

**1. Identification**

<b>Product identifier</b>	<b>Nitrogen Dioxide Calibration Gas</b>
<b>Other means of identification</b>	
<b>SDS number</b>	NOCG2
<b>Synonyms</b>	INocal® 10ppm Nitrogen Dioxide, 21% Oxygen, Balance Nitrogen
<b>Recommended use</b>	Compressed gas used for calibration of INOmax® delivery devices.
<b>Recommended restrictions</b>	None known.

**Manufacturer/Importer/Supplier/Distributor information****Manufacturer**

<b>Company name</b>	Mallinckrodt Manufacturing LLC
<b>Address</b>	1060 Allendale Drive Port Allen, LA 70767

**Supplier**

<b>Company name</b>	Ikaria Canada Inc.
<b>Address</b>	6345 Dixie Road, Unit 1 Mississauga Ontario ON L5T 2E6 Canada
<b>Telephone number</b>	888-744-1414

**Emergency telephone number** 1-800-424-9300 (CHEMTREC)/ 703-527-3887

**Supplier** Not available.

**2. Hazard(s) identification**

<b>Physical hazards</b>	Gases under pressure	Compressed gas
<b>Health hazards</b>	Not classified.	
<b>Environmental hazards</b>	Not classified.	

**Label elements**

<b>Signal word</b>	Warning
<b>Hazard statement</b>	Contains gas under pressure; may explode if heated.
<b>Precautionary statement</b>	
<b>Prevention</b>	Do not handle until all safety precautions have been read and understood.
<b>Response</b>	Wash hands after handling.
<b>Storage</b>	Protect from sunlight. Store in a well-ventilated place.
<b>Disposal</b>	Dispose of contents/container in accordance with local/regional/national/international regulations.
<b>Other hazards</b>	May support combustion. Use a back flow preventive device. Close valve after each use and when empty.

Exposure to rapidly expanding gas or vapourizing liquid may cause frostbite ("cold burn").  
Exposure may aggravate those with pre-existing eye, skin, or respiratory conditions.

**Supplemental information** Handle in accordance with good industrial hygiene and safety practices.

**3. Composition/information on ingredients****Mixtures**

Chemical name	Common name and synonyms	CAS number	%
Nitrogen	Nitrogen; Nitrogen NF; LIN; Cryogenic Liquid Nitrogen; Refrigerated Liquid Nitrogen	7727-37-9	78.9
Oxygen		132259-10-0	21
Nitrogen Dioxide		10102-44-0	0.001

**Composition comments** All concentrations are in percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

#### 4. First-aid measures

<b>Inhalation</b>	Move to fresh air. Call a physician if symptoms develop or persist.
<b>Skin contact</b>	Remove contaminated clothing. Wash off with soap and water. Get medical attention if irritation develops and persists. Wash contaminated clothing before reuse.
<b>Eye contact</b>	Rinse immediately with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical attention if irritation develops and persists.
<b>Ingestion</b>	Rinse mouth. Never give anything by mouth to a victim who is unconscious or is having convulsions. Do not induce vomiting. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs. Get medical attention if symptoms occur.
<b>Most important symptoms/effects, acute and delayed</b>	May cause frostbite or freezing of skin. Permanent eye damage including blindness could result.
<b>Indication of immediate medical attention and special treatment needed</b>	Provide general supportive measures and treat symptomatically.  Frostbite: Do not remove clothes, but flush with copious amounts of lukewarm water. Call an ambulance and continue to flush during transportation to hospital. Do not rub affected area.
<b>General information</b>	IF exposed or concerned: Get medical advice/attention. In case of cold burns (frostbite) caused by rapidly expanding gas or vapourizing liquids, get medical attention promptly. Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. Show this safety data sheet to the doctor in attendance.

#### 5. Fire-fighting measures

<b>Suitable extinguishing media</b>	Use any media suitable for the surrounding fires.
<b>Unsuitable extinguishing media</b>	Do not use water jet as an extinguisher, as this will spread the fire.
<b>Specific hazards arising from the chemical</b>	Contents under pressure. Fire or excessive heat may result in rupture of container due to release of significant amounts of gases. Ruptured cylinders may rocket. During fire, gases hazardous to health may be formed such as: Nitrogen oxides. Carbon oxides.
<b>Special protective equipment and precautions for firefighters</b>	Firefighters must use standard protective equipment including flame retardant coat, helmet with face shield, gloves, rubber boots, and in enclosed spaces, SCBA.
<b>Fire fighting equipment/instructions</b>	In case of fire: Stop leak if safe to do so. Do not move cargo or vehicle if cargo has been exposed to heat. ALWAYS stay away from tanks engulfed in flame. Move containers from fire area if you can do so without risk. Use water spray to cool unopened containers. For massive fire in cargo area, use unmanned hose holder or monitor nozzles, if possible. If not, withdraw and let fire burn out.
<b>Specific methods</b>	Cool containers exposed to flames with water until well after the fire is out.
<b>General fire hazards</b>	Pressurised container may explode when exposed to heat or flame.

#### 6. Accidental release measures

<b>Personal precautions, protective equipment and emergency procedures</b>	Keep away from sources of ignition - No smoking. Keep out of low areas. Keep unnecessary personnel away. Keep people away from and upwind of spill/leak. Wear appropriate protective equipment and clothing during clean-up. Avoid breathing gas. Avoid breathing mist or vapour. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Ensure adequate ventilation. Local authorities should be advised if significant spillages cannot be contained. For personal protection, see section 8.
<b>Methods and materials for containment and cleaning up</b>	Stop leak if you can do it without risk. Eliminate sources of ignition. Isolate area until gas has dispersed. Use water spray to reduce vapours or divert vapour cloud drift. Collect spillage. Transfer to a container for disposal. Prevent entry into waterways, sewer, basements or confined areas. Following product recovery, flush area with water. For waste disposal, see section 13 of the SDS.
<b>Environmental precautions</b>	Avoid discharge into drains, water courses or onto the ground.

## 7. Handling and storage

**Precautions for safe handling** DO NOT PRESSURIZE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND, OR EXPOSE SUCH CONTAINERS TO HEAT, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION; THEY MAY EXPLODE AND CAUSE INJURY OR DEATH. Prevent electrostatic charge build-up by using common bonding and grounding techniques. Avoid breathing gas. Avoid contact with eyes, skin, and clothing. Avoid prolonged exposure. When using, do not eat, drink or smoke. Provide adequate ventilation. Wear appropriate personal protective equipment. Wash thoroughly after handling. Observe good industrial hygiene practices.

**Conditions for safe storage, including any incompatibilities** Keep away from heat/sparks/open flames/hot surfaces. - No smoking. Store in original tightly closed container. Protect against physical damage and/or friction. For storage condition, see finished product label. Store in a well-ventilated place. Protect from sunlight. Store away from incompatible materials (see Section 10 of the SDS).

## 8. Exposure controls/personal protection

### Occupational exposure limits

#### US. ACGIH Threshold Limit Values

Components	Type	Value
Nitrogen Dioxide (CAS 10102-44-0)	TWA	0.2 ppm

#### Canada. Alberta OELs (Occupational Health & Safety Code, Schedule 1, Table 2)

Components	Type	Value
Nitrogen Dioxide (CAS 10102-44-0)	STEL	9.4 mg/m3
	TWA	5 ppm 5.6 mg/m3 3 ppm

#### Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended)

Components	Type	Value
Nitrogen Dioxide (CAS 10102-44-0)	Ceiling	1 ppm

#### Canada. Manitoba OELs (Reg. 217/2006, The Workplace Safety And Health Act)

Components	Type	Value
Nitrogen Dioxide (CAS 10102-44-0)	TWA	0.2 ppm

#### Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents)

Components	Type	Value
Nitrogen Dioxide (CAS 10102-44-0)	STEL	5 ppm
	TWA	3 ppm

#### Canada. Quebec OELs. (Ministry of Labour - Regulation Respecting the Quality of the Work Environment)

Components	Type	Value
Nitrogen Dioxide (CAS 10102-44-0)	TWA	5.6 mg/m3
		3 ppm

**Biological limit values** No biological exposure limits noted for the ingredient(s).

**Appropriate engineering controls** Use explosion-proof equipment. Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. Ensure adequate ventilation, especially in confined areas. Eye wash facilities and emergency shower must be available when handling this product.

### Individual protection measures, such as personal protective equipment

**Eye/face protection** Wear safety glasses with side shields (or goggles). Chemical goggles are recommended.

#### Skin protection

**Hand protection** Wear protective gloves. Thermally protective, chemical resistant gloves are recommended. If contact with forearms is likely, wear gauntlet style gloves.

<b>Other</b>	Wear suitable protective clothing.
<b>Respiratory protection</b>	If airborne concentrations are above the applicable exposure limits, use NIOSH approved respiratory protection.
<b>Thermal hazards</b>	Wear appropriate thermal protective clothing, when necessary.
<b>General hygiene considerations</b>	When using, do not eat, drink or smoke. Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

## 9. Physical and chemical properties

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### Appearance

<b>Physical state</b>	Gas.
<b>Form</b>	Compressed gas.
<b>Colour</b>	Colorless in product concentration.
<b>Odour</b>	Odorless in product concentration (NO <sub>2</sub> has pungent, acrid odor at higher concentrations).
<b>Odour threshold</b>	0.4 - 5 ppm (detection for NO <sub>2</sub> )
<b>pH</b>	Not available.
<b>Melting point/freezing point</b>	-9.44 °C (15 °F)
<b>Initial boiling point and boiling range</b>	21.11 °C (70 °F)
<b>Flash point</b>	Not flammable.
<b>Evaporation rate</b>	Not available.
<b>Flammability (solid, gas)</b>	Not available.
<b>Upper/lower flammability or explosive limits</b>	
<b>Flammability limit - lower (%)</b>	Not available.
<b>Flammability limit - upper (%)</b>	Not available.
<b>Explosive limit - lower (%)</b>	Not available.
<b>Explosive limit - upper (%)</b>	Not available.
<b>Vapour pressure</b>	Not available.
<b>Vapour density</b>	Not available.
<b>Relative density</b>	Not available.
<b>Solubility(ies)</b>	
<b>Solubility (water)</b>	0.02 @ 32 °F (0 °C) and 1 atm
<b>Partition coefficient (n-octanol/water)</b>	Not available.
<b>Auto-ignition temperature</b>	Not available.
<b>Decomposition temperature</b>	Not available.
<b>Viscosity</b>	Not available.
<b>Other information</b>	
<b>Explosive properties</b>	Contains gas under pressure; may explode if heated.
<b>Specific gravity</b>	1.44 g/l (Liquid at 68 °F)

## 10. Stability and reactivity

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<b>Reactivity</b>	The product is stable and non-reactive under normal conditions of use, storage and transport.
<b>Chemical stability</b>	Contains gas under pressure; may explode if heated.
<b>Possibility of hazardous reactions</b>	Hazardous polymerisation does not occur.
<b>Conditions to avoid</b>	Protect against direct sunlight. Avoid heat, sparks, open flames and other ignition sources. Avoid high temperatures. Low temperatures. Contact with incompatible materials.
<b>Incompatible materials</b>	Strong oxidising agents. Strong acids. Strong bases.
<b>Hazardous decomposition products</b>	Nitrogen dioxide decomposes in water to form nitric and nitrous acids.

## 11. Toxicological information

### Information on likely routes of exposure

<b>Inhalation</b>	Prolonged or repeated inhalation may cause: Irritation.
<b>Skin contact</b>	May cause frostbite or freezing of skin.
<b>Eye contact</b>	Exposure to rapidly expanding gas or vapourizing liquid may cause frostbite ("cold burn"). Permanent eye damage including blindness could result.
<b>Ingestion</b>	Exposure to rapidly expanding gas or vapourizing liquid may cause frostbite ("cold burn"). However, ingestion is not likely to be a primary route of occupational exposure.
<b>Symptoms related to the physical, chemical and toxicological characteristics</b>	May cause frostbite or freezing of skin. Permanent eye damage including blindness could result.

### Information on toxicological effects

**Acute toxicity** Due to lack of data the classification is not possible.

Components	Species	Test results
Nitrogen Dioxide (CAS 10102-44-0)		
<b>Acute</b>		
<b>Inhalation</b>		
LC50	Guinea pig	30 ppm, 1 Hours
	Rat	88 ppm, 4 Hours

**Skin corrosion/irritation** May cause frostbite or freezing of skin.

**Serious eye damage/eye irritation** Exposure to rapidly expanding gas or vapourizing liquid may cause frostbite ("cold burn"). Permanent eye damage including blindness could result.

### Respiratory or skin sensitisation

#### Canada - Alberta OELs: Irritant

Nitrogen Dioxide (CAS 10102-44-0) Irritant

#### Canada - British Columbia OELs: Simple asphyxiant

Nitrogen (CAS 7727-37-9) Simple asphyxiant.

#### Canada - Manitoba OELs Hazard: Asphyxiant

Nitrogen (CAS 7727-37-9) Simple asphyxiant.

#### Canada - Ontario OELs: Asphyxiant

Nitrogen (CAS 7727-37-9) Simple asphyxiant.

#### Canada - Quebec OELs: Asphyxiant

Nitrogen (CAS 7727-37-9) Simple asphyxiant.

**Respiratory sensitisation** Due to lack of data the classification is not possible.

**Skin sensitisation** Due to lack of data the classification is not possible.

**Germ cell mutagenicity** Due to lack of data the classification is not possible.

**Carcinogenicity** Due to lack of data the classification is not possible. This product is not considered to be a carcinogen by IARC, ACGIH, NTP, or OSHA.

#### ACGIH Carcinogens

Nitrogen Dioxide (CAS 10102-44-0) A4 Not classifiable as a human carcinogen.

#### Canada - Manitoba OELs: carcinogenicity

NITROGEN DIOXIDE (CAS 10102-44-0) Not classifiable as a human carcinogen.

**Reproductive toxicity** Due to lack of data the classification is not possible.

**Specific target organ toxicity - single exposure** Due to lack of data the classification is not possible.

**Specific target organ toxicity - repeated exposure** Due to lack of data the classification is not possible.

**Aspiration hazard** Due to lack of data the classification is not possible.

**Chronic effects** Prolonged inhalation may be harmful.

## 12. Ecological information

**Ecotoxicity** This product has no known eco-toxicological effects. Nitrogen dioxide decomposes in water to form nitric and nitrous acids.

Components	Species	Test results
Nitrogen Dioxide (CAS 10102-44-0)		
<b>Aquatic</b>		
Fish	LC50 Tench (Tinca tinca)	19.6 mg/l, 96 hours
<b>Persistence and degradability</b>	No data is available on the degradability of this product.	
<b>Bioaccumulative potential</b>		
<b>Partition coefficient n-octanol / water (log Kow)</b>		
Nitrogen		0.67
<b>Mobility in soil</b>	No data available.	
<b>Other adverse effects</b>	An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.	

### 13. Disposal considerations

<b>Disposal instructions</b>	Do not puncture, incinerate or crush. Waste materials should not be released into the environment. Dispose of contents/container in accordance with local/regional/national/international regulations.
<b>Hazardous waste code</b>	The waste code should be assigned in discussion between the user, the producer and the waste disposal company.
<b>Waste from residues / unused products</b>	Dispose of in accordance with local regulations.
<b>Contaminated packaging</b>	Empty gas cylinders should be returned to the vendor for recycling or refilling. Empty containers should be taken to an approved waste handling site for recycling or disposal. Since emptied containers may retain product residue, follow label warnings even after container is emptied.

### 14. Transport information

<b>TDG</b>	
<b>UN number</b>	UN1956
<b>UN proper shipping name</b>	COMPRESSED GAS, N.O.S. (10 ppm Nitrogen dioxide, 21% Oxygen, Nitrogen)
<b>Transport hazard class(es)</b>	
<b>Class</b>	2.2
<b>Subsidiary risk</b>	-
<b>Packing group</b>	Not applicable.
<b>Environmental hazards</b>	No
<b>Special precautions for user</b>	Read safety instructions, SDS and emergency procedures before handling.
<b>IATA</b>	
<b>UN number</b>	UN1956
<b>UN proper shipping name</b>	Compressed gas, n.o.s. (10 ppm Nitrogen dioxide, 21% Oxygen, Nitrogen)
<b>Transport hazard class(es)</b>	
<b>Class</b>	2.2
<b>Subsidiary risk</b>	-
<b>Packing group</b>	Not applicable.
<b>Environmental hazards</b>	No.
<b>ERG Code</b>	2L
<b>Special precautions for user</b>	Read safety instructions, SDS and emergency procedures before handling.
<b>Other information</b>	
<b>Passenger and cargo aircraft</b>	Allowed with restrictions.
<b>Cargo aircraft only</b>	Allowed with restrictions.
<b>IMDG</b>	
<b>UN number</b>	UN1956
<b>UN proper shipping name</b>	COMPRESSED GAS, N.O.S. (10 PPM NITROGEN DIOXIDE, 21% OXYGEN, NITROGEN)
<b>Transport hazard class(es)</b>	
<b>Class</b>	2.2
<b>Subsidiary risk</b>	-
<b>Packing group</b>	Not applicable.
<b>Environmental hazards</b>	
<b>Marine pollutant</b>	No.
<b>EmS</b>	F-C, S-V
<b>Special precautions for user</b>	Read safety instructions, SDS and emergency procedures before handling.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Not applicable.

IATA; IMDG; TDG



## 15. Regulatory information

### Canadian regulations

This product has been classified in accordance with the hazard criteria of the HPR and the SDS contains all the information required by the HPR.

#### Controlled Drugs and Substances Act

Not regulated.

#### Export Control List (CEPA 1999, Schedule 3)

Not listed.

#### Greenhouse Gases

Not listed.

#### Precursor Control Regulations

Not regulated.

### International regulations

#### Stockholm Convention

Not applicable.

#### Rotterdam Convention

Not applicable.

#### Kyoto protocol

Not applicable.

#### Montreal Protocol

Not applicable.

#### Basel Convention

Not applicable.

### International Inventories

#### Country(s) or region

#### Inventory name

#### On inventory (yes/no)\*

Australia	Australian Inventory of Chemical Substances (AICS)	No
Canada	Domestic Substances List (DSL)	No
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	No
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	No
Korea	Existing Chemicals List (ECL)	No
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	No
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	No

\*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)

A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

## 16. Other information

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**Issue date** Draft version.

**Revision date** Draft version.

**Version No.** 00

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