


1. Identification

Product identifier	Nitrogen
Other means of identification	
SDS number	NTRGN
Recommended use	Compressed gas for inhalation.
Recommended restrictions	None known.
Manufacturer/Importer/Supplier/Distributor information	
Manufacturer	
Supplier	
Company name	INO Therapeutics LLC d/b/a Mallinckrodt Pharmaceuticals
Address	Perryville III Corporate Park 53 Frontage Road, 3rd Floor, P.O. Box 9001 Hampton, New Jersey 08827-9001, USA
Telephone number	1-877-566-9466
Emergency telephone number	1-800-424-9300 (CHEMTREC)

2. Hazard(s) identification

Physical hazards	Gases under pressure	Compressed gas
Health hazards	Not classified.	
Environmental hazards	Not classified.	
OSHA defined hazards	Simple asphyxiant	
Labeling		
Contains	NITROGEN	
Label elements		
		
Signal word	Warning	
Hazard statement	Contains gas under pressure; may explode if heated. May displace oxygen and cause rapid suffocation.	
Precautionary statement		
Prevention	Keep container tightly closed. Use only outdoors or in a well-ventilated area. Wear respiratory protection.	
Response	Wash hands after handling.	
Storage	Protect from sunlight. Store in a well-ventilated place.	
Disposal	Dispose of waste and residues in accordance with local authority requirements.	
Hazard(s) not otherwise classified (HNOC)	Exposure to rapidly expanding gas or vaporizing liquid may cause frostbite ("cold burn").	
	PRE-EXISTING MEDICAL CONDITIONS WHICH MAY BE AGGRAVATED BY EXPOSURE: Respiratory disorder.	
Supplemental information	None.	

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

Material name: Nitrogen
MSDS ID: NTRGN Version #: 01 Revision date: 03-29-2016

Chemical name	Common name and synonyms	CAS number	%
NITROGEN	Nitrogen; Nitrogen NF; LIN; Cryogenic Liquid Nitrogen; Refrigerated Liquid Nitrogen	7727-37-9	> 99
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			
Inhalation	Move to fresh air. Oxygen or artificial respiration if needed. Call a physician if symptoms develop or persist.		
Skin contact	Wash off with soap and water. Get medical attention if irritation develops and persists.		
Eye contact	Rinse with water. Get medical attention if irritation develops and persists.		
Ingestion	Rinse mouth. Never give anything by mouth to a victim who is unconscious or is having convulsions. Do not induce vomiting without advice from poison control center. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs. Get medical attention if symptoms occur.		
Most important symptoms/effects, acute and delayed	Exposure to rapidly expanding gas or vaporizing liquid may cause frostbite ("cold burn"). May cause redness and pain. Permanent eye damage including blindness could result. Symptoms of overexposure can include shortness of breath, drowsiness, headaches, confusion, decreased coordination, visual disturbances and vomiting, and are reversible if exposure is stopped. Continued exposure can lead to hypoxia (inadequate oxygen), cyanosis (bluish discoloration of the skin), numbness of the extremities, unconsciousness and death.		
Indication of immediate medical attention and special treatment needed	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.		
General information	In case of cold burns (frostbite) caused by rapidly expanding gas or vaporizing liquids, get medical attention promptly. Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.		
5. Fire-fighting measures			
Flammable properties	The product is not flammable.		
Suitable extinguishing media	Use any media suitable for the surrounding fires.		
Unsuitable extinguishing media	Do not use water jet as an extinguisher, as this will spread the fire.		
Specific hazards arising from the chemical	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.		
Special protective equipment and precautions for firefighters	Firefighters must use standard protective equipment including flame retardant coat, helmet with face shield, gloves, rubber boots, and in enclosed spaces, SCBA.		
Fire-fighting equipment/instructions	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.		
Specific methods	Cool containers exposed to flames with water until well after the fire is out.		
General fire hazards	Pressurized container may explode when exposed to heat or flame.		

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures	In the event of a leak evacuate all personnel until ventilation can restore oxygen concentrations to safe levels. 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. Do not breathe gas. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Ensure adequate ventilation. Emergency personnel need self-contained breathing equipment. Local authorities should be advised if significant spillages cannot be contained. For personal protection, see section 8 of the SDS.
Methods and materials for containment and cleaning up	Stop leak if you can do it without risk. Eliminate sources of ignition. Isolate area until gas has dispersed. Following product recovery, flush area with water. For waste disposal, see section 13 of the SDS.
Environmental precautions	Avoid release to the environment.

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. Do not breathe gas. Avoid contact with eyes, skin, and clothing. Avoid prolonged exposure. When using, do not eat, drink or smoke. Use only outdoors or in a well-ventilated area. Always wear NIOSH approved, positive pressure air supplied respirator when handling this material. 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. Store in a cool, dry place. Store in a well-ventilated place. Protect from sunlight. Storage temperature: between 59 °F (15 °C) and 86 °F (30 °C). Refrigeration recommended. Keep reduction valves free from grease and oil. Store away from incompatible materials (see Section 10 of the SDS).

8. Exposure controls/personal protection

Occupational exposure limits	No exposure limits noted for ingredient(s).
Biological limit values	No biological exposure limits noted for the ingredient(s).
Appropriate engineering controls	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.
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 gloves are recommended. If contact with forearms is likely, wear gauntlet style gloves.
Other	Wear suitable protective clothing.
Respiratory protection	Self-contained breathing apparatus.
Thermal hazards	Wear appropriate thermal protective clothing, when necessary.
General hygiene considerations	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

Appearance	
Physical state	Gas.
Form	Compressed gas.
Color	Colorless.
Odor	Odorless.

Odor threshold	Not available.
pH	Not available.
Melting point/freezing point	-346 °F (-210 °C) @ 1 atm
Initial boiling point and boiling range	-321 °F (-196.11 °C)
Flash point	Not available.
Evaporation rate	Not available.
Flammability (solid, gas)	Not flammable.
Upper/lower flammability or explosive limits	
Flammability limit - lower (%)	Not available.
Flammability limit - upper (%)	Not available.
Explosive limit - lower (%)	Not available.
Explosive limit - upper (%)	Not available.
Vapor pressure	Not available.
Vapor density	0.97 lighter or similar to air (Air = 1)
Relative density	0.906 (Air = 1) (70 °F (21.11 °C))
Solubility(ies)	
Solubility (water)	0.02 g/l
Auto-ignition temperature	Not available.
Decomposition temperature	Not available.
Viscosity	Not available.
Other information	
Critical temperature	-233 °F (-147.22 °C)
Density	Gas density at 21.1 °C (70 °F) = 0.075 lbs/ft3 (0.0012 g/cm3)
Molecular formula	N2
Molecular weight	28 g/mol

10. Stability and reactivity

Reactivity	The product is stable and non-reactive under normal conditions of use, storage and transport.
Chemical stability	Material is stable under normal conditions. Contains gas under pressure; may explode if heated.
Possibility of hazardous reactions	Hazardous polymerization does not occur.
Conditions to avoid	Avoid heat, sparks, open flames and other ignition sources. Contact with incompatible materials.
Incompatible materials	Strong oxidizing agents. Lithium. Titanium. Neodymium. Zirconium.
Hazardous decomposition products	Nitrogen oxides (NOx).

11. Toxicological information

Information on likely routes of exposure

Ingestion	Exposure to rapidly expanding gas or vaporizing liquid may cause frostbite ("cold burn"). However, ingestion is not likely to be a primary route of occupational exposure.
Inhalation	Suffocation (asphyxiant) hazard - if allowed to accumulate to concentrations that reduce oxygen below safe breathing levels.
Skin contact	May cause frostbite or freezing of skin.
Eye contact	Exposure to rapidly expanding gas or vaporizing liquid may cause frostbite ("cold burn"). Permanent eye damage including blindness could result.

Symptoms related to the physical, chemical and toxicological characteristics

Exposure to rapidly expanding gas or vaporizing liquid may cause frostbite ("cold burn"). May cause redness and pain. Permanent eye damage including blindness could result.

Symptoms of overexposure can include shortness of breath, drowsiness, headaches, confusion, decreased coordination, visual disturbances and vomiting, and are reversible if exposure is stopped.

Continued exposure can lead to hypoxia (inadequate oxygen), cyanosis (bluish discoloration of the skin), numbness of the extremities, unconsciousness and death.

Information on toxicological effects

Acute toxicity

May displace oxygen and cause rapid suffocation.

Chronic effects

Prolonged inhalation may be harmful.

Skin corrosion/irritation

May cause frostbite or freezing of skin.

Serious eye damage/eye irritation

Exposure to rapidly expanding gas or vaporizing liquid may cause frostbite ("cold burn"). Permanent eye damage including blindness could result.

Respiratory or skin sensitization

Respiratory sensitization

Due to lack of data the classification is not possible.

Skin sensitization

Due to lack of data the classification is not possible.

Germ cell mutagenicity

No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.

Carcinogenicity

This product is not considered to be a carcinogen by IARC, ACGIH, NTP, or OSHA.

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.

12. Ecological information

Ecotoxicity

This product has no known eco-toxicological effects.

Persistence and degradability

No data is available on the degradability of this product.

Bioaccumulative potential

Partition coefficient n-octanol / water (log Kow)

NITROGEN

0.67

Mobility in soil

No data available.

Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

13. Disposal considerations

Disposal instructions

Dispose of contents/container in accordance with local/regional/national/international regulations.

Hazardous waste code

Waste codes should be assigned by the user based on the application for which the product was used. The waste code should be assigned in discussion between the user, the producer and the waste disposal company.

Waste from residues / unused products

Dispose of in accordance with local regulations.

Contaminated packaging

Empty containers should be taken to an approved waste handling site for recycling or disposal. Empty gas cylinders should be returned to the vendor for recycling or refilling.

14. Transport information

DOT

UN number

UN1066

UN proper shipping name

Nitrogen, compressed

Transport hazard class(es)
 Class 2.2
 Subsidiary risk -
 Label(s) 2.2
 Packing group Not applicable.
 Special precautions for user Read safety instructions, SDS and emergency procedures before handling.
 ERG number 121

IATA

UN number UN1066
 UN proper shipping name Nitrogen, compressed
Transport hazard class(es)
 Class 2.2
 Subsidiary risk -
 Packing group Not applicable.
 Environmental hazards No.
 ERG Code 2L
 Special precautions for user Read safety instructions, SDS and emergency procedures before handling.
Other information
 Passenger and cargo aircraft Allowed.
 Cargo aircraft only Allowed.

IMDG

UN number UN1066
 UN proper shipping name NITROGEN, COMPRESSED
Transport hazard class(es)
 Class 2.2
 Subsidiary risk -
 Packing group Not applicable.
 Environmental hazards
 Marine pollutant No.
 EmS F-C, S-V
 Special precautions for user 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.

DOT





15. Regulatory information

US federal regulations This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.
All components are on the U.S. EPA TSCA Inventory List.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Not regulated.

CERCLA Hazardous Substance List (40 CFR 302.4)

Not listed.

SARA 304 Emergency release notification

Not regulated.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not listed.

CERCLA (Superfund) reportable quantity

None

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories Immediate Hazard - Yes
Delayed Hazard - No
Fire Hazard - No
Pressure Hazard - Yes
Reactivity Hazard - No

SARA 302 Extremely hazardous substance

Not listed.

SARA 311/312 Hazardous chemical Yes

Other federal regulations

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

Not regulated.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

Not regulated.

Safe Drinking Water Act (SDWA) Not regulated.

Food and Drug Administration (FDA) Total food additive
Direct food additive
GRAS food additive

US state regulations

US. Massachusetts RTK - Substance List

NITROGEN (CAS 7727-37-9)

US. New Jersey Worker and Community Right-to-Know Act

NITROGEN (CAS 7727-37-9)

US. Pennsylvania Worker and Community Right-to-Know Law

NITROGEN (CAS 7727-37-9)

US. Rhode Island RTK

Not regulated.

US. California Proposition 65

California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65): This material is not known to contain any chemicals currently listed as carcinogens or reproductive toxins.

International Inventories

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	Yes
Canada	Domestic Substances List (DSL)	Yes
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)	Yes
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	No
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*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, including date of preparation or last revision**Issue date** 03-29-2016**Version #** 01**NFPA Ratings****Disclaimer**

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