AFROX
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MATERIAL SAFETY DATA SHEET (MSDS)
COSMIC
(Please ensure that this MSDS is received by the appropriate person)

DATE: April 2017 **Version 3** **Ref. No.: MS016**

1 PRODUCT AND COMPANY IDENTIFICATION

Product Name	COSMIC
Chemical Formula	COS
Synonym(s)	Carbonyl Sulphide, Carbonyl Sulfide, Carbon Oxysulphide, COS
Use(s)	FUMIGANT INDUSTRIAL APPLICATIONS
Company Identification	African Oxygen Limited 23 Webber Street Johannesburg, 2001 Tel. No: (011) 490-0400 Fax No: (011) 490-0506
EMERGENCY NUMBER (24 hours)	**0860111185 or 0860 020202**

2 HAZARDS IDENTIFICATION

Main Hazards: Extremely flammable and Toxic by inhalation.

Adverse Health Effects: Irritating to the eyes, mucous membranes and respiratory system. Narcotic at high concentrations. May decompose into hydrogen sulphide within body tissues resulting in inhibition of cellular respiration, possible pulmonary paralysis, sudden collapse and death

Eye effects: Low concentration 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 skin upon contact.

Ingestion Effects: Ingestion is unlikely

Inhalation Effects: Irritating and narcotic at high concentrations. May decompose into hydrogen sulphide within body tissues. Hydrogen sulphide 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. Exposure for more than 30 minutes at concentrations greater than 700 ppm has been fatal.

3 COMPOSITION/INFORMATION ON INGREDIENTS

Components

Chemical Name: Carbonyl Sulphide
Chemical Abstract Service Number (CAS No.): 463-58-1

4 FIRST AID MEASURES

Eyes: Persons with potential exposure to carbonyl sulphide 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 or Swallowing: Due to product form and application, ingestion is considered unlikely however if ingested treat 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 hazard of over exposure due to olfactory fatigue**.** An extreme fire hazard exists when rescuing semiconscious persons due 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 contaminate 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

Specific hazards

Exposure to fire may cause containers or vessels to rupture/explode. If involved in fire, it produces Sulphur dioxide and Carbon monoxide fumes. Carbonyl sulphide 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

All known extinguishants can be used.

Firefighting instructions

If possible, stop the flow of the product by slowly closing the cylinder valve. Move the container away or cool with water from a protected position. Do not extinguish a leaking gas flame unless absolutely necessary. Spontaneous/explosive re-ignition may occur.

Special protective equipment for fire fighters

Fire fighters should use self-contained breathing apparatus.

6 ACCIDENTAL RELEASE MEASURES

Personal Precautions

Evacuate the area. Eliminate ignition sources. Ensure adequate air ventilation. Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe

Environmental Protection

Try to stop release. Prevent from entering sewers/drains, basements and workpits, or any place where its accumulation can be dangerous.

Clean up methods

Ventilate area. Keep area evacuated and free from ignition sources until any spilled liquid has evaporated.

7 HANDLING AND STORAGE

Electrical Classification

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

Anhydrous carbonyl sulphide can be handled at normal temperatures with most metals. Moist carbonyl sulphide should be handled in aluminium alloys 24 and 35, 316 stainless steel or 18-8 chromium-nickel steels. Teflon®, Kel-F®, Viton® or Nylon® is 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 the 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 the 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

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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 "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 area.
Never carry a compressed gas cylinder or container of 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

Exposure limit value

Value type	Value	Note
TLV (ACGIH)	10 ppm	ACGIH 1995 - 1996

Occupational Exposure Hazards
Avoid any areas where spillage has taken place unless entering with self contained breathing apparatus. Only enter once testing has proved the atmosphere to be safe.

Engineering Control Measures
Hood with force ventilation. Use local exhaust to prevent accumulation above exposure limit.

Personal Protection
Gas tight chemical goggles or full-face piece respirator. Neoprene, butyl rubber, PVC or polyethylene protective gloves. Positive pressure air line with full-face mask and escape bottle or self-contained breathing apparatus should be available for emergency use. Safety shoes, safety shower, eyewash should also be used.

9 PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL DATA

Chemical Symbol	COS
Molecular Weight	60,07g/mol
Boiling point @ 101,325 kPa	-50.2°C
Density, Liquid @ saturation pre @ -80°C	1.238 kg/l
Relative density (Air = 1) @ 101,325 kPa	2.10
Latent heat of fusion @ -138.8°C	78.66 kJ/kg
Colour	Colourless
Taste	None
Odour	Rotten eggs

10 STABILITY AND REACTIVITY

Stability and reactivity
Can form explosive mixture with air. Thermal decomposition yields toxic products which can be corrosive in the presence of moisture. May react violently with oxidants.

Incompatible Materials
Reacts with oxidizers and form explosive mixtures with oxygen. Hydrolyzes slowly in water, forming hydrogen sulphide and carbon dioxide.

11 TOXICOLOGICAL INFORMATION

Health Hazard Summary: Toxic. Inadequate odour warning due to olfactory fatigue. Formation of hydrogen sulphide by decomposition in the lungs and adsorption into the blood stream is suspected. At low concentrations, marked dryness and irritation of the nose and throat occurs. Prolonged exposure may cause runny nose, cough, hoarseness, shortness of breath and pneumonia. At higher concentrations, there is a temporary loss of smell, severe irritation, headache, nausea, vomiting and dizziness occur. Concentrations around 300 vpm can be rapidly fatal.

Acute Toxicity: Damage to central nervous system. May cause irritation to the respiratory tract. Delayed fatal pulmonary edema possible.

12 ECOLOGICAL INFORMATION

Due to the volatility of Carbonyl sulphide, accumulation is unlikely to occur in soils and water, as evidenced by naturally produced carbonyl sulphide not accumulating in oceans and soils. Organisms that encounter high concentrations of carbonyl sulphide for extended periods of time will be killed. Ensure that appropriate measures are taken to prevent this product from entering the environment other than its use within the fumigation risk area. Does not contain class I or II ozone depleting chemicals

13 DISPOSAL CONSIDERATIONS

General: Avoid discharge to atmosphere.
Do not discharge into any place where accumulation could be dangerous. Do not discharge into areas where there is a risk of forming an explosive mixture with air. Waste gas should be flared through a suitable burner with flash back arrestor. Toxic and corrosive gases formed during combustion should be scrubbed before discharge to atmosphere. Contact supplier if guidance is required.

14 TRANSPORT INFORMATION

ROAD TRANSPORTATION

United Nations Number (UN No.):	2204
Hazchem warning:	2.3 Poison gas, Flammable gas

Other transport information:
Ensure vehicle driver is aware of potential hazards of the load and knows what to do in the event of an accident or an emergency.

Before transporting product containers, ensure that they are firmly secured. Ensure that the cylinder valve is closed and not leaking. Ensure that the valve outlet cap nut or plug (where provided) is correctly fitted. Ensure that the valve protection device (where provided) is correctly fitted. Ensure adequate ventilation. Ensure compliance with applicable regulations.

15 REGULATORY INFORMATION

EEC Hazard class: flammable
National legislation OHSact and Regulations 85 of 1993.
Reference SANS 10234 and its supplement.

16 OTHER INFORMATION

Ensure operators understand the flammability hazard. Contact with liquid may cause cold burns/frost bite. Users of breathing apparatus must be trained. Ensure operators understand the toxicity hazard. Before using this product in any new process or experiment, a through material compatibility and safety study should be carried out.

EXCLUSION OF LIABILITY
Whilst AFROX made best endeavour to ensure that the information contained in this publication is accurate at the date of publication, AFROX does not accept liability for an inaccuracy or liability arising from the use of this information, or the use, application, adaptation or process of any products described herein.

BOC
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SAFETY DATA SHEET

0209

Product Name **COSMIC 1000 FUMIGANT**

1. IDENTIFICATION OF THE MATERIAL AND SUPPLIER

Supplier Name	**BOC LIMITED (AUSTRALIA)**
Address	10 Julius Avenue, North Ryde, NSW, AUSTRALIA, 2113
Telephone	131 262, (02) 8874 4400
Fax	132 427 (24 hours)
Emergency	1800 653 572 (24/7) (Australia only)
Web Site	http://www.boc.com.au/
Synonym(s)	209 - MSDS NUMBER • CARBONYL SULPHIDE
Use(s)	GRAIN FUMIGANT
SDS Date	26 Mar 2010

2. HAZARDS IDENTIFICATION

CLASSIFIED AS HAZARDOUS ACCORDING TO ASCC CRITERIA

RISK PHRASES

R11	Highly flammable.
R20	Harmful by inhalation.

SAFETY PHRASES

S16	Keep away from sources of ignition - No smoking.
S45	In case of accident or if you feel unwell seek medical advice immediately (show the label where possible).
S7	Keep container tightly closed.

CLASSIFIED AS A DANGEROUS GOOD BY THE CRITERIA OF THE ADG CODE

UN No.	2204	**DG Class**	2.3	**Subsidiary Risk(s)**	2.1
Packing Group	None Allocated	**Hazchem Code**	2WE	**EPG**	2B2

3. COMPOSITION/ INFORMATION ON INGREDIENTS

Ingredient	Formula	CAS No.	Content
CARBONYL SULPHIDE	C-O-S	463-58-1	100%

4. FIRST AID MEASURES

Eye	Cold burns: Immediately flush with tepid water or with sterile saline solution. Hold eyelids apart and irrigate for 15 minutes. Seek medical attention.
Inhalation	If inhaled, remove from contaminated area. To protect rescuer, use an Air-line respirator or Self Contained Breathing Apparatus (SCBA). Apply artificial respiration if not breathing. Give oxygen if breathing is difficult. Seek immediate medical attention. For advice, contact a Poisons Information Centre on 13 11 26 (Australia Wide) or a doctor.
Skin	Cold burns: Remove contaminated clothing and gently flush affected areas with warm water (30°C) for 15 minutes. Apply sterile dressing and treat as for a thermal burn. For large burns, immerse in warm water for 15 minutes. DO NOT apply any form of direct heat. Seek immediate medical attention.
Ingestion	Due to product form and application, ingestion is considered unlikely.

Advice to Doctor Treat symptomatically

First Aid Facilities Eye wash facilities and safety shower are recommended.

5. FIRE FIGHTING MEASURES

Flammability Highly flammable gas - potentially explosive. May evolve toxic gases (sulphur oxides) when heated to decomposition. Do not expose to heat and ignition sources. Eliminate ignition sources including cigarettes, open flames, electrical equipment, spark producing switches/ tools, naked lights, heaters, pilot lights, etc when handling.

Fire and Explosion Temperatures in a fire may cause cylinders to rupture. Cool cylinders or containers exposed to fire by applying water from a protected location. Do not approach cylinders or containers suspected of being hot. Remove cool cylinders from the path of the fire. Evacuate area if unable to keep cylinders cool. This material is capable of forming explosive mixtures in air.

Extinguishing Stop flow of gas if safe to do so, such as by slowly closing the cylinder valve.

Hazchem Code 2WE

6. ACCIDENTAL RELEASE MEASURES

Spillage If the cylinder is leaking, eliminate all potential ignition sources and evacuate area of personnel. Prevent spreading of vapours through drains and ventilation systems. Inform manufacturer/supplier of leak. Use personal protective equipment. Carefully move material to a well ventilated remote area, then allow to discharge. Do not attempt to repair leaking valve or cylinder safety devices.

7. STORAGE AND HANDLING

Storage Do not store near incompatible materials. Cylinders should be stored below 45°C in a secure area, upright and restrained to prevent cylinders from falling. Cylinders should also be stored in a dry, well ventilated area constructed of non-combustible material with firm level floor (preferably concrete), away from areas of heavy traffic and emergency exits.

Handling Use of safe work practices are recommended to avoid eye or skin contact and inhalation. Do not drag, drop, slide or roll cylinders. The uncontrolled release of a gas under pressure may cause physical harm. Use a suitable hand truck for cylinder movement.

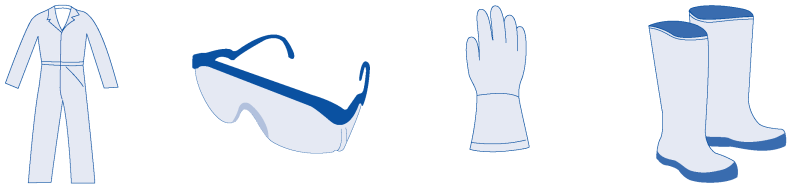
8. EXPOSURE CONTROLS/ PERSONAL PROTECTION

Exposure Stds No exposure standard(s) allocated.

Biological Limits No biological limit allocated.

Engineering Controls Avoid inhalation. Use in well ventilated areas. Where an inhalation risk exists, mechanical explosion proof extraction ventilation is recommended. Flammable or explosive vapours may accumulate in confined or poorly ventilated areas. Vapours may travel some distance to an ignition source and flash back. Maintain vapour levels below the recommended exposure standard.

PPE Wear safety boots, leather gloves, coveralls and safety glasses. Where an inhalation risk exists, wear: an Air-line respirator or self Contained Breathing Apparatus (SCBA).



9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	COLOURLESS GAS	**Solubility (Water)**	1.44 cm3/cm3
Odour	ROTTEN EGG ODOUR	**Specific Gravity**	NOT APPLICABLE
pH	NOT APPLICABLE	**% Volatiles**	100 %
Vapour Pressure	1250 kPa @ 25°C	**Flammability**	HIGHLY FLAMMABLE
Vapour Density	NOT AVAILABLE	**Flash Point**	< 0°C
Boiling Point	-50.2°C	**Upper Explosion Limit**	29 %
Melting Point	NOT AVAILABLE	**Lower Explosion Limit**	12 %
Evaporation Rate	NOT APPLICABLE		

Critical Pressure	5877 kPa	**Critical Temperature**	102°C
Density	2.1 (Air = 1)		

10. STABILITY AND REACTIVITY

Chemical Stability Stable under recommended conditions of storage.

Conditions to Avoid Avoid shock, friction, heavy impact, heat, sparks, open flames and other ignition sources.

Material to Avoid Incompatible with water/moisture (evolving highly flammable and toxic hydrogen sulphide and carbon monoxide), alkalis (eg. hydroxides) and oxidising agents (eg. hypochlorites).

Decomposition May evolve toxic gases (sulphur oxides) when heated to decomposition.

Hazardous Reactions Polymerization will not occur.

11. TOXICOLOGICAL INFORMATION

Health Hazard Summary Toxic. Inadequate odour warning due to olfactory fatigue. Formation of hydrogen sulphide by decomposition in the lungs and adsorption into the blood stream is suspected. At low concentrations, marked dryness and irritation of the nose and throat occurs. Chronic exposure may result in runny nose, cough, hoarseness, shortness of breath and pneumonia. At higher concentrations, there is a temporary loss of smell, severe irritation, headache, nausea, vomiting and dizziness occur. Concentrations around 300 vppm can be rapidly fatal.

Eye Irritant. May cause inflammation and irritation. Cold burns may be caused by evaporating liquid.

Inhalation Irritant - toxic. Over exposure may result in depression and damage to the central nervous system, and asphyxiation.

Skin Irritant. Low temperature evaporating liquid can cause cold burns.

Ingestion Ingestion is considered unlikely due to product form. However, ingestion of liquid may result in burns to the mouth and throat.

Toxicity Data CARBONYL SULPHIDE (463-58-1)
LC50 (Inhalation): 1070 ppm/4 hours (rat)
LD50 (Intraperitoneal): 23 mg/kg (rat)
TCLo (Inhalation): 162 ppm/6 hours/14 weeks intermittently (rat)

12. ECOLOGICAL INFORMATION

Environment Limited ecotoxicity data was available for this product at the time this report was prepared. Ensure appropriate measures are taken to prevent this product from entering the environment.

13. DISPOSAL CONSIDERATIONS

Waste Disposal Cylinders should be returned to the manufacturer or supplier for disposal of contents.

Legislation Dispose of in accordance with relevant local legislation.

14. TRANSPORT INFORMATION

Transport Ensure cylinder is separated from driver and foodstuffs. Refer to Commonwealth, State and Territory Dangerous Goods Legislation which contain requirements which affect gas storage and transport.

CLASSIFIED AS A DANGEROUS GOOD BY THE CRITERIA OF THE ADG CODE

Shipping Name	CARBONYL SULFIDE				
UN No.	2204	**DG Class**	2.3	**Subsidiary Risk(s)**	2.1
Packing Group	None Allocated	**Hazchem Code**	2WE	**EPG**	2B2

15. REGULATORY INFORMATION

Poison Schedule A poison schedule number has not been allocated to this product using the criteria in the Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP).

AICS All chemicals listed on the Australian Inventory of Chemical Substances (AICS).

16. OTHER INFORMATION

Additional Information

The storage of significant quantities of gas cylinders must comply with AS4332 The storage and handling of gases in cylinders.

Application method: Gas regulator of suitable pressure and flow rating fitted to cylinder valve with low pressure distribution to specialised equipment.

ABBREVIATIONS:
ADB - Air-Dry Basis.
BEI - Biological Exposure Indice(s)
CAS# - Chemical Abstract Service number - used to uniquely identify chemical compounds.
CNS - Central Nervous System.
EINECS - European INventory of Existing Commercial chemical Substances.
IARC - International Agency for Research on Cancer.
M - moles per litre, a unit of concentration.
mg/m3 - Milligrams per cubic metre.
NOS - Not Otherwise Specified.
NTP - National Toxicology Program.
OSHA - Occupational Safety and Health Administration.
pH - relates to hydrogen ion concentration using a scale of 0 (high acidic) to 14 (highly alkaline).
ppm - Parts Per Million.
RTECS - Registry of Toxic Effects of Chemical Substances.
TWA/ES - Time Weighted Average or Exposure Standard.

HEALTH EFFECTS FROM EXPOSURE:
It should be noted that the effects from exposure to this product will depend on several factors including: frequency and duration of use; quantity used; effectiveness of control measures; protective equipment used and method of application. Given that it is impractical to prepare a Chem Alert report which would encompass all possible scenarios, it is anticipated that users will assess the risks and apply control methods where appropriate.

PERSONAL PROTECTIVE EQUIPMENT GUIDELINES:
The recommendation for protective equipment contained within this Chem Alert report is provided as a guide only. Factors such as method of application, working environment, quantity used, product concentration and the availability of engineering controls should be considered before final selection of personal protective equipment is made.

Report Status

This document has been compiled by RMT on behalf of the manufacturer of the product and serves as the manufacturer's Safety Data Sheet ('SDS').

It is based on information concerning the product which has been provided to RMT by the manufacturer or obtained from third party sources and is believed to represent the current state of knowledge as to the appropriate safety and handling precautions for the product at the time of issue. Further clarification regarding any aspect of the product should be obtained directly from the manufacturer.

While RMT has taken all due care to include accurate and up-to-date information in this SDS, it does not provide any warranty as to accuracy or completeness. As far as lawfully possible, RMT accepts no liability for any loss, injury or damage (including consequential loss) which may be suffered or incurred by any person as a consequence of their reliance on the information contained in this SDS.

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End of Report