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MATERIAL
SAFETY
DATA SHEET

No. 114

PRODUCT NAME Carbonyl Sulfide	CAS # 463-58-1
TRADE NAME AND SYNONYMS Carbonyl sulfide (D.O.T.)	DOT I.D. No.: UN 2204; RQ 100 (45.4)
CHEMICAL NAME AND SYNONYMS Carbonyl Sulfide	DOT Hazard Class: Division 2.3
ISSUE DATES AND REVISIONS Revised April 1998	Formula CO₂S
	Chemical Family: Nonmetal Carbonyl

HEALTH HAZARD DATA

TIME WEIGHTED AVERAGE EXPOSURE LIMIT TWA = None listed. Suggest using hydrogen sulfide which is a hydrolysis product of COS. H ₂ S TWA = 10 Molar PPM; STEL = 15 Molar PPM (ACGIH 1-997). OSHA 1995 H ₂ S ceiling concentration = 20 Molar PPM. (Continued on Page 4)
SYMPTOMS OF EXPOSURE Inhalation: Although the technical literature does not report any cases of carbonyl sulfide poisoning in industry, symptoms should be similar to that of toxic poisoning by hydrogen sulfide. They include headache, dizziness, and nausea for low concentrations. Higher concentrations cause respiratory arrest, coma, unconsciousness and death. Pure carbonyl sulfide has only a faint odor warning quality. It irritates the eyes and mucosal tissues causing redness, swelling and pain.
TOXICOLOGICAL PROPERTIES It is believed that it partially decomposes in the lungs and in the blood liberating hydrogen sulfide which is the poisoning agent reacting with the enzymes in the blood stream thus inhibiting cell respiration resulting in pulmonary paralysis, sudden collapse, and death. Tests have been run on animals as follows: Inhalation: Rabbits: @ 1300 molar ppm for 30 minutes - some harmful effects detected @ 9200 molar ppm for 1 hour- convulsions followed by death (Continued on Page 4)
RECOMMENDED FIRST AID TREATMENT PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF OVEREXPOSURE TO CARBONYL SULFIDE. RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS AND BE COGNIZANT OF EXTREME FIRE AND EXPLOSION HAZARD. <u>Inhalation:</u> Move affected person to an uncontaminated area. If breathing has stopped, give assisted respiration. Oxygen or a mixture of 5% carbon dioxide in oxygen should be administered by a qualified person. Keep victim warm and calm. Seek immediate medical assistance. Continued treatment should be symptomatic and supportive. <u>Eye Contact:</u> PERSONS WITH POTENTIAL EXPOSURE TO CARBONYL SULFIDE SHOULD NOT WEAR CONTACT LENSES. (Continued on Page 4)

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Since the Company shall have no control of the use of the product described herein, the Company assumes no liability for loss or damage incurred from the proper or improper use of such product.

Carbonyl Sulfide

HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES

Reacts with oxidizers. Forms explosive mixtures with oxygen. Hydrolyzes slowly in water forming hydrogen sulfide and carbon dioxide. Is flammable over a wide range in air.

PHYSICAL DATA

BOILING POINT -58.4°F (-50.2°C)	LIQUID DENSITY AT BOILING POINT 73.0 lb/ft ³ (1169.3 kg/m ³)
VAPOR PRESSURE @ 70°F (21.1°C) = 168 psia (1158.3 kPa)	GAS DENSITY AT 70°F, 1 atm .152 lb/ft ³ (2.43 kg/m ³)
SOLUBILITY IN WATER Slightly soluble	FREEZING POINT -216.8°F (-138.2°C)
EVAPORATION RATE N/A (Gas)	SPECIFIC GRAVITY (AIR=1) @ 70°F (21.1°C) =2.03
APPEARANCE AND ODOR Colorless gas with an odor of rotten eggs	

FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method used) N/A (Gas)	AUTO IGNITION TEMPERATURE Unknown	FLAMMABLE LIMITS % BY VOLUME (See Page 4) LEL 12 UEL 29
EXTINGUISHING MEDIA Water, carbon dioxide, dry chemical	ELECTRICAL CLASSIFICATION Class 1, Group D	
SPECIAL FIRE FIGHTING PROCEDURES If possible, stop the flow of carbonyl sulfide. Use water spray to cool surrounding containers.		
UNUSUAL FIRE AND EXPLOSION HAZARDS Carbonyl sulfide is heavier than air and may travel a considerable distance to a source of ignition. Should flame be extinguished and flow of gas continue, increase ventilatio to prevent flammable mixture formation in low areas or pockets.		

REACTIVITY DATA

STABILITY Unstable		CONDITIONS TO AVOID None
Stable	X	
INCOMPATIBILITY (Materials to avoid)	Oxidizers	
HAZARDOUS DECOMPOSITION PRODUCTS	Combustion products are sulfur dioxide and carbon dioxide	
HAZARDOUS POLYMERIZATION May Occur		CONDITIONS TO AVOID None
Will Not Occur	X	

SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED Evacuate all personnel from affected area. Use appropriate protective equipment. If leak is in user's equipment, be certain to purge piping with an inert gas prior to attempting repairs. If leak is in container or container valve, contact your closest supplier location or call the emergency telephone number listed herein.
WASTE DISPOSAL METHOD Do not attempt to dispose of 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 your supplier. For emergency disposal assistance, contact your closest supplier location or call the emergency telephone number listed herein.

SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (Specify type)		Positive pressure air line with mask or self-contained breathing apparatus should be available for emergency use.	
VENTILATION Hood with forced ventilation	LOCAL EXHAUST To prevent accumulation above the TWA for H ₂ S.	SPECIAL	N/A
	MECHANICAL (Gen.) In accordance with electrical codes.	OTHER	N/A
PROTECTIVE GLOVES Plastic or rubber			
EYE PROTECTION Safety goggles or glasses			
OTHER PROTECTIVE EQUIPMENT Safety shoes, safety shower, eyewash "fountain"			

SPECIAL PRECAUTIONS*

SPECIAL LABELING INFORMATION	
DOT Shipping Name: Carbonyl sulfide	DOT Hazard Class: Division 2.3
DOT Shipping Labels: Toxic Gas, Flammable Gas	I.D. No.: UN 2204; RQ 100 (45.4)
SPECIAL HANDLING RECOMMENDATIONS	
<p>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 cylinder.</p> <p>For additional handling recommendations, consult Compressed Gas Association's Pamphlet P-1.</p>	
SPECIAL STORAGE RECOMMENDATIONS	
<p>Protect cylinders from physical damage. Store in cool, dry, well-ventilated area of noncombustible construction away from heavily trafficked areas and emergency exits. Do not allow the temperature where cylinders are stored to exceed 125F (52C). 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 or use area. There should be no sources of ignition in the storage or use area.</p> <p>For additional storage recommendations, consult Compressed Gas Association's Pamphlet P-1.</p>	
SPECIAL PACKAGING RECOMMENDATIONS	
<p>Anhydrous carbonyl sulfide may be used at normal temperatures with most metals. Water or moisture slowly decomposes carbonyl sulfide to hydrogen sulfide and carbon dioxide which causes corrosion problems. Moist COS should be handled in 316 stainless steel, 18-8 chromium-nickel steels or aluminum alloys 25 and 35. Teflon[®], Kel-F[®], Viton A[®] and Nylon[®] are the preferred gasketing materials.</p>	
OTHER RECOMMENDATIONS OR PRECAUTIONS	
<p>Earth-ground and bond all lines and equipment associated with the carbonyl sulfide system. Electrical equipment should be non-sparking or explosion proof. Compressed gas cylinders should not be refilled except by qualified producers of compressed gases. Shipment of a compressed gas cylinder which has not been filled by the owner or with his (written) consent is a violation of Federal Law (49CFR).</p>	

*Various Government Agencies (i.e. Department of Transportation, Occupational Safety and Health Administration, Food and Drug Administration and others) may have specific regulations concerning the transportation, handling, storage or use of this product which will not be reflected in this data sheet. The customer should review these regulations to ensure that he is in full compliance.

Carbonyl Sulfide

HEALTH HAZARD DATA

TIME WEIGHTED AVERAGE EXPOSURE LIMIT: (Continued) (acceptable max. peak = 50 Molar PPM for 10 mine.)

TOXICOLOGICAL PROPERTIES: (Continued)

Inhalation:

Mice: @	900 molar ppm for 16 minutes	-	no harmful effects
@	8900 molar ppm for 45 seconds	-	death
@	2900 molar ppm for 90 seconds	-	death
@	1200 molar ppm for 35 minutes	-	death

Carbonyl sulfide is not listed in the IARC, NTP or by OSHA as a carcinogen or potential carcinogen.

Persons in ill health where such illness would be aggravated by exposure to carbonyl sulfide should not be allowed to work with or handle this product.

RECOMMENDED FIRST AID TREATMENT: (Continued)

Flush contaminated eye(s) with copious quantities of water. Part eyelids with fingers to assure complete flushing. Continue for at least 15 minutes.

SPECIAL PRECAUTIONS

OTHER RECOMMENDATIONS OR PRECAUTIONS: (Continued)

Always secure cylinders in an upright position before transporting them. NEVER transport cylinders in trunks of vehicles, enclosed vans, truck cabs or in passenger compartments. Transport cylinders secured in open flatbed or in open pick-up type vehicles.

Carbonyl Sulfide is considered a toxic chemical and is subject to the reporting requirements of CARA, Title III, Section 313.

NFPA 704 No. for carbonyl sulfide = 3 4 0 None