1. Chemical 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 Street, Unit 2  
Mississauga, Ontario L5R 3W6  

TELEPHONE NUMBER: (905) 501-1700  
24-HOUR EMERGENCY TELEPHONE NUMBER: (905) 501-0802  
EMERGENCY RESPONSE PLAN NO: 20101

PRODUCT NAME: CARBONYL SULFIDE  
CHEMICAL NAME: Carbonyl Sulfide  
COMMON NAMES/SYNONYMS: Carbon Oxysulfide, Carbon Oxide Sulfide  
TDG (Canada) CLASSIFICATION: 2.3 (2.1)  
WHMIS CLASSIFICATION: A, B1, D1A, D2A, D2B  

PREPARED BY: Loss Control (908)464-8100/(905)501-1700  
PREPARATION DATE: 6/1/95  
REVIEW DATES: 6/7/96

2. Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>INGREDIENT</th>
<th>% VOLUME</th>
<th>PEL-OSHA¹</th>
<th>TLV-ACGIH²</th>
<th>LD₅₀ or LC₅₀ Route/Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbonyl Sulfide</td>
<td>100.0</td>
<td>Not Available</td>
<td>Not Available</td>
<td>LD₅₀ 23 mg/kg (rat)</td>
</tr>
<tr>
<td>FORMULA: COS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAS: 463-58-1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RTECS #: FG64000000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

¹ As stated in 29 CFR 1910, Subpart Z (revised July 1, 1993)  
² As stated in the ACGIH 1994-95 Threshold Limit Values for Chemical Substances and Physical Agents

3. Hazards Identification

**EMERGENCY OVERVIEW**  
Irritating to the eyes, mucous membranes and respiratory system. Narcotic at high concentrations. May decompose into hydrogen sulfide within body tissues resulting in inhibition of cellular respiration, possible pulmonary paralysis, sudden collapse and death. Highly flammable.

**ROUTE OF ENTRY:**

<table>
<thead>
<tr>
<th>Skin Contact</th>
<th>Skin Absorption</th>
<th>Eye Contact</th>
<th>Inhalation</th>
<th>Ingestion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>
HEALTH EFFECTS:

<table>
<thead>
<tr>
<th>Exposure Limits</th>
<th>Irritant</th>
<th>Sensitization</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Teratogen</td>
<td>Reproductive Hazard</td>
<td>No</td>
</tr>
<tr>
<td>No</td>
<td>Mutagen</td>
<td>No</td>
</tr>
</tbody>
</table>

Synergistic Effects
None Reported

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

EYE EFFECTS:
Low concentrations will generally cause irritation to the conjunctiva. Repeated exposure to low concentrations is reported to cause conjunctivitis, photo phobia, corneal bullae, tearing, pain and blurred vision.

SKIN EFFECTS:
May irritate the skin upon contact.

INGESTION EFFECTS:
Ingestion is unlikely.

INHALATION EFFECTS:
Irritating and a narcotic at high concentrations. May decompose into hydrogen sulfide within body tissues. Hydrogen sulfide reacts with enzymes in the bloodstream and inhibits cellular respiration resulting in pulmonary paralysis, sudden collapse and death. Continuous exposure to low (15-50 ppm) concentrations will generally cause irritation to mucous membranes, and may also cause headache, dizziness or nausea. Higher concentrations (200-300 ppm) may result in respiratory arrest leading to coma or unconsciousness. Exposures for more than 30 minutes at concentrations greater than 700 ppm have been fatal.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE:
Blood disorders.

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

Ratings:
3 = Serious Hazard
4 = Severe Hazard

4. First Aid Measures

EYES:
PERSONS WITH POTENTIAL EXPOSURE TO CARBONYL SULFIDE SHOULD NOT WEAR CONTACT LENSES. Flush contaminated eyes with large amounts of water for at least 15 minutes. Part eyelids with fingers to ensure complete flushing. If irritation persists, seek medical attention immediately.

SKIN:
Flush affected area with water. If irritation persists, consult a physician.

INGESTION:
Treat in a manner similar to inhalation exposure. Seek medical attention as soon as possible.

INHALATION:
PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF OVEREXPOSURE. RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS AND SHOULD RECOGNIZE THE HAZARDS OF OVEREXPOSURE DUE TO OLFATORY FATIGUE. An extreme fire hazard exists when rescuing semiconscious or unconscious persons due to the flammability hazard. Avoid use of rescue equipment which may contain ignition sources or cause static discharge. Victims should be assisted to an uncontaminated area and inhale fresh air. Quick removal from the contaminated area is most important. If breathing has stopped administer artificial resuscitation and supplemental oxygen or a mixture of 5% carbon dioxide in oxygen. Keep victim calm and warm. Further treatment should be symptomatic and supportive. Seek medical assistance immediately.

5. Fire Fighting Measures

<table>
<thead>
<tr>
<th>Conditions of Flammability: Flammable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flash point: Not Available</td>
</tr>
<tr>
<td>Method: Not Applicable</td>
</tr>
<tr>
<td>Autoignition Temperature: Not Available</td>
</tr>
<tr>
<td>LEL(%): 12</td>
</tr>
<tr>
<td>UEL(%): 29</td>
</tr>
<tr>
<td>Hazardous combustion products: Sulfur Compounds</td>
</tr>
<tr>
<td>Sensitivity to mechanical shock: None</td>
</tr>
<tr>
<td>Sensitivity to static discharge: None</td>
</tr>
</tbody>
</table>

FIRE AND EXPLOSION HAZARDS:
Carbonyl sulfide is heavier than air and may accumulate in low areas and may travel a considerable distance to a source of ignition. Should flame be extinguished and flow of gas continue, increase ventilation to prevent flammable mixture formation in low areas or pockets. Product may explode or burn over a wide range of mixtures in air.

EXTINGUISHING MEDIA:
Water, carbon dioxide, dry chemicals.

FIRE FIGHTING INSTRUCTIONS:
If possible, stop the flow of carbonyl sulfide. Use water spray to cool surrounding containers. Fire fighters should use self-contained breathing apparatus.

6. Accidental Release Measures

Evacuate all personnel from affected area. Use appropriate protective equipment. 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

Electrical Classification:
Class I, Group D. Earth-ground and bond all lines and equipment associated with the Carbonyl Sulfide system. All electrical equipment should be non-sparking or explosion proof.

Anhydrous carbonyl sulfide can be handled at normal temperatures with most metals. Moist carbonyl sulfide should be handled in aluminum alloys 25 and 35, 316 stainless steel or 18-8 chromium-nickel steels. Teflon®, Kel-F®, Viton® or Nylon® are preferred gasket materials. 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 (<400 psig) 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.

Protect cylinders from physical damage. Store in cool, dry, well-ventilated area away from heavily trafficked areas and emergency exits. Do not allow the temperature where cylinders are stored to exceed 130°F (54°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 "NO SMOKING OR OPEN FLAMES" signs in the storage area or use area. There should be no sources of ignition in the storage or use area.

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

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.

8. Exposure Controls, Personal Protection

<table>
<thead>
<tr>
<th>INGREDIENT</th>
<th>% VOLUME</th>
<th>PEL-OSHA²</th>
<th>TLV-ACGIH³</th>
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<tbody>
<tr>
<td>Carbonyl Sulfide</td>
<td>100.0</td>
<td>Not Available</td>
<td>Not Available</td>
<td>LD₅₀ 23 mg/kg (rat)</td>
</tr>
</tbody>
</table>

1 Refer to individual state of 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 1994-1995 Threshold Limit Values for Chemical Substances and Physical Agents.

BOC recommends a 10 ppm 8-hr TWA limit and a 15 ppm 15-minute STEL limit based on the ACGIH TLV and STEL limits for Hydrogen Sulfide.

ENGINEERING CONTROLS:
Hood with forced ventilation. Use local exhaust to prevent accumulation above exposure limit.

EYE/FACE PROTECTION:
Gas tight chemical goggles or full-face piece respirator.

SKIN PROTECTION:
Protective gloves: Neoprene, butyl rubber, PVC, polyethylene.

RESPIRATORY PROTECTION:
Positive pressure air line with full-face mask and escape bottle or self-contained breathing apparatus should be available for emergency use.

OTHER/GENERAL PROTECTION:
Safety shoes, safety shower, eyewash "fountain".
9. Physical and Chemical Properties

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>VALUE</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical state (gas, liquid, solid)</td>
<td>Gas</td>
<td></td>
</tr>
<tr>
<td>Vapor pressure at 70 °F</td>
<td>168</td>
<td>psia</td>
</tr>
<tr>
<td>Vapor density at STP (Air = 1)</td>
<td>2.03</td>
<td></td>
</tr>
<tr>
<td>Evaporation point</td>
<td>Not Available</td>
<td></td>
</tr>
<tr>
<td>Boiling point</td>
<td>-58.4</td>
<td>°F</td>
</tr>
<tr>
<td></td>
<td>-50.2</td>
<td>°C</td>
</tr>
<tr>
<td>Freezing point</td>
<td>-216.8</td>
<td>°F</td>
</tr>
<tr>
<td></td>
<td>-138.2</td>
<td>°C</td>
</tr>
<tr>
<td>pH</td>
<td>Not Available</td>
<td></td>
</tr>
<tr>
<td>Specific gravity</td>
<td>Not Available</td>
<td></td>
</tr>
<tr>
<td>Oil/water partition coefficient</td>
<td>Not Available</td>
<td></td>
</tr>
<tr>
<td>Solubility (H2O)</td>
<td>Slightly soluble</td>
<td></td>
</tr>
<tr>
<td>Odor threshold</td>
<td>Not Available</td>
<td></td>
</tr>
<tr>
<td>Odor and appearance</td>
<td>Colorless gas with rotten egg odor.</td>
<td></td>
</tr>
</tbody>
</table>

10. Stability and Reactivity

STABILITY:
Stable

INCOMPATIBLE MATERIALS:
Reacts with oxidizers and forms explosive mixtures with oxygen. Hydrolyzes slowly in water, forming hydrogen sulfide and carbon dioxide.

HAZARDOUS DECOMPOSITION PRODUCTS:
Oxides of sulfur.

HAZARDOUS POLYMERIZATION:
Will not occur.

11. Toxicological Information

No chronic effects data given in the Registry of Toxic Effects of Chemical Substances (RTECS) or Sax, Dangerous Properties of Industrial Materials, 7th ed.

12. Ecological Information

No data given.

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

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>United States DOT</th>
<th>Canada TDG</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROPER SHIPPING NAME:</td>
<td>Carbonyl Sulfide</td>
<td>Carbonyl Sulfide</td>
</tr>
<tr>
<td>HAZARD CLASS:</td>
<td>2.3</td>
<td>2.3 (2.1)</td>
</tr>
<tr>
<td>IDENTIFICATION NUMBER:</td>
<td>UN 2204</td>
<td>UN 2204</td>
</tr>
<tr>
<td>SHIPPING LABEL:</td>
<td>POISON GAS, FLAMMABLE GAS</td>
<td>POISON GAS, FLAMMABLE GAS</td>
</tr>
</tbody>
</table>

Additional Marking Requirement: “Inhalation Hazard”
Additional Shipping Paper Description Requirement: “Poison Inhalation-Hazard, Zone B”

15. Regulatory Information

Carbonyl sulfide is listed under the accident prevention provisions of section 112(r) of the Clean Air Act (CAA) with a threshold quantity (TQ) of 10,000 pounds.

SARA TITLE III - NOTIFICATIONS AND INFORMATION
Releases of carbonyl sulfide in quantities equal to or greater than the reportable quantity (RQ) of 100 pounds are subject to reporting to the National Response Center under CERCLA, Section 304 SARA Title III.

SARA TITLE III - HAZARD CLASSES:
Acute Health Hazard
Fire Hazard
Sudden Release of Pressure Hazard

SARA TITLE III - SECTION 313 SUPPLIER NOTIFICATION:
This product contains the following toxic chemicals 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:

<table>
<thead>
<tr>
<th>CAS NUMBER</th>
<th>INGREDIENT NAME</th>
<th>PERCENT BY VOLUME</th>
</tr>
</thead>
<tbody>
<tr>
<td>463-58-1</td>
<td>CARBONYL SULFIDE</td>
<td>100.0</td>
</tr>
</tbody>
</table>

This information must be included on all MSDSs that are copied and distributed for this material.

16. Other Information

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:
Although reasonable care has been taken in the preparation of this document, we extend no warranties and make no representations as to the accuracy or completeness of the information contained herein, and assume no responsibility regarding the suitability of this information for the user's intended purposes or for the consequences of its use. Each individual should make a determination as to the suitability of the information for their particular purpose(s).