

Praxair Material Safety Data Sheet

1. Chemical Product and Company Identification

Product Name: Compressed gases, n.o.s. (nitrogen, oxygen) or (nitrogen, carbon dioxide)/Compressed gas, oxidizing, n.o.s. (oxygen, nitrogen) or (oxygen, carbon dioxide) (MSDS No. P-4858-D)		Trade Name: Clinical Blood Gas Mixtures
Chemical Name: Mixtures of Carbon Dioxide, Nitrogen, and Oxygen		Synonyms: Blood gas standards
Formula: Mixtures of O ₂ -N ₂ , CO ₂ -O ₂ -N ₂ , CO ₂ -O ₂ , CO ₂ -N ₂ (See section 4.)		Chemical Family: Not applicable
Telephone:	Emergencies: 1-800-645-4633* CHEMTREC: 1-800-424-9300* Routine: 1-800-PRAXAIR	Company Name: Praxair, Inc. 39 Old Ridgebury Road Danbury, CT 06810-5113

** Call emergency numbers 24 hours a day only for spills, leaks, fire, exposure, or accidents involving this product. For routine information, contact your supplier, Praxair sales representative, or call 1-800-PRAXAIR (1-800-772-9247).*

2. Composition/Information on Ingredients

**For custom mixtures of this product, request an MSDS for each component.
See section 16 for important information about mixtures.**

INGREDIENT	CAS NUMBER	CONCENTRATION	OSHA PEL	ACGIH TLV (1999)
Carbon Dioxide	124-38-9	0-50%	5000 ppm	5000 ppm*
Oxygen	7782-44-7	0-99.9%	None currently established	Simple Asphyxiant
Nitrogen	7727-37-9	0-99.9%	None currently established	Simple Asphyxiant

** 30,000 ppm, 15-min ACGIH TLV-STEL (1999).*

WARNING: Federal law prohibits dispensing for drug use. These mixtures are intended only for the calibration of research and clinical blood gas analyzers.

3. Hazards Identification

EMERGENCY OVERVIEW

WARNING! High-pressure gas.
Concentrations above 23.5% oxygen vigorously accelerate combustion.
Concentrations below 19.5% oxygen can cause rapid suffocation.
Can increase respiration and heart rate.
May cause nervous system damage.
May cause dizziness and drowsiness.
Self-contained breathing apparatus may be required by rescue workers.
Odor: None

THRESHOLD LIMIT VALUE: See section 2. TLV-TWAs should be used as a guide in the control of health hazards and not as fine lines between safe and dangerous concentrations.

EFFECTS OF A SINGLE (ACUTE) OVEREXPOSURE:

INHALATION—Most of these mixtures are asphyxiants. Effects are due to lack of oxygen. Mixtures containing carbon dioxide are also physiologically active, affecting circulation and breathing. Moderate concentrations may cause headache, drowsiness, dizziness, stinging of the nose and throat, excitation, rapid breathing, excess salivation, vomiting, and unconsciousness. Lack of oxygen can kill. Breathing 80% or more oxygen at atmospheric pressure for more than a few hours may cause nasal stuffiness, cough, sore throat, chest pain, and breathing difficulty. Breathing oxygen at higher pressure increases the likelihood of adverse effects within a shorter time period. Breathing pure oxygen under pressure may cause lung damage and also central nervous system (CNS) effects resulting in dizziness, poor coordination, tingling sensation, visual and hearing disturbances, muscular twitching, unconsciousness, and convulsions. Breathing oxygen under pressure may prolong adaptation to darkness and reduce peripheral vision.

SKIN CONTACT—No harm expected.

SWALLOWING—This product is a gas at normal temperature and pressure.

EYE CONTACT—May cause a stinging sensation.

EFFECTS OF REPEATED (CHRONIC) OVEREXPOSURE: No harm expected.

OTHER EFFECTS OF OVEREXPOSURE: Damage to retinal or ganglion cells CNS may occur.

MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE: The toxicology and the physical and chemical properties of the mixture components suggest that overexposure is unlikely to aggravate existing medical conditions.

SIGNIFICANT LABORATORY DATA WITH POSSIBLE RELEVANCE TO HUMAN HEALTH HAZARD EVALUATION: A single study has shown an increase in heart defects in rats exposed to 6% carbon dioxide in air for 24 hours at different times during gestation. There is no evidence that carbon dioxide is teratogenic in humans.

CARCINOGENICITY: None of the components are listed by NTP, OSHA, and IARC.

4. First Aid Measures

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, qualified personnel may give oxygen. Call a physician.

SKIN CONTACT: No emergency care anticipated.

SWALLOWING: An unlikely route of exposure, This product is a gas at normal temperature and pressure.

EYE CONTACT: Flush with water. Hold the eyelids open and away from the eyeballs to ensure that all surfaces are flushed thoroughly. Get medical attention if discomfort persists.

NOTES TO PHYSICIAN: Supportive treatment should include immediate sedation, anti-convulsive therapy if needed, and rest. See section 11, Toxicological Information.

NOTE: Typical mixtures include 5% CO₂/balance N₂, 10% CO₂/balance N₂, 5% CO₂/12% O₂/balance N₂, 8% CO₂/12% O₂/balance N₂, 12% CO₂/21% O₂/balance N₂.

5. Fire Fighting Measures

FLASH POINT (test method):	Not applicable	
AUTOIGNITION TEMPERATURE:	Not applicable	
FLAMMABLE LIMITS IN AIR , % by volume:	LOWER: Not applicable	UPPER: Not applicable

EXTINGUISHING MEDIA: Mixtures containing greater than 23.5 percent oxygen vigorously accelerate combustion. Use media appropriate for surrounding fire. Water (i.e., safety shower) is the preferred extinguishing media for clothing fires.

SPECIAL FIRE FIGHTING PROCEDURES: WARNING! High-pressure gas. Evacuate all personnel from danger area. Immediately deluge cylinders with water from maximum distance until cool; then move them away from fire area if without risk. Shut off leak if without risk. On-site fire brigades must comply with OSHA 29 CFR 1910.156.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Oxygen-rich mixtures vigorously accelerate combustion. Contact with flammable materials may cause fire or explosion. Heat of fire can build pressure in cylinder and cause it to rupture. No part of cylinder should be subjected to a temperature higher than 125°F (52°C). Cylinders containing this mixture are equipped with a pressure relief device. (Exceptions may exist where authorized by DOT.)

HAZARDOUS COMBUSTION PRODUCTS: None

6. Accidental Release Measures

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED: WARNING! High-pressure gas. Most of these mixtures are asphyxiants. Lack of oxygen can kill. Evacuate all personnel from danger area. Use self-contained breathing apparatus where needed. Shut off leak if you can do so without risk. Ventilate area or move cylinder to a well-ventilated area. Test for sufficient oxygen, especially in confined spaces, before allowing reentry.

WASTE DISPOSAL METHOD: Prevent waste from contaminating the surrounding environment. Keep personnel away. Discard any product, residue, disposable container, or liner in an environmentally acceptable manner, in full compliance with federal, state, and local regulations. If necessary, call your local supplier for assistance.

7. Handling and Storage

PRECAUTIONS TO BE TAKEN IN STORAGE: Store and use with adequate ventilation. Store oxygen-rich mixtures away from oil, grease, and other flammable materials. Firmly secure cylinders upright to keep them from falling or being knocked over. Screw valve protection cap firmly in place by hand. Store only where temperature will not exceed 125°F (52°C). Store full and empty cylinders separately. Use a first-in, first-out inventory system to prevent storing full cylinders for long periods.

PRECAUTIONS TO BE TAKEN IN HANDLING: Protect cylinders from damage. Use a suitable hand truck to move cylinders; do not drag, roll, slide, or drop. Never attempt to lift a cylinder by its cap; the cap is intended solely to protect the valve. Never insert an object (e.g., wrench, screwdriver, pry bar) into cap openings; doing so may damage the valve and cause a leak. Use an adjustable strap wrench to remove over-tight or rusted caps. Open valve slowly. If valve is hard to open, discontinue use and contact your supplier. For other precautions in using Clinical Blood Gas Mixtures, see section 16.

For additional information on storage and handling, refer to Compressed Gas Association (CGA) pamphlet P-1, *Safe Handling of Compressed Gases in Containers*, available from the CGA. Refer to section 16 for the address and phone number along with a list of other available publications.

8. Exposure Controls/Personal Protection

VENTILATION/ENGINEERING CONTROLS:

LOCAL EXHAUST—Use a local exhaust system, if necessary, to control buildup of the asphyxiant gases (carbon dioxide and nitrogen) in the worker's breathing zone.

MECHANICAL (general)—Under certain conditions, general exhaust ventilation may be acceptable to control concentration of the asphyxiant gases (carbon dioxide and nitrogen) in the worker's breathing zone.

SPECIAL—None

OTHER—None

RESPIRATORY PROTECTION: None required under normal operations. Air-supplied respirators are required while working in confined spaces or in an oxygen-deficient atmosphere. Respiratory protection must conform to OSHA rules as specified in 29 CFR 1910.134.

SKIN PROTECTION: Wear work gloves when handling cylinders.

EYE PROTECTION: Wear safety glasses when handling cylinders. Select in accordance with OSHA 29 CFR 1910.133.

OTHER PROTECTIVE EQUIPMENT: Metatarsal shoes for cylinder handling. Select in accordance with OSHA 29 CFR 1910.132 and 1910.133. Regardless of protective equipment, never touch live electrical parts.

9. Physical and Chemical Properties

SPECIFIC GRAVITY (Air = 1) at 70°F (21.1°C) and 1 atm: 0.968 to 1.244

SOLUBILITY IN WATER: Negligible

PERCENT VOLATILES BY VOLUME: 100

APPEARANCE, ODOR, AND STATE: Colorless, odorless gas at normal temperature and pressure.

10. Stability and Reactivity

STABILITY: Unstable Stable

INCOMPATIBILITY (materials to avoid): Combustible materials, flammable materials especially oils and greases.

HAZARDOUS DECOMPOSITION PRODUCTS: None

HAZARDOUS POLYMERIZATION: May Occur Will Not Occur

CONDITIONS TO AVOID: None known.

11. Toxicological Information

Oxygen Component. Animal studies suggest that the administration of certain drugs, including phenothiazine drugs and chloroquine, increases the susceptibility to toxicity from oxygen at high concentrations or pressures. Animal studies also indicate that vitamin E deficiency may increase susceptibility to oxygen toxicity.

Airway obstruction during high oxygen tension may cause alveolar collapse following absorption of the oxygen. Similarly, occlusion of the Eustachian tubes may cause retraction of the eardrum and obstruction of the paranasal sinuses may produce vacuum-type headache.

Newborn premature infants exposed to high oxygen concentrations may suffer delayed retinal damage, which can progress to retinal detachment and blindness (retrolental fibroplasia). Retinal damage can also occur in adults exposed to 100% oxygen under greater than atmospheric pressure, particularly in individuals whose retinal circulation has been previously compromised.

All individuals exposed for long periods to oxygen at high pressure and all who exhibit overt oxygen toxicity should have ophthalmologic examinations.

Carbon Dioxide Component. Carbon dioxide is an asphyxiant. It initially stimulates respiration and then causes respiratory depression. High concentrations result in narcosis. Symptoms in humans are as follows:

EFFECT:	CONCENTRATION:
Breathing rate increases slightly.	1%
Breathing rate increases to 50% above normal level. Prolonged exposure can cause headache, tiredness.	2%
Breathing increases to twice normal rate and becomes labored. Weak narcotic effect. Impaired hearing, headache, increased blood pressure and pulse rate.	3%
Breathing increases to approximately four times normal rate, symptoms of intoxication become evident, and slight choking may be felt.	4 - 5%
Characteristic sharp odor noticeable. Very labored breathing, headache, visual impairment, and ringing in the ears. Judgment may be impaired, followed within minutes by loss of consciousness.	5 - 10%
Unconsciousness occurs more rapidly above 10% level. Prolonged exposure to high concentrations may eventually result in death from asphyxiation.	50 - 100%

12. Ecological Information

These mixtures do not contain any Class I or Class II ozone-depleting chemicals. None of the mixture components is listed as a marine pollutant by DOT.

13. Disposal Considerations

WASTE DISPOSAL METHOD: Keep waste from contaminating surrounding environment. Keep personnel away. Do not dispose of unused quantities. Return cylinder to supplier.

14. Transport Information

DOT/IMO SHIPPING NAME:	Compressed gases, n.o.s. (nitrogen, oxygen) or (nitrogen, carbon dioxide)/Compressed gas, oxidizing, n.o.s. (oxygen, nitrogen) or (oxygen, carbon dioxide)
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HAZARD CLASS: 2.2	PRODUCT RQ: None
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IDENTIFICATION NUMBER:	UN 1956 UN 3156 (mixtures above 23.5% O ₂)
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SHIPPING LABEL(s):	NONFLAMMABLE GAS NONFLAMMABLE GAS, OXIDIZER (mixtures above 23.5% O ₂)
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PLACARD (when required):	NONFLAMMABLE GAS NONFLAMMABLE GAS, OXIDIZER (mixtures above 23.5% O ₂)
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SPECIAL SHIPPING INFORMATION: Cylinders should be transported in a secure position, in a well-ventilated vehicle. Cylinders transported in an enclosed, nonventilated compartment of a vehicle can present serious safety hazards.

Shipment of compressed gas cylinders that have been filled without the owner's consent is a violation of federal law [49 CFR 173.301(b)].

15. Regulatory Information

The following selected regulatory requirements may apply to this product. Not all such requirements are identified. Users of this product are solely responsible for compliance with all applicable federal, state, and local regulations.

U.S. FEDERAL REGULATIONS:

EPA (ENVIRONMENTAL PROTECTION AGENCY)

CERCLA: COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT OF 1980 (40 CFR Parts 117 and 302):

Reportable Quantity (RQ): None

SARA: SUPERFUND AMENDMENT AND REAUTHORIZATION ACT:

SECTIONS 302/304: Require emergency planning based on Threshold Planning Quantity (TPQ) and release reporting based on Reportable Quantities (RQ) of extremely hazardous substances (40 CFR Part 355):

Threshold Planning Quantity (TPQ): None

Extremely Hazardous Substances (40 CFR 355): None

SECTIONS 311/312: Require submission of MSDSs and reporting of chemical inventories with identification of EPA hazard categories. The hazard categories for this product are as follows:

IMMEDIATE: Yes

PRESSURE: Yes

DELAYED: No

REACTIVITY: No

FIRE: Yes

SECTION 313: Requires submission of annual reports of release of toxic chemicals that appear in 40 CFR Part 372.

None of the components of these mixtures requires reporting under Section 313.

40 CFR 68: RISK MANAGEMENT PROGRAM FOR CHEMICAL ACCIDENTAL RELEASE PREVENTION: Requires development and implementation of risk management programs at facilities that manufacture, use, store, or otherwise handle regulated substances in quantities that exceed specified thresholds.

None of the components of these mixtures is listed as a regulated substance.

TSCA: TOXIC SUBSTANCES CONTROL ACT: The mixture components are listed on the TSCA inventory.

OSHA: OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION:

29 CFR 1910.119: PROCESS SAFETY MANAGEMENT OF HIGHLY HAZARDOUS CHEMICALS: Requires facilities to develop a process safety management program based on Threshold Quantities (TQ) of highly hazardous chemicals.

None of the components of these mixtures is listed in Appendix A as a highly hazardous chemical.

STATE REGULATIONS:

CALIFORNIA: None of the components of these mixtures is listed by California under the SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT OF 1986 (Proposition 65).

PENNSYLVANIA: This product is subject to the PENNSYLVANIA WORKER AND COMMUNITY RIGHT-TO-KNOW ACT (35 P.S. Sections 7301-7320).

16. Other Information

WARNING: For in vitro diagnostic use. Prior to handling this mixture, the physician or clinician must become familiar with the mixture and its hazards.

ADDITIONAL SAFETY AND HEALTH HAZARDS: *High-pressure gas.* May accelerate combustion. Keep oil, grease, and combustibles away. Use piping and equipment adequately designed to withstand pressures to be encountered. *Gas can cause rapid suffocation due to oxygen deficiency.* Store and use with adequate ventilation. Close valve after each use; keep closed even when empty. *Never work on a pressurized system.* If there is a leak, close the cylinder valve. Blow the system down in a safe and environmentally sound manner in compliance with all federal, state, and local laws; then repair the leak. *Never allow a compressed gas cylinder to become part of an electrical circuit.*

NOTE: *Prior to using any plastics, confirm their compatibility with the carbon dioxide component of this mixture.*

Personnel who have been exposed to high concentrations of oxygen should stay in a well-ventilated or open area before going into a confined space or near an ignition source.

OTHER HAZARDOUS CONDITIONS OF HANDLING, STORAGE, AND USE: *Store and use away from flammable materials.* Never lubricate valves, regulators, etc., with any combustible substance.

Be sure to read and understand all labels and other instructions supplied with all containers of this product.

MIXTURES: When you mix two or more gases or liquefied gases, you can create additional, unexpected hazards. Obtain and evaluate the safety information for each component before you produce the mixture. Consult an industrial hygienist or other trained person when you evaluate the end product. Remember, gases and liquids have properties that can cause serious injury or death.

HAZARD RATING SYSTEMS:**NFPA RATINGS:**

HEALTH = 1
 FLAMMABILITY = 0
 REACTIVITY = 0
 SPECIAL = None

HMIS RATINGS:

HEALTH = 0
 FLAMMABILITY = 0
 REACTIVITY = 0

STANDARD VALVE CONNECTIONS FOR U.S. AND CANADA:

THREADED: 0 - 3,000 psig CGA-500
PIN-INDEXED YOKE: 0 - 3,000 psig CGA-973 (medical use)
ULTRA-HIGH-INTEGRITY CONNECTION: Not applicable

Use the proper CGA connections. **DO NOT USE ADAPTERS.**

Ask your supplier about free Praxair safety literature as referred to in this MSDS and on the label for this product. Further information about this product can be found in the following pamphlets published by the Compressed Gas Association, Inc. (CGA), 1725 Jefferson Davis Highway, Arlington, VA 22202-4102, Telephone (703) 412-0900.

AV-1	<i>Safe Handling and Storage of Compressed Gases</i>
G-6	<i>Carbon Dioxide</i>
P-1	<i>Safe Handling of Compressed Gases in Containers</i>
P-9	<i>Inert Gases – Neon, Nitrogen, and Helium</i>
P-14	<i>Accident Prevention in Oxygen-Rich, Oxygen-Deficient Atmospheres</i>
SB-2	<i>Oxygen-Deficient Atmospheres</i>
V-1	<i>Compressed Gas Cylinder Valve Inlet and Outlet Connections</i>
V-7	<i>Standard Method of Determining Cylinder Valve Outlet Connections for Industrial Gas Mixtures</i>
V-7.1	<i>Standard Method of Determining Cylinder Valve Outlet Connections for Medical Gases</i>
—	<i>Handbook of Compressed Gases, Fourth Edition</i>

Praxair asks users of this product to study this MSDS and become aware of product hazards and safety information. To promote safe use of this product, a user should (1) notify employees, agents, and contractors of the information in this MSDS and of any other known product hazards and safety information, (2) furnish this information to each purchaser of the product, and (3) ask each purchaser to notify its employees and customers of the product hazards and safety information.

The opinions expressed herein are those of qualified experts within Praxair, Inc. We believe that the information contained herein is current as of the date of this Material Safety Data Sheet. Since the use of this information and the conditions of use of the product are not within the control of Praxair, Inc., it is the user's obligation to determine the conditions of safe use of the product.

Praxair MSDSs are furnished on sale or delivery by Praxair or the independent distributors and suppliers who package and sell our products. To obtain current Praxair MSDSs for these products, contact your Praxair sales representative or local distributor or supplier. If you have questions regarding Praxair MSDSs, would like the form number and date of the latest MSDS, or would like the names of the Praxair suppliers in your area, phone or write the Praxair Call Center (**Phone:** 1-800-PRAXAIR; **Address:** Praxair Call Center, Praxair, Inc., PO Box 44, Tonawanda, NY 14150-7891).

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