BOC Limited
ABN 95 000 029 729

MATERIAL SAFETY DATA SHEET

 # 2102

PRODUCT NAME **4 COMPONENT MIXTURE (CO2 9%, CO 12%, H2 4.5%, BALANCE N2)**

1. IDENTIFICATION OF THE MATERIAL AND SUPPLIER

Supplier Name	**BOC LIMITED (AUSTRALIA)**
Address	10 Julius Avenue, North Ryde, NSW, AUSTRALIA, 2113
Telephone	+61 131 262, (02) 8874 4400
Fax	+61 132 427 (24 hours)
Emergency	1800 653 572 (24/7) (Australia only)
Web Site	http://www.boc.com.au/
Synonym(s)	PRODUCT CODES: 285, 288 • SPECIAL GAS MIXTURE • 2102 - MSDS NUMBER
Use(s)	CALIBRATION • INDUSTRIAL APPLICATIONS
MSDS Date	04 February 2008

2. HAZARDS IDENTIFICATION

CLASSIFIED AS HAZARDOUS ACCORDING TO NOHSC CRITERIA

RISK PHRASES

R11	Highly flammable.
R48/23	Toxic: danger of serious damage to health by prolonged exposure through inhalation.
R61	May cause harm to the unborn child.

SAFETY PHRASES

S45	In case of accident or if you feel unwell seek medical advice immediately (show the label where possible).
S53	Avoid exposure - obtain special instructions before use.

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

UN No.	1953	**DG Class**	2.3	**Subsidiary Risk(s)**	2.1
Pkg Group	None Allocated	**Hazchem Code**	2PE	**EPG**	2A4

3. COMPOSITION / INFORMATION ON INGREDIENTS

Ingredient	Formula	CAS No.	Content
CARBON MONOXIDE	C-O	630-08-0	9%
HYDROGEN	H2	1333-74-0	4.5%
CARBON DIOXIDE	CO2	124-38-9	12%
NITROGEN	N2	7727-37-9	remainder

4. FIRST AID MEASURES

Eye Exposure is considered unlikely.

Inhalation Remove from area of exposure immediately. If assisting a victim avoid becoming a casualty, wear an Air-line respirator or Self Contained Breathing Apparatus (SCBA). Be aware of possible explosive atmospheres. If victim is not breathing apply artificial respiration and seek urgent medical attention. Give oxygen if available. Keep warm and rested.

Skin Exposure is considered unlikely.

Ingestion For advice, contact a Poison Information Centre on 13 11 26 (Australia Wide) or a doctor. Due to product form and application, ingestion is considered unlikely.

Advice to Doctor Treat symptomatically

5. FIRE FIGHTING MEASURES

Flammability Highly flammable. Heating to decomposition produces acrid smoke and irritating fumes. Product will add fuel to a fire. Eliminate all ignition sources including cigarettes, open flames, spark producing switches/tools, heaters, naked lights, pilot lights, mobile phones etc. when handling.

Fire and Explosion Highly flammable. Temperatures in a fire may cause cylinders to rupture and internal pressure relief devices to be activated. Call fire brigade. This product will add fuel to a fire. Cool cylinders exposed to fire by applying water from a protected location. Do not approach cylinders suspected of being hot.

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

Hazchem Code 2PE

6. ACCIDENTAL RELEASE MEASURES

Spillage GAS CYLINDERS: If the cylinder is leaking, eliminate all potential ignition sources and evacuate area of personnel. Inform manufacturer/supplier of leak. Wear appropriate PPE and carefully move it 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 sources of ignition or 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 Before use carefully read the product label. Use of safe work practices are recommended to avoid eye or skin contact and inhalation. Observe good personal hygiene, including washing hands before eating. Prohibit eating, drinking and smoking in contaminated areas.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure Stds

Ingredient	Reference	TWA		STEL	
		ppm	mg/m3	ppm	mg/m3
Carbon dioxide	NOHSC (AUS)	5000.0	9000.0	30000.0	54000.0
	NOHSC (AUS)	12500.0	22500.0	30000.0	54000.0
Carbon monoxide	NOHSC (AUS)	30.0	34.0	--	--

HYDROGEN

ES-TWA: Asphyxiant

WES-TWA: Simple asphyxiant - may present an explosion hazard

NITROGEN

ES-TWA: Asphyxiant - No values assigned

WES-TWA: Simple asphyxiant

Biological Limits

Ingredient	Reference	Determinant	Sampling Time	BEI
CARBON MONOXIDE	ACGIH BEI	Carboxyhemoglobin in blood	End of shift	3.5% of hemoglobin

Ingredient	Reference	Determinant	Sampling Time	BEI
	ACGIH BEI	Carbon monoxide in end-exhaled air	End of shift	20 ppm

Engineering Controls Maintain adequate ventilation. Confined areas (eg. tanks) should be adequately ventilated or gas tested. Flammable/explosive vapours may accumulate in poorly ventilated areas. Maintain vapour levels below the recommended exposure standard.

PPE Wear leather gloves and safety glasses. When using large quantities or where heavy contamination is likely, wear coveralls. 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)**	0.035 L/L (Carbon monoxide)
Odour	ODOURLESS	**Specific Gravity**	NOT AVAILABLE
pH	NOT AVAILABLE	**% Volatiles**	NOT AVAILABLE
Vapour Pressure	NOT AVAILABLE	**Flammability**	HIGHLY FLAMMABLE
Vapour Density	NOT AVAILABLE	**Flash Point**	NOT AVAILABLE
Boiling Point	NOT AVAILABLE	**Upper Explosion Limit**	NOT AVAILABLE
Melting Point	NOT AVAILABLE	**Lower Explosion Limit**	5.7 % (Hydrogen in nitrogen)
Evaporation Rate	NOT AVAILABLE	**Autoignition Temperature**	NOT AVAILABLE
Cylinder pressure (when full)	13000 kPa @ 15°C		

10. STABILITY AND REACTIVITY

Chemical Stability Stable under recommended conditions of storage.

Conditions to Avoid Avoid heat, sparks, open flames and other ignition sources.

Material to Avoid Carbon monoxide can react with iron, nickel and other metals to form highly toxic carbonyls. Reacts violently with oxygen difluoride, chlorine, barium peroxide. Dust of aluminium, chrome, manganese will ignite, then explode when heated in carbon dioxide. Incompatible with acrylaldehyde, aziridine, sodium peroxide. Corrosive when moist. Stress corrosion cracking can occur in steels, especially if other acid gases (eg. carbon dioxide, sulphur compounds) are present. Below 3500 kPa, corrosion is negligible and common materials can be used.

Decomposition Heating to decomposition produces acrid smoke and irritating fumes.

11. TOXICOLOGICAL INFORMATION

Health Hazard Summary Asphyxiant gas - non irritant. Carbon monoxide effects depend on the percentage of carboxyhaemoglobin: 10-20% mild headache and breathlessness on mild exertion; 20-30% headache, irritability, rapid fatigue and impaired memory; 30-40% severe headache, weakness, nausea, vomiting, dizziness, visual impairment and confusion; 40-50% increasing confusion, ataxia and collapse; 50-60% coma; >80% rapid death. Chronic exposure to carbon monoxide may result in an increase in cardiovascular problems. Can aggravate some diseases of the cardiovascular system such as coronary artery disease. The effect is enhanced by cigarette smoking. Adverse behavioural effects have been noted including impairment of vigilance, co-ordination, timing, behaviour, visual perception and certain cognitive functions. Some adaptation occurs in individuals repeatedly exposed to moderate concentrations. Developmental defects on foetuses can occur without maternal symptoms. Carbon dioxide is normally present in the air at a concentration of 340ppm by volume. Adverse health affects to long term exposure to carbon dioxide have not been reported. However in environments such as submarines where exposure to levels of 0.5 - 1.0% may occur, specialist medical opinion should be sought on the effects of long term exposure

Eye Non irritating.

Inhalation Irritant. Over exposure to carbon monoxide may result in rapid breathing, nausea, lack of coordination, unconsciousness & coma. Reacts with blood haemoglobin to prevent oxygen uptake.

Skin Non irritating.

Ingestion Exposure considered unlikely. Due to product form, ingestion is not considered a potential exposure route.

Toxicity Data CARBON MONOXIDE (630-08-0)
LC50 (Inhalation): 1807 ppm/4 hours (rat)

12. ECOLOGICAL INFORMATION

Environment Natural sources of carbon monoxide (CO) such as atmospheric oxidation of methane, forest fires and product from living organisms account for about 90 % of the atmosphere's carbon monoxide content. Human activity produces about 10%. Motor vehicles account for about 55 to 65 % of global man made emissions of carbon monoxide.

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 that outlet of relief device is not obstructed. Refer to Commonwealth, State and Territory Dangerous Goods Legislation which contain requirements which affect gas storage and transport. Keep locked up and out of reach of children.

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

Shipping Name	COMPRESSED GAS, TOXIC, FLAMMABLE, N.O.S.				
UN No.	1953	**DG Class**	2.3	**Subsidiary Risk(s)**	2.1
Pkg Group	None Allocated	**Hazchem Code**	2PE	**EPG**	2A4

IATA

Shipping Name	COMPRESSED GAS, TOXIC, FLAMMABLE, N.O.S.				
UN No.	1953	**DG Class**	2.3	**Subsidiary Risk(s)**	2.1
Pkg Group	None Allocated				

IMDG

Shipping Name	COMPRESSED GAS, TOXIC, FLAMMABLE, N.O.S.				
UN No.	1953	**DG Class**	2.3	**Subsidiary Risk(s)**	2.1
Pkg Group	None Allocated				

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 Application Method: Gas regulator of suitable pressure and flow rating fitted to cylinder valve or manifold with low pressure gas distribution to 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.
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.
pH - relates to hydrogen ion concentration using a scale of 0 (high acidic) to 14 (highly alkaline).
ppm - Parts Per Million.
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 Material Safety Data Sheet ('MSDS').

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 MSDS, 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 MSDS.

Prepared By

Risk Management Technologies
5 Ventnor Ave, West Perth
Western Australia 6005
Phone: +61 8 9322 1711
Fax: +61 8 9322 1794
Email: info@rmt.com.au
Web: www.rmt.com.au

MSDS Date: 04 February 2008

End of Report