contribute to the greenhouse effect.

Carbon dioxide
UN / IPCC. Greenhouse Gas Global Warming Potentials (IPCC Fourth Assessment Report, Climate Change, Table TS.2
- Global warming potential: 1 100-yr

SECTION 13: Disposal Considerations

13.1 Waste treatment methods

General information:
Do not discharge into any place where its accumulation could be dangerous. Vent to atmosphere in a well ventilated place.

Disposal methods:
Refer to the EIGA code of practice (Doc.30 “Disposal of Gases”, downloadable at http://www.eiga.org) for more guidance on suitable disposal methods. Dispose of container via supplier only. Discharge, treatment, or disposal may be subject to national, state, or local laws.

European Waste Codes

Container: 16 05 05: Gases in pressure containers other than those mentioned in 16 05 04.

SECTION 14: Transport Information

Emergency Action Code: 2T

IMDG

14.1 UN Number: UN 1845

14.2 UN Proper Shipping Name: CARBON DIOXIDE, SOLID

14.3 Transport Hazard Class(es)
Class: 9
Label(s): 9
EmS No.: F-C, S-V

14.3 Packing Group: –

14.5 Environmental hazards: not applicable

14.6 Special precautions for user: –

IATA

14.1 UN Number: UN 1845

14.2 Proper Shipping Name: Carbon dioxide, solid

14.3 Transport Hazard Class(es):
Class: 9
Label(s): 9MI

14.4 Packing Group: –

14.5 Environmental hazards: not applicable

14.6 Special precautions for user: –

Other information
Passenger and cargo aircraft: Allowed.
Cargo aircraft only: Allowed

14.7 Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code: not applicable

Additional identification:
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 that they are firmly secured.

SECTION 15: Regulatory information

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

EU Regulations

Directive 96/61/EC: concerning integrated pollution prevention and control (IPPC): Article 15, European Pollution Emission Registry (EPER):

Chemical name	CAS-No.	Concentration
Carbon Dioxide	124-38-9	100%

National Regulations
Management of Health and Safety at Work Regulations (1999 No. 3242). The Regulatory Reform (Fire Safety) Order 2005 (2005 No. 1541). Control of Substances Hazardous to Health Regulations (COSHH, 2002 No. 2677). Provision and Use of Work Equipment Regulations (PUWER, 1998 No. 2306). Personal Protective Equipment Regulations (1992 No. 2966). Control of Major Accident Hazards Regulations (COMAH, 2015 No. 483). Pressure Systems Safety Regulations (PSSR, 2000 No. 128). Only products that comply with the food regulations (EC) No. 1333/2008 and (EU) No. 231/2012 and are labelled as such may be used as food additives. This Safety Data Sheet has been produced to comply with Regulation (EU) 453/2010.

15.2 Chemical safety assessment:
No Chemical Safety Assessment has been carried out.

SECTION 16: Other information

Revision Information: Not relevant.

Key literature references and sources for data:
Various sources of data have been used in the compilation of this SDS, they include but are not exclusive to:

Agency for Toxic Substances and Diseases Registry (ATSDR)
(http://www.atsdr.cdc.gov/).
European Chemical Agency: Guidance on the Compilation of Safety Data Sheets.
European Chemical Agency: Information on Registered Substances
http://apps.echa.europa.eu/registered/registered-sub.aspx#search
European Industrial Gases Association (EIGA) Doc. 169 Classification and Labelling guide.
International Programme on Chemical Safety (http://www.inchem.org/)
ISO 10156:2010 Gases and gas mixtures - Determination of fire potential and oxidizing ability for the selection of cylinder valve outlets.
Matheson Gas Data Book, 7th Edition.
National Institute for Standards and Technology (NIST) Standard Reference Database Number 69.
The ESIS (European chemical Substances 5 Information System) platform of the former European Chemicals Bureau (ECB) ESIS (http://ecb.jrc.ec.europa.eu/esis/).
The European Chemical Industry Council (CEFIC) ERICards.
United States of America's National Library of Medicine's toxicology data network TOXNET (http://toxnet.nlm.nih.gov/index.html)
Threshold Limit Values (TLV) from the American Conference of Governmental Industrial Hygienists (ACGIH).
Substance specific information from suppliers.
Details given in this document are believed to be correct at the time of publication.
EH40 (as amended) Workplace exposure limits.

Wording of the R-phrases and H-statements in sections 2 and 3

Training information:
Users of breathing apparatus must be trained. The hazard of asphyxiation is often overlooked and must be stressed during operator training. Ensure operators understand the hazards.

Other information:
Before using this product in any new process or experiment, a thorough material compatibility and safety study should be carried out. Ensure adequate air ventilation. Ensure all national/local regulations are observed. Whilst proper care has been taken in the preparation of this document, no liability for injury or damage resulting from its use can be accepted. Note: When the Product Name appears in the SDS header the decimal sign and its position comply with rules for the structure and drafting of international standards, and is a comma on the line. As an example 2,000 is two (to three decimal places) and not two thousand, whilst 1.000 is one thousand and not one (to three decimal places).

Last revised date: 24.02.2016

Disclaimer: This information is provided without warranty. The information is believed to be correct. This information should be used to make an independent determination of the methods to safeguard workers and the environment.