BOC GASES

MATERIAL SAFETY DATA SHEET

PRODUCT NAME: LASER GAS MIXTURE

1. Product and Company Identification

BOC Gases,
Division of,
The BOC Group, Inc.
575 Mountain Avenue
Murray Hill, NJ 07974

TELEPHONE NUMBER: (908)464-8100
24-HOUR EMERGENCY TELEPHONE NUMBER:
CHEMTREC (800)424-9300

BOC Gases,
Division of
BOC Canada Limited
5975 Falbourne St., Unit 2
Mississauga, Ontario L5R 3W6

TELEPHONE NUMBER: (905)501-1700
24-HOUR EMERGENCY TELEPHONE NUMBER:
(905)501-0802
EMERGENCY RESPONSE PLAN NO: 2-0101

PRODUCT NAME: LASER GAS MIXTURE
CHEMICAL NAME: CO (4.0%), CO_2 (5-10%), H_2 (0.4%), N_2 (0.0001-90.6%), He (0.0001-90.6%)
COMMON NAMES/SYNONYMS: None
TDG CLASSIFICATION: 2.2
WHMIS CLASSIFICATION: A, D2A, D2B

PREPARED BY: Loss Control (908)464-8100/(905)501-1700
PREPARATION DATE: 6/1/95
REVIEW DATES: 10/28/02

2. Composition, Information on Ingredients

EXPOSURE LIMITS[1]:

INGREDIENT	% VOLUME	PEL-OSHA[2]	TLV-ACGIH[3]	LD_{50} or LC_{50} Route/Species
Carbon Monoxide FORMULA: CO CAS: 630-08-0 RTECS #: FG3500000	4.0	50 ppm TWA	25 ppm TWA	LC_{50}: 3760 ppm Inhalation/rat (1 H, time adjusted)
Carbon Dioxide FORMULA: CO_2 CAS:124-38-9 RTECS #: FF6400000	5.0-10.0	5000 ppm TWA	5000 ppm TWA 30000 ppm STEL	Not Available
Hydrogen FORMULA: H_2 CAS: 1333-74-0 RTECS #: MW8900000	0.4	Simple Asphyxiant	Simple Asphyxiant	Not Available
Nitrogen FORMULA: N_2 CAS: 7727-37-9 RTECS #: QW9700000	0.0001-90.6	Simple Asphyxiant	Simple Asphyxiant	Not Available
Helium FORMULA: He CAS: 74440-59-7 RTECS #: MH6520000	0.0001-90.6	Simple Asphyxiant	Simple Asphyxiant	Not Available

[1] Refer to individual state or provincial regulations, as applicable, for limits which may be more stringent than those listed here.
[2] As stated in 29 CFR 1910, Subpart Z (revised July 1, 1993)
[3] As stated in the ACGIH 2002 Threshold Limit Values for Chemical Substances and Physical Agents.

OSHA Regulatory Status: This material is classified as hazardous under OSHA regulations.

3. Hazards Identification

EMERGENCY OVERVIEW

Odorless, colorless non-flammable gas. This product does not contain oxygen and may cause asphyxia if released in a confined area. Inhalation of carbon monoxide can reduce the ability of the blood to carry oxygen to the body. Effects depend on the level of exposure and may include headaches, dizziness, convulsions, loss of consciousness and death. Carbon dioxide acts as a weak narcotic at high concentrations (30,000 ppm). Inhalation of high concentrations of carbon dioxide can cause reduced hearing acuity, changes in respiration and increased blood pressure and pulse. Contents under pressure. Use and store below 125 °F.

ROUTE OF ENTRY:

Skin Contact	Skin Absorption	Eye Contact	Inhalation	Ingestion
No	No	No	Yes	No

HEALTH EFFECTS:

Exposure Limits	Irritant	Sensitization
Yes	No	No
Teratogen	Reproductive Hazard	Mutagen
Yes	Yes	Yes
Synergistic Effects None Reported		

Carcinogenicity: -- NTP: No IARC: No OSHA: No

EYE EFFECTS: None reported.

SKIN EFFECTS: None reported.

INGESTION EFFECTS: None reported.

INHALATION EFFECTS: This gas mixture is odorless and colorless. There may be no warning of overexposure until symptoms occur. Release in a confined area may cause asphyxiation. Inhaled carbon monoxide binds with blood hemoglobin to form carboxyhemoglobin, a substance that can not take part in normal oxygen transport. This greatly reduces the blood's ability to transport oxygen. Inhalation of carbon monoxide may also adversely affect fetal development.

Depending on concentration and duration of exposure carbon dioxide may cause increased respiration, headache, mild narcotic effects, increased blood pressure and pulse, and asphyxiation. Symptoms of overexposure to carbon dioxide become more apparent when atmospheric oxygen is decreased to 15-17%. Chronic harmful effects are not known from repeated inhalation of concentrations below the PEL/TLV.

Depending on levels and duration of exposure, symptoms may include headache, dizziness, heart palpitations, weakness, confusion, nausea, and even convulsions, eventual unconsciousness and death.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: None known. Individuals with anemia, lung disease, cerebrovascular disease, heart disease, smokers, and children are expected to be more susceptible to the effects of carbon monoxide.

POTENTIAL ENVIRONMENTAL EFFECTS: Ecotoxicity values were unavailable. Toxic effects are expected to be similar to those seen in humans and test animals.

4. First Aid Measures

EYES: None required.

SKIN: None required.

INGESTION: None required.

INHALATION: Conscious persons should be assisted to an uncontaminated area and be treated with supplemental oxygen. Quick removal from the contaminated area is most important. Unconscious persons should be moved to an uncontaminated area and be given artificial respiration and oxygen at the same time. The administering of the oxygen at an elevated pressure (up to 2 to 2.5 atmospheres) has shown to be beneficial as has treatment in a hyperbaric chamber. The physician should be informed that the patient has inhaled toxic quantities of carbon monoxide. PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF OVEREXPOSURE. RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS.

5. Fire Fighting Measures

Conditions of Flammability: Nonflammable		
Flash point: None	Method: Not Applicable	Autoignition: Temperature: None
LEL(%): None	UEL(%): None	
Hazardous combustion products: None		
Sensitivity to mechanical shock: None		
Sensitivity to static discharge: Not Available		

FIRE AND EXPLOSION HAZARDS:
Nonflammable. Cylinders may vent rapidly or rupture violently from pressure when involved in a fire situation.

EXTINGUISHING MEDIA:
None required. Use media appropriate for surrounding materials.

FIRE FIGHTING INSTRUCTIONS:
Continue to cool fire exposed containers until well after flames have been extinguished. Firefighters should wear respiratory protection (SCBA) and full turnout or Bunker gear.

6. Accidental Release Measures

Evacuate all personnel from affected area. Use appropriate protective equipment (See Section 8). Stop the flow of gas or remove cylinder to outdoor location if this can be done without risk. Ventilate enclosed areas. If leak is in user's equipment, be certain to purge piping with inert gas prior to attempting repairs. If leak is in container or container valve, contact the appropriate emergency telephone number listed in Section 1 or call your closest BOC location.

7. Handling and Storage

Protect cylinders from physical damage. Store in cool, dry, well-ventilated areas away from heavily trafficked areas and emergency exits. Do not allow the temperature where cylinders are stored to exceed 125°F (52°C). Cylinders should be stored upright and firmly secured to prevent falling or being knocked over.
Full and empty cylinders should be segregated. Use a "first in-first out" inventory system to prevent full cylinders being stored for excessive periods of time

Use only in well-ventilated areas. Valve protection caps must remain in place unless container is secured with valve outlet piped to use point. Do not drag, slide or roll cylinders. Use a suitable hand truck for cylinder movement. Use a pressure reducing regulator when connecting cylinder to lower pressure piping or systems. Do not heat cylinder by any means to increase the discharge rate of product from the cylinder. Use a check valve or trap in the discharge line to prevent hazardous back flow into the system. Do not insert any object (i.e.: screwdriver) into valve cap openings as this can damage the valve causing leakage.

Never carry a compressed gas cylinder or a container of a gas in cryogenic liquid form in an enclosed space such as a car trunk, van or station wagon. A leak can result in a fire, explosion, asphyxiation or a toxic exposure.

For additional recommendations, consult Compressed Gas Association Pamphlet P-1.

8. Exposure Controls, Personal Protection

ENGINEERING CONTROLS: Use local exhaust in combination with general ventilation as necessary to control air contaminants to at or below acceptable exposure guidelines.

EYE/FACE PROTECTION: Safety goggles or glasses as appropriate for the job.

SKIN PROTECTION: Protective gloves of material appropriate for the job.

RESPIRATORY PROTECTION: For emergency release use a positive pressure NIOSH approved air-supplying respirator systems (SCBA or airline/escape bottle) using at a minimum Grade D air.

OTHER/GENERAL PROTECTION: Safety shoes.

9. Physical and Chemical Properties

PARAMETER	VALUE	UNITS
Physical state (gas, liquid, solid)	: Gas	
Vapor pressure	: Not Available	
Vapor density (Air = 1)	: Not Available	
Evaporation point	: Not Available	
Boiling point	: Not Available	
	: Not Available	
Freezing point	: Not Available	
	: Not Available	
PH	: Not Available	
Specific gravity	: Not Available	
Oil/water partition coefficient	: Not Available	
Solubility (H_20)	: Very slight	
Odor threshold	: Not Applicable	
Odor and appearance	: Odorless; colorless gas	

10. Stability and Reactivity

STABILITY: Stable

INCOMPATIBLE MATERIALS: None known

HAZARDOUS DECOMPOSITION PRODUCTS: Carbon dioxide

HAZARDOUS POLYMERIZATION: Will not occur.

11. Toxicological Information

INHALATION: The 4 hour LC_{50} for carbon monoxide is 1807 ppm (rat). The ACGIH TLV of 5,000 ppm for carbon dioxide is expected to provide a good margin of safety from asphyxiation and undue metabolic stress provided sufficient oxygen levels are maintained in the air.

SKIN AND EYE: Does not cause skin or eye irritation.

OTHER: Mice exposed to concentrations of carbon monoxide at 65 ppm and higher demonstrated dose-dependent effects on the fetus (i.e.: increased mortality and decreased weight) with no signs of maternal toxicity. Offspring of rats exposed at 150 ppm carbon monoxide had minor reductions in birth weight and persistent memory deficits which became more pronounced in adulthood. Fetal carboxyhemoglobin levels are generally 10-15% higher than maternal levels. Overexposure to carbon monoxide may also decrease the likelihood of successful pregnancy. In rats treated with carbon monoxide, the rate of successful pregnancy in the control group was 100% whereas the rate of successful pregnancy in animals treated with 30 and 90 ppm CO was 69% and 38% respectively.

Genetic changes observed in mammalian cell assay systems at exposures of 1500 to 2500 ppm for 10 minutes.

Increased physical activity, duration of exposure, and decreased oxygen content can affect systemic and respiratory effects resulting from exposure to carbon dioxide.

12. Ecological Information

Product does not contain Class I or Class II ozone depleting substances. Carbon monoxide emissions in general suppress OH and increase O_3 in most regions.

13. Disposal Considerations

Do not attempt to dispose of residual waste or unused quantities. Return in the shipping container PROPERLY LABELED, WITH ANY VALVE OUTLET PLUGS OR CAPS SECURED AND VALVE PROTECTION CAP IN PLACE to BOC Gases or authorized distributor for proper disposal.

14. Transport Information

PARAMETER	United States DOT	Canada TDG
PROPER SHIPPING NAME:	Compressed gas, n.o.s. (Carbon Monoxide, Carbon Dioxide, Hydrogen)	Compressed gas, n.o.s.
HAZARD CLASS:	2.2	2.2
IDENTIFICATION NUMBER:	UN 1956	UN 1956
SHIPPING LABEL:	NONFLAMMABLE GAS	NONFLAMMABLE GAS

15. Regulatory Information

SARA TITLE III NOTIFICATIONS AND INFORMATION
SARA TITLE III - HAZARD CLASSES:
Acute Health Hazard
Sudden Release of Pressure Hazard

SARA TITLE III - SECTION 313 SUPPLIER NOTIFICATION:
This product does not contain toxic chemicals subject to reporting requirements of section 313 of the Emergency Planning and Community Right-To-Know Act (EPCRA) of 1986 and of 40 CFR 372.

U.S. TSCA/Canadian DSL: All ingredients are listed on the U.S. Toxic Substances Control Act (TSCA) inventory or exempt from listing and on the Canadian Domestic Substance List (DSL).

California Proposition 65: This product contains an ingredient (carbon monoxide) known to the State of California to cause birth defects or other reproductive harm.

16. Other Information

NFPA HAZARD CODES	HMIS HAZARD CODES	RATINGS SYSTEM
Health: 0	Health: 0	0 = No Hazard
Flammability: 0	Flammability: 0	1 = Slight Hazard
Instability: 0	Reactivity: 0	2 = Moderate Hazard
		3 = Serious Hazard
		4 = Severe Hazard

Note: The Reactivity Hazard Rating is based on the 2nd Edition of the National Paint and Coatings Association's (NPCA's) Hazardous Materials Identification System (HMIS®). Hazard ratings were based on the best available information at the time of the review. Ratings will be re-assigned in accordance with Compressed Gas Association (CGA) guidelines as published in the future edition of CGA Pamphlet P-19.

ACGIH	American Conference of Governmental Industrial Hygienists
DOT	Department of Transportation
IARC	International Agency for Research on Cancer
NTP	National Toxicology Program
OSHA	Occupational Safety and Health Administration
PEL	Permissible Exposure Limit
SARA	Superfund Amendments and Reauthorization Act
STEL	Short Term Exposure Limit
TDG	Transportation of Dangerous Goods
TLV	Threshold Limit Value
WHMIS	Workplace Hazardous Materials Information System

Compressed gas cylinders shall not be refilled without the express written permission of the owner. Shipment of a compressed gas cylinder which has not been filled by the owner or with his/her (written) consent is a violation of transportation regulations.

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