Aceti-Oxigeno, S.A.
FABRICANTES DE GASES PARA USO MÉDICO, ALIMENTICIO E INDUSTRIALES

MATERIAL SAFETY DATA SHEET

(MSDS MATERIAL SAFETY DATA SHEET)

Annex 12

GASEOUS NITROGEN

1. Product and company identification

1.1	Product name:	Compressed Nitrogen
1.2	Common chemical name:	Nitrogen
1.3	IUPAC chemical name:	Nitrogen
1.4	Chemical family:	Family of inert gases
1.5	Condensed formula:	N_2
1.6	Synonyms:	Nitrogen, Nitrous Gas
1.7	Company name:	Aceti-Oxígeno, S.A.
1.8	Company address:	Panama Mañanitas-Industrial Zone
1.9	Telephone:	Tel. 321-8888
1.10	Emergency Telephone:	103 Fire Brigade
1.11	REVISION DATE:	June 20. of 2022, rev. 1, valid until: June 20, 2027
1.12	Use:	Industrial, medical, analytical, and in inertization, protection and preservation of food and substances susceptible to oxidation.

2. Composition or information on ingredients

2.1	Ingredient name:	Nitrogen
2.2	CAS [1] Number:	7727-37-91
2.3	Percentage:	> 99%
2.4	OSHA PEL-TWA [2]:	None
2.5	ACGIH TLV [3]:	Simple asphyxiant
2.6	[LD_{50}]:	None
2.7	[LC_{50}]:	None

[1] Chemical Abstracts Service (International Material Identification Number according to the Chemical Abstracts Service)

[2] Occupational Safety and Health Administration. Permissible Exposure Limits. Time Weighted Average (Occupational Safety and Hygiene Administration. Permissible Exposure Limits. Time weighted average exposure)

[3] American Conference of Governmental Industrial Hygienists. Threshold Limit Value (North American Conference of Governmental Industrial Public Health. Threshold Limit Value)

3. Risk identification

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3.1 Considerations and hazards during emergencies
3.1.1 High pressure gas
3.1.2 Can quickly cause suffocation
3.1.3 Do not breathe the gas
3.1.4 Rescue workers must require self-contained breathing equipment.

3.2 Information on potential health effects
3.2.1 Exposure routes
3.2.1.1 Inhalation: Simple asphyxiant. Nitrogen is not toxic, but it can cause suffocation by displacing oxygen from the air. Exposure to atmospheres deficient in oxygen (less than 19.5%) can cause dizziness, drowsiness, nausea, vomiting, excessive salivation, decreased alertness, loss of consciousness, and death. Exposure to atmospheres containing 8% to 10% or less oxygen will cause unconsciousness without warning and so rapidly that individuals are unable to help or protect themselves. Severe oxygen deficiency can cause serious damage and even death.
3.2.1.2 Contact with eyes: No risk
3.2.1.3 Skin contact: No risk
3.2.1.4 Skin absorption: No risk
3.2.1.5 Ingestion: No risk
3.2.2 Chronic effects: No chronic effects have been established from its use.
3.2.3 Medical conditions aggravated by overexposure: None
3.2.4 Other effects of overexposure: None
3.2.5 Carcinogenicity: Nitrogen is not listed by NTP [4], OSHA or IARC [5]

[4] National Toxicology Program
[5] International Agency for Research on Cancer

4. First aid

4.1 Inhalation: Move person to fresh air. If there is no breathing, administer artificial respiration. If breathing is difficult, administer oxygen. Get immediate medical attention.

4.2 Contact with eyes: No first aid required.

4.3 Skin contact: No first aid required.

4.4 *Ingestion: No first aid required*

4.5 Remarks to the doctor: None

5. Measures in case of fire

5.1 Ignition point: Not applicable because it is a gas.

5.2 Auto ignition: Non-flammable

5.3 Flammable limits in air, volume by volume:
5.3.1 Lower: Not applicable
5.3.2 Superior: Not applicable

5.4 Extinguishing media: Nitrogen is non-flammable and does not stimulate combustion. Use appropriate extinguishing media for the surrounding flammable materials.

5.5 Special Instructions to firefighters: Nitrogen is a simple asphyxiant. If possible, remove nitrogen cylinders from fire area and cool with water. Rescue workers may require self-contained breathing apparatus.

5.6 Unusual fire and explosion hazards: On exposure to intense heat or flame, cylinders will rapidly vent and/or rupture violently. Most cylinders are designed to vent their contents when exposed to high temperatures. Pressure in a container can rise due to heat, which can cause it to rupture if pressure relief devices fail to function.

5.7 Hazardous Combustion Products: None known.

5.8 Static Discharge Sensitivity: None

5.9 Sensitivity to mechanical impact: None

6. Measures in case of accidental release

6.1 Steps to be taken if material is released or spilled:
6.1.1 Evacuate all personnel from the affected area
6.1.2 Disconnect the nitrogen source if there is no additional risk in doing so
6.1.3 Ventilate the area or move cylinders outside the facility
6.1.4 If a leak is observed from the cylinder body or its valve, immediately contact Aceti-Oxígeno, S.A.

7. Handling and storage

7.1 Precautions for Storage
7.1.1 Store and use with adequate ventilation
7.1.2 Cylinders must be stored upright with the valve protection cap in place, properly secured to prevent falling or being knocked over.
7.1.3 Protect cylinders from any physical damage. Do not drag, roll, slide or drop them.
7.1.4 Do not allow storage temperature to exceed 125ºF (52ºC).
7.1.5 Full and empty cylinders must be separated.
7.1.6 Use a FIFO (first-in, first-out) inventory system to prevent full cylinders from being stored for long periods of time.

7.2 Precautions to be taken into account for handling.
7.2.1 Use a handcart to move cylinders.
7.2.2 Never attempt to lift a cylinder by the protective valve cap.
7.2.3 Any difficulty in the operation of the valve implies discontinuing its use and contacting Aceti-Oxígeno, S.A.
7.2.4 Never insert an object (tool such as wrench, screwdriver, etc.) into the openings of the valve protection cap, as it may be damaged and generate air leakage.
7.2.5 Do not hit the valve protection cap with a hammer. Use an adjustable strap wrench to remove rusted or overtightened plugs.
7.2.6 Never bring an electric arc near a compressed gas cylinder or make it part of an electrical circuit.
7.2.7 For additional precautions in the use of air, see Section 16. Other Information.

8. Exposure control and personal protection

8.1 Infrastructure controls
8.1.1 Ventilation: Provide adequate natural ventilation or mechanical ventilation to prevent the appearance of oxygen-deficient atmospheres that contain less than 19.5% oxygen.

8.2 Respiratory protection
8.2.1 General routine use: Not required
8.2.2 Emergency use: Self-contained breathing apparatus or positive pressure airline with face mask is required for use in oxygen-deficient atmospheres. Air-purifying respirator systems will not provide any protection.

8.3 Protective Gloves: It is recommended to wear work gloves when handling cylinders.

8.4 Eye protection: The use of safety glasses is recommended for handling the cylinders.

8.5 Other protective equipment: The use of safety footwear is recommended for handling cylinders. It is advisable to wear cotton clothing to prevent the accumulation of static electricity.

9. Physical and chemical properties

9.1 Molecular weight: 28.0134 g/mol

9.2 Boiling point (1 atmosphere): -320.4ºF (-195.8ºC)

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9.3 Specific gravity (Air = 1) at 70ºF (21.1ºC) and 1 atmospheric pressure: 0.967

9.4 Melting point (1 atmosphere): -345.6ºF (-209.9ºC)

9.5 Vapor pressure at 70ºF (21.1ºC): Not applicable

9.6 Gas density at 70ºF (21.1ºC) and 1 atmospheric pressure: 0.072 lb/cf or 1,153 Kg/m^3

9.7 Evaporation rate (Butyl Acetate = 1): Not applicable because it is a gas.

9.8 Solubility in water:
9.8.1 Vol/Vol at 32ºF (0ºC) and 1 atmospheric pressure: 0.023

9.9 Expansion ratio: Not applicable

9.10 pH: Not applicable

9.11 Appearance, odor and condition: Colorless, odorless and tasteless gas at normal temperature and pressure.

9.12 Water/oil distribution coefficient: Not available

9.13 Odor threshold: Not applicable

10. Stability and reactivity

10.1 Stability: Stable

10.2 Conditions to avoid: None

10.3 Incompatibilities (Materials to Avoid): None

10.4 Reactivity:
10.4.1 Hazardous decomposition products: None
10.4.2 Hazardous polymerization products: Will not occur.

11. Toxicological information

11.1 General toxicological effect: Simple asphyxiant

11.2 Ability to cause irritation: None

11.3 Sensitization to material: None

11.4 Effects on the reproductive system: None

11.5 Teratogenicity: None

11.6 Mutagenicity: None

11.7 Synergistic Materials: None

12. Ecological information

No adverse or negative ecological impacts are expected because the atmosphere contains approximately 78% nitrogen. Nitrogen contains no Class I or Class II chemicals, which deplete the ozone layer (40 CFR [6] Part 82). Nitrogen is not listed as a marine pollutant by DOT [7] (49 CFR Part 171).

[6] Code of Federal Regulations (United States Code of Federal Regulations)
[7] Department of Transportation of the United States of America

13. Disposal considerations

13.1 Waste disposal method: Do not attempt to dispose of residual or unused amounts. Return the cylinder to the supplier.

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13.2 For emergency disposal, secure cylinder and slowly discharge gas to atmosphere in a well-ventilated area or outdoors.

14. Transport information

14.1 DOT/IMO shipping name: Compressed Nitrogen.

14.2 Hazard classification: 2.2 (Non-flammable Gas)

14.3 Identification number: UN 1066

14.4 Product identification number: 1066

14.5 Product reportable quantity: Not applicable

14.6 Shipping labels: Non-flammable gas

14.7 Placard: Non-flammable gas

14.8 Special shipping information: Cylinders must be transported in a secure upright position, in a well-ventilated vehicle. The transport of compressed gases in automobiles or closed body vehicles can present great safety risks and should not be recommended or encouraged.

15. Related regulations

The following information is related to United States regulatory requirements potentially applicable to this product in Panama. Users of this product are responsible for complying with their local or general regulatory requirements.

15.1 United States Federal Regulations

15.1.1 EPA - Environmental Protection Agency

15.1.1.1 CERCLA: Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (40 CFR Parts 117 and 302). Reportable Quantity RQ: Not applicable

15.1.1.2 SARA: Superfund Amendment and Reauthorization Act

Section 302/304: Requires emergency planning based on Threshold Planning Quantities (TPQ) and release reporting based on Reportable Quantities (RQ) of EPA-scheduled substances as extremely hazardous (40 CFR Part 355)

Extremely Hazardous Substance: Not applicable
Planning Threshold Quantity: Not applicable

Section 311/312: Requires the submission of a Material Safety Data Sheet (MSDS) and a chemical inventory report with identification of the risk classes defined by the EPA (40 CFR Part 370). The hazard classes for this product are:

Immediate:	No
Late:	No
Pressure:	Yes
Reactivity:	No
Fire:	No

Section 313: Requires submission of annual toxic chemical release reports listed in 40 CFR Part 372. Nitrogen is not required to report under this Section.

15.1.2 40 CFR Part 68: Risk Management for Chemical Accidental Release: Requires the development and implementation of risk management programs in manufacturing facilities, use, storage, or any other Controlled substance handled in amounts exceeding specified thresholds. Nitrogen is not listed as a regulated substance.

15.1.3 TSCA Toxic Substance Control Act: Nitrogen is listed on the inventory of controlled products by TSCA.

15.2 OSHA Occupational Safety and Health Administration

15.2.1 29 CFR 1910.119: Process Safety Management of Highly Hazardous Chemicals: Requires facilities to develop Process Safety Management based on Threshold Quantities (TQ) of products high-risk chemicals, such as those listed in Appendix A. Nitrogen is not listed in Appendix A as a high-risk chemical.

15.3 FDA - Food and Drug Administration

15.3.1 21 CFR 184.1540: Recognized as a safe supply and ingredient (GRAS) in food for human consumption when used as a pressurizer, propellant, in modified atmosphere packaging and others. Nitrogen NF (National Formulary) is regulated by the FDA as a prescription drug.

16. Additional information

16.1 Special precautions: Use piping and equipment properly designed to withstand working pressures. Use a check valve or other cylinder protection device to prevent and avoid reverse flow.

Shipping compressed gas cylinders that have been filled without the consent of the cylinder owner is a violation of US federal law [49CFR Part 173.301(b)].

16.2 Mixtures: When two or more gases or liquefied products are mixed, their properties can combine to create additional unexpected hazards. Obtain and evaluate the safety information for each component before manufacturing the mixture. Seek advice from an industrial health worker or other qualified person, when carrying out the safety evaluation of the final product. Remember that gases and liquids have properties that can cause severe harm or death.

16.3 Other data:

16.3.1 NFPA Valuation (National Fire Protection Association)

Health	0
Flammability	0
Instability	0
Special	Simple Asphyxiant (CGA recommended designation)

16.3.2 HMIS Valuation (Hazardous Materials Identification Systems)

Health	0
Flammability	0
Reactivity	0

Classification of the chemical substance according to the SGA:

Physical hazards:
Gases under pressure – Compressed gas.
Health hazards: N/A.
Environmental hazards: N/A.

Elements for the communication and signalization of hazards:

Word of warning: Attention.
Hazard statements:
H280: Contains gas under pressure; may explode if heated.
Precautionary advice:
Prevention: N/A.
Answer: N/A.

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Storage:
P410+P403: Protect from sunlight. Store in a well-ventilated place.
Elimination: N/A.

Other hazards:

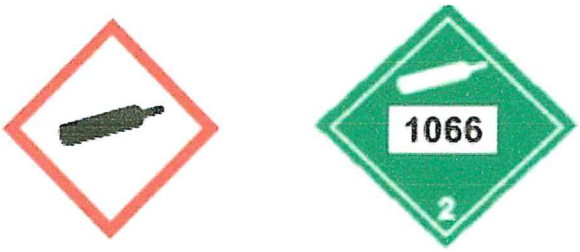
It can act as a simple asphyxiant, diluting the concentration of oxygen in the air to levels below those necessary to support life.

Inhalation of Nitrogen in excessive concentrations can cause: dizziness, nausea, vomiting, loss of consciousness and death.

Containers may explode when heated.

Ruptured cylinders can project

Pictogram/ Hazard Symbol:



16.4 Standard valve connection for the United States and Canada
16.4.1 Coiled: Standard CGA 580 for cylinders at pressures between 0 and 3000 psig. CGA Standard 680 for cylinders with pressures between 3001 and 5500 psig. CGA 677 standard for cylinders with pressures between 5501 and 7500. For Panama the standard is CGA 580.
16.4.2 Indexed Pin Yoke: CGA 960 (Medical Use)
16.4.3 Ultra High Integrity: Standard 718 for cylinders with pressures between 0 and 3000 psig.

Use the proper CGA connection. DO NOT USE ADAPTERS.

More detailed information on nitrogen can be found in the following documents published by the Compressed Gas Association Inc. (CGA), 1725 Jefferson Davis Highway, Suite 1004, Arlington, VA 22202-4102. Phone (703) 412-0900:

G-10.1 Commodity Specifications for Nitrogen

P-9 Inert Gases - Argon, Nitrogen, Helium

P-14 Accident Prevention in Oxygen-Rich, Oxygen-Deficient Atmospheres

SB-2 Oxygen Deficient Atmospheres

AV-1 Safe Handling and Storage of Compressed Gases

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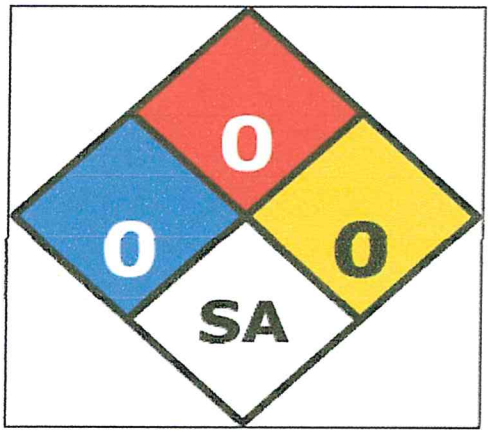
COMPATIBILITY WITH OTHER MATERIALS

Metals	
Bronze	Satisfactory
303 Stainless Steel	Satisfactory
316 Stainless Steel	Satisfactory
Aluminum	Satisfactory
Zinc	Satisfactory
Copper	Satisfactory
Monel-metal	Satisfactory
Plastics	
PCTFE	Satisfactory
Teflon	Satisfactory
Tefzel	Satisfactory
Kynar	Satisfactory
PVC	Satisfactory
Polycarbonate	Satisfactory
Elastomers	
Kalrez	Satisfactory
Viton	Satisfactory
Buna-N	Satisfactory
Neoprene	Satisfactory
Polyurethane	Satisfactory

Conversion Table

NITROGEN (N_2) 28.013 g/mol PE=-195.8 °C

UNITS	WEIGHT		GAS VOLUME		LIQUID VOLUME	
	Pounds	Kilograms	SCF Gas	Nm^3 Gas	Liquid gallons	Liquid liters
Pounds	**1.000**	0.454	13.803	0.363	0.148	0.561
Kilograms	2.205	**1.000**	30.420	0.800	0.326	1.235
SCF Gas	0.072	0.033	**1.000**	0.026	0.011	0.041
Nm^3 Gas	2.757	1.251	38.040	**1.000**	0.408	1.544
Liquid gallons	6.745	3.060	93.110	2.447	**1.000**	3.785
Liquid liters	1.782	0.808	24.600	0.646	0.264	**1.000**



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Change control:

Revision 01:

- Added safety color code for NFPA and the global harmonized system.
- The format was modified to the standards and approved by the sister companies Infra and Productos del Aire.

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