

PRODUCT NAME: OZONE

1. Chemical Product and Company Identification

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

BOC Gases
Division of
BOC Canada Limited
5975 Falbourn Street, Unit 2
Mississauga, Ontario L5R 3W6

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

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

PRODUCT NAME: Ozone
CHEMICAL NAME: Ozone
COMMON NAMES/SYNONYMS: Triatomic oxygen
TDG (Canada) CLASSIFICATION: 2.3 (5.1)
WHMIS CLASSIFICATION: D1A, C, D2B

PREPARED BY: Loss Control (908)464-8100/(905)501-1700
PREPARATION DATE: 2/14/97
REVIEW DATES: 3/3/00

2. Composition, Information on Ingredients

EXPOSURE LIMITS¹:

INGREDIENT	% VOLUME	PEL-OSHA ¹	TLV-ACGIH ²	LD ₅₀ or LC ₅₀ Route/Species
Ozone FORMULA: O ₃ CAS: 10028-15-6 RTECS #: RS8225000	100	0.1 ppm	0.05 ppm (heavy work) 0.08 ppm (moderate work) 0.10 ppm (light work) 0.20 ppm (heavy, moderate, or light work ≤ 2 hours)	LC50: 9 ppm (1 H; ISO – CGA P-20, 1995)

¹ As stated in 29 CFR 1910, Subpart Z (revised July 1, 1993)

² Refer to individual state of provincial regulations, as applicable, for limits which may be more stringent than those listed here.

³ As stated in the ACGIH 1999-00 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

POISON GAS. OXIDIZER. Colorless to blue gas with characteristic pungent odor which is lethal at relatively low concentrations and at short exposure periods. The primary toxic effect is lung injury characterized by pulmonary congestion, edema, and hemorrhage. Can cause eye, nose, throat, and respiratory irritation. Long-term exposure may result in chronic respiratory disease. Incompatible with all oxidizable materials. Will accelerate combustion and increase the risk of fire and explosion in combustible, flammable materials or other oxidizable materials. Contents under pressure. Use and store below 125 °F.

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ROUTE OF ENTRY:

Skin Contact Yes	Skin Absorption No	Eye Contact Yes	Inhalation Yes	Ingestion No
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HEALTH EFFECTS:

Exposure Limits Yes	Irritant Yes	Sensitization No
Teratogen No	Reproductive Hazard No	Mutagen No
Synergistic Effects: Co-exposure with particulates results in enhanced toxic effects.		

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

EYE EFFECTS:

May cause irritation and conjunctivitis.

SKIN EFFECTS:

May cause skin irritation.

INGESTION EFFECTS:

Product is a gas, ingestion is not anticipated.

INHALATION EFFECTS:

Poison gas. Inhalation of low concentrations may cause lung damage and death. Lung damage caused by ozone is characterized by pulmonary congestion, edema and hemorrhage. Symptoms following acute exposure include headache, fatigue, decreased pulse rate and blood pressure, cough, respiratory stimulation, and irritation of the eyes, nose, throat, and chest. Primary symptoms of acute exposure are eye, nose, throat, and chest irritation and tiredness. Exposures of short duration may cause dryness of the throat and mucous membranes.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Exposure to ozone has aggravated or accelerated pre-existing respiratory disease. Pulmonary inflammation from exposure may increase susceptibility to pulmonary infection. Irritant properties may aggravate pre-existing eye conditions.

NFPA HAZARD CODES

Health: 4
Flammability: 0
Instability: 3

HMS HAZARD CODES

Health: 4
Flammability: 0
Reactivity: 3

RATINGS SYSTEM

0 = No Hazard
1 = Slight Hazard
2 = Moderate Hazard
3 = Serious Hazard
4 = Severe Hazard

OXIDIZER

4. First Aid Measures

EYES:

Flush eyes with large amounts of warm water for 15 minutes. If irritation, pain, swelling, lacrimation or photophobia persist, seek medical attention.

SKIN:

Flush skin thoroughly with lukewarm water. If irritation persists, seek medical attention.

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INGESTION:

Unlikely as product is a gas.

INHALATION:

IMMEDIATELY REMOVE TO UNCONTAMINATED AREA. Quick removal from the contaminated area is most important. Monitor for respiratory distress and administer oxygen or artificial respiration as indicated. IMMEDIATE MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF OVEREXPOSURE TO OZONE. RESCUE PERSONNEL SHOULD BE EQUIPPED WITH A FULL-FACEPIECE SELF-CONTAINED BREATHING APPARATUS OPERATED IN POSITIVE PRESSURE MODE.

Note to physicians: Ozone is not found in the blood or serum due to rapid reaction with cellular tissues. One of the most sensitive measures of ozone exposure is induction of the glutathione peroxidase system.

5. Fire Fighting Measures

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

FIRE AND EXPLOSION HAZARDS:

OXIDIZER. May accelerate pre-existing fire. May initiate fire/explosion in combustible materials. May react explosively with alkenes, aromatic compounds, bromine, combustible gases, diethyl ether, hydrogen bromide, hydrogen iodide, isopropylidene compounds, and other oxidizable materials. Cylinder may rupture violently from pressure when involved in a fire situation.

EXTINGUISHING MEDIA:

Any, use media appropriate for surrounding fire.

FIRE FIGHTING INSTRUCTIONS:

If it can be done without risk, stop the flow of gas which is supporting the fire. Continue to cool fire exposed containers until well after flames have been extinguished. Firefighters should wear a NIOSH/MSHA approved full-facepiece self-contained breathing apparatus (SCBA) operated in positive pressure mode and full turnout gear.

6. Accidental Release Measures

Evacuate all personnel from affected area. A leak near flammable, combustible, or other oxidizable materials may cause a fire or an explosion. Eliminate all ignition sources. Appropriate protective equipment is essential to prevent a toxic exposure. Clean-up personnel should be aware of the health and fire hazards associated with an ozone leak. If leak is in cylinder, remove to outside if it can be done without risk. REMOVE ALL OXIDIZABLE MATERIALS FROM CONTAMINATED AREA. 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 nearest BOC location.

7. Handling and Storage

Electrical Classification:

No Data

Protect cylinders from physical damage. Store in cool, dry, well-ventilated area of non-combustible construction 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. Post "OXIDIZER - NO SMOKING OR OPEN FLAMES" signs in the storage or use area. Open storage preferred. Isolate from combustible and oxidizable materials. There should be no sources of ignition in the storage or use area. For additional storage recommendations, consult Compressed Gas Association's Pamphlet P-1.

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 cylinder.

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. Do not use or store near flammable, combustible, or other oxidizable materials.

8. Exposure Controls, Personal Protection

ENGINEERING CONTROLS:

Use local exhaust in combination with enclosed processes as necessary to control air contaminants at or below acceptable exposure guidelines.

EYE/FACE PROTECTION:

Gas tight goggles, as necessary to prevent irritation.

SKIN PROTECTION:

Protective gloves as required for the job.

RESPIRATORY PROTECTION:

A supplied air respirator with full face piece equipped with an escape bottle or a self-contained breathing apparatus should be available for emergency use. Operate this equipment in the positive pressure demand mode.

OTHER/GENERAL PROTECTION:

Safety shoes are recommended.

9. Physical and Chemical Properties

PARAMETER	VALUE	UNITS
Physical state (gas, liquid, solid)	: Gas	
Vapor pressure at 100 °F	: > 1 atm	
Vapor density (Air = 1)	: 2.144 g/l @ 0 °C	(gas)
Evaporation point	: Not Applicable	
Boiling point	: -169	°F
Freezing point	: -315	°F
pH	: Not Available	
Specific gravity @ 70 °F	: Not Available	
Oil/water partition coefficient	: Not Available	
Solubility (H ₂ O)	: 0.001% (@ 32 °F)	
Odor threshold	: Not Available	
Odor and appearance	: Colorless to blue gas with very pungent odor	

10. Stability and Reactivity

STABILITY:

Stable. Ozone is a strong oxidizer. Oxidation evolves more heat and generally starts at a lower temperature than oxidation with biatomic oxygen.

INCOMPATIBLE MATERIALS:

ALL COMBUSTIBLE, FLAMMABLE AND OTHER OXIDIZABLE MATERIALS. Both organic and inorganic.

HAZARDOUS DECOMPOSITION PRODUCTS:

None known.

HAZARDOUS POLYMERIZATION:

Will not occur.

11. Toxicological Information

INHALATION:

Patchy damage of the ciliated cells of the upper airway have been seen in various experimental animals following exposure to 0.2 to 0.5 ppm ozone for 7 days (8 to 24 H/day). The four hour inhalation LC₅₀ for ozone is 4800 ppb (4.8 ppm; albino rat). Human inhalation of 80 ppb/6.6 H ozone resulted in cough, respiratory depression and other changes. NIOSH considers a 5 ppm concentration of ozone "Immediately Dangerous to Life and Health (IDLH)".

CHRONIC: Immunosuppression has been reported in mice and guinea pigs (but not in humans) exposed to low levels of ozone. Chronic exposure to ozone has resulted in bronchiolitis and bronchitis in animals exposed daily to concentrations slightly greater than 1 ppm for 6 hours per day for 1 year.

OTHER: While ozone has had experimental teratogenic, genotoxic, oncogenic, and mutagenic effects, the extreme reactivity, gaseous nature, and toxicity of ozone present confounding influences in many of these tests. Ozone concentrations must be carefully regulated to allow detection of mutagenicity in the absence of extreme toxicity and ozone concentrations tend to fluctuate or drop (as ozone is highly labile) over the period of a few hours to produce ineffective exposures. Due to confounding factors, studies are still inconclusive.

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12. Ecological Information

FATE: Formed from reaction between atomic oxygen and molecular oxygen, ozone is the principal oxidizing agent of photochemical smog.

13. Disposal Considerations

Recycle, reclaim and dispose of in accordance with applicable local, state, and federal regulations. Dispose per 40 CFR Part 261 and 262.

14. Transport Information

PARAMETER	United States DOT	Canada TDG*
PROPER SHIPPING NAME:	Compressed gases, toxic, oxidizing, n.o.s. (Ozone)	Compressed gas, toxic, oxidizing, n.o.s. (Ozone)
HAZARD CLASS:	2.3 (5.1)	2.3 (5.1)
IDENTIFICATION NUMBER:	UN 3303	UN 3303
SHIPPING LABEL:	POISON GAS, OXIDIZER	TOXIC GAS, OXIDIZER

Additional Marking Requirement: "Inhalation Hazard"

Additional Shipping Paper Description Requirement: "Poison-Inhalation Hazard, Zone A"

*Described in accordance with the UN *Recommendations on the Transport of Dangerous Goods, Model Regulations*, 10th revised edition, 1997.

15. Regulatory Information

SARA HAZARD CLASSES:

Sudden Release of Pressure Hazard

Fire Hazard

Acute Health Hazard

Chronic Health Hazard

SARA TITLE III - SECTION 302, EHS:

Ozone is listed as an Extremely Hazardous Substance (EHS) under Section 302 of SARA Title III with a Threshold Planning Quantity (TPQ) of 100 pounds. The presence of ozone in quantities in excess of the TPQ requires certain emergency planning activities to be conducted.

SARA TITLE III - SECTION 304, EHS:

Releases of ozone in quantities equal to or greater than the EHS Reportable Quantity (RQ) of 1 pound are subject to reporting to the National Response Center under Section 304.

SARA TITLE III - SECTION 313 SUPPLIER NOTIFICATION:

Ozone is a toxic chemical subject to the reporting requirements of Section 313 of the Emergency Planning and Community Right-To-Know Act (EPCRA) of 1986 and of 40 CFR 372. This information must be included on all MSDSs that are copied and distributed for this material.

16. Other Information

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.

DISCLAIMER OF EXPRESSED AND IMPLIED WARRANTIES:

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