

SAFETY DATA SHEET

Product Name 4 COMPONENT MIXTURE (CO <1%, CH4 1%, H2 25% BALANCE N2)

1. IDENTIFICATION OF THE MATERIAL AND SUPPLIER

Supplier name BOC LIMITED (AUSTRALIA)
Address 10 Julius Avenue, North Ryde, NSW, 2113, AUSTRALIA
Telephone 131 262, (02) 8874 4400
Fax 132 427 (24 hours)
Emergency 1800 653 572 (24/7) (Australia only)
<http://www.boc.com.au>
Synonym(s) BOC 4 COMPONENT MIXTURE (CO, CH4, H2 BALANCE N2)
Use(s) CALIBRATION • INDUSTRIAL APPLICATIONS
SDS date 13 November 2014

2. HAZARDS IDENTIFICATION

CLASSIFIED AS HAZARDOUS ACCORDING TO SAFE WORK AUSTRALIA CRITERIA

Risk Phrases

R12 Extremely Flammable.

Safety Phrases

S9 Keep container in a well ventilated place.
S16 Keep away from sources of ignition - No smoking.
S33 Take precautionary measures against static discharges.

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

UN Number 1954 **Transport Hazard Class** 2.1
Packing Group None Allocated **Hazchem Code** 2SE

3. COMPOSITION/ INFORMATION ON INGREDIENTS

| Ingredient | CAS Number | EC Number | Content |
|-----------------|------------|-----------|-----------|
| HYDROGEN | 1333-74-0 | 215-605-7 | 25% |
| METHANE | 74-82-8 | 200-812-7 | 1% |
| CARBON MONOXIDE | 630-08-0 | 211-128-3 | <0.2% |
| NITROGEN | 7727-37-9 | 231-783-9 | 73 to 74% |

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). Be aware of possible explosive atmospheres. Apply artificial respiration if not breathing. Give oxygen if available. For advice, contact a Poison 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.

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Ingestion Due to product form and application, ingestion is considered unlikely.

Advice to doctor Treat for asphyxia and cold burns.

5. FIRE FIGHTING MEASURES

Flammability Highly flammable. 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 Temperatures in a fire may cause cylinders to rupture and internal pressure relief devices to be activated. Cool cylinders or containers exposed to fire by applying water from a protected location. Do not approach cylinders or containers suspected of being hot. 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. If the gas source cannot be isolated, do not extinguish the flame, since re-ignition and explosion could occur. Await arrival of emergency services or manufacturer's advisor. Drench and cool cylinders with water spray from protected area at a safe distance. If it is absolutely necessary to extinguish the flame, use only a dry chemical powder extinguisher. Do not move cylinders for at least 24 hours. Avoid shock and bumps to cylinders.

Hazchem code 2SE
2 Water Fog (or fine water spray if fog unavailable)
S Self Contained Breathing apparatus and protective gloves.
E Evacuation of people in the vicinity of the incident should be considered.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions If the cylinder is leaking, evacuate area of personnel. Inform manufacturer/supplier of leak. Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe. Ensure adequate air ventilation. Eliminate all sources of ignition. Consider the risk of potentially explosive atmospheres.

Environmental precautions Prevent from entering sewers, basements and workpits, or any place where its accumulation can be dangerous.

Methods of cleaning up Carefully move material to a well ventilated remote area, then allow to discharge if safe to do so. Do not attempt to repair leaking valve or cylinder safety devices.

References See Sections 8 and 13 for exposure controls and disposal.

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 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 standards

| Ingredient | Reference | TWA | | STEL | |
|-----------------|-----------|------------|-------------------|------|-------------------|
| | | ppm | mg/m ³ | ppm | mg/m ³ |
| Carbon monoxide | SWA (AUS) | 30 | 34 | -- | -- |
| Hydrogen | SWA (AUS) | Asphyxiant | | | |
| Methane | SWA (AUS) | Asphyxiant | | | |
| Nitrogen | SWA (AUS) | Asphyxiant | | | |

Biological limits

| Ingredient | Determinant | Sampling Time | BEI |
|-----------------|------------------------------------|---------------|--------------------|
| CARBON MONOXIDE | Carboxyhemoglobin in blood | End of shift | 3.5% of hemoglobin |
| | Carbon monoxide in end-exhaled air | End of shift | 20 ppm |

Reference: ACGIH Biological Exposure Indices

Engineering controls Provide suitable ventilation to minimise or eliminate exposure. Confined areas (e.g. tanks) should be adequately ventilated or gas tested. Maintain vapour levels below the recommended exposure standard.

PPE

- Eye / Face** Wear safety glasses.
- Hands** Wear leather or insulated gloves.
- Body** Wear safety boots.
- Respiratory** Where an inhalation risk exists, wear Self Contained Breathing Apparatus (SCBA) or an Air-line respirator.



9. PHYSICAL AND CHEMICAL PROPERTIES

| | |
|--------------------------------------|-------------------|
| Appearance | COLOURLESS GAS |
| Odour | ODOURLESS |
| Flammability | HIGHLY FLAMMABLE |
| Flash point | < 23°C |
| Boiling point | NOT AVAILABLE |
| Melting point | NOT RELEVANT |
| Evaporation rate | NOT APPLICABLE |
| pH | NOT APPLICABLE |
| Vapour density | NOT AVAILABLE |
| Specific gravity | NOT APPLICABLE |
| Solubility (water) | NOT AVAILABLE |
| Vapour pressure | NOT AVAILABLE |
| Upper explosion limit | NOT AVAILABLE |
| Lower explosion limit | NOT AVAILABLE |
| Partition coefficient | NOT AVAILABLE |
| Autoignition temperature | NOT AVAILABLE |
| Decomposition temperature | NOT AVAILABLE |
| Viscosity | NOT AVAILABLE |
| Explosive properties | NOT AVAILABLE |
| Oxidising properties | NOT AVAILABLE |
| % Volatiles | 100 % |
| Cylinder pressure (when full) | 13,000 kPa @ 15°C |

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 oxidising agents (e.g. hypochlorites), acids (e.g. nitric acid), heat and ignition sources. Do not use natural rubber flexible hoses. Also incompatible (potentially violently) with oxygen, halogens and metal halides. |
| Hazardous Decomposition Products | This material will not decompose to form hazardous products other than that already present. |
| Hazardous Reactions | Polymerization will not occur. |

11. TOXICOLOGICAL INFORMATION

| | | |
|------------------------------|---|----------------------|
| Health Hazard Summary | Asphyxiant. Symptoms of exposure are directly related to displacement of oxygen. As the amount of oxygen inhaled is reduced from 21-14% volume, the pulse rate may accelerate and the rate and volume of breathing may increase. The ability to maintain attention and think clearly is diminished, muscular co-ordination is somewhat disturbed. As oxygen decreases from 14-10% volume, judgement becomes faulty, severe injuries may result in no pain. Muscular effort may lead to rapid fatigue. Further reduction to 6% may result in nausea and vomiting. Ability to move may be lost. Permanent brain damage may result even after resuscitation from exposure to this low level of oxygen. Below 6% breathing is in gasps and convulsions may occur. Inhalation of a mixture containing no oxygen may result in unconsciousness from the first breath and death may follow in minutes. | |
| Eye | Direct contact with evaporating liquid may result in cold burns, similar to frostbite injury, with possible permanent damage. | |
| Inhalation | Asphyxiant. Effects are proportional to oxygen displacement. Acts as a simple asphyxiant by displacing oxygen in the lungs thereby diminishing the supply of oxygen to the blood and tissues. | |
| Skin | Direct contact with the liquefied material or escaping compressed gas may cause cold burns similar to frostbite injury. | |
| Ingestion | Ingestion is considered unlikely due to product form. | |
| Toxicity data | METHANE (74-82-8) | |
| | LC50 (inhalation) | 326 gm/m3/2h (mouse) |
| | CARBON MONOXIDE (630-08-0) | |
| | LC50 (inhalation) | 1807 ppm/4H (rat) |
| | LCLo (inhalation) | 5000 ppm/5M (human) |

12. ECOLOGICAL INFORMATION

| | |
|--------------------------------------|--------------------------|
| Toxicity | No information provided. |
| Persistence and degradability | No information provided. |
| Bioaccumulative potential | No information provided. |
| Mobility in soil | No information provided. |
| Other adverse effects | No information provided. |

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

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



| | LAND TRANSPORT (ADG) | SEA TRANSPORT (IMDG / IMO) | AIR TRANSPORT (IATA / ICAO) |
|-------------------------------|--------------------------------------|-------------------------------|--------------------------------|
| UN Number | 1954 | - | - |
| Proper Shipping Name | COMPRESSED GAS, FLAMMABLE, N.O.S. | - | - |
| Transport Hazard Class | 2.1 | - | - |
| Packing Group | None Allocated | - | - |

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Environmental hazards No information provided

Special precautions for user

Hazchem code 2SE

GTEPG 2A1

Other information Ensure cylinder is separated from driver and that outlet of relief device is not obstructed.

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 Medicines and Poisons (SUSMP).

Inventory Listing(s) **AUSTRALIA: AICS (Australian Inventory of Chemical Substances)**
All components are listed on AICS, or are exempt.

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 or manifold with low pressure gas distribution to equipment.

PERSONAL PROTECTIVE EQUIPMENT GUIDELINES:

The recommendation for protective equipment contained within this 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.

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 ChemAlert report which would encompass all possible scenarios, it is anticipated that users will assess the risks and apply control methods where appropriate.

Abbreviations

| | |
|-------------------|---|
| ACGIH | American Conference of Governmental Industrial Hygienists |
| CAS # | Chemical Abstract Service number - used to uniquely identify chemical compounds |
| CNS | Central Nervous System |
| EC No. | EC No - European Community Number |
| GHS | Globally Harmonized System |
| IARC | International Agency for Research on Cancer |
| LC50 | Lethal Concentration, 50% / Median Lethal Concentration |
| LD50 | Lethal Dose, 50% / Median Lethal Dose |
| mg/m ³ | Milligrams per Cubic Metre |
| OEL | Occupational Exposure Limit |
| PEL | Permissible Exposure Limit |
| pH | relates to hydrogen ion concentration using a scale of 0 (high acidic) to 14 (highly alkaline). |
| ppm | Parts Per Million |
| REACH | Regulation on Registration, Evaluation, Authorisation and Restriction of Chemicals |
| STEL | Short-Term Exposure Limit |
| STOT-RE | Specific target organ toxicity (repeated exposure) |
| STOT-SE | Specific target organ toxicity (single exposure) |
| SUSMP | Standard for the Uniform Scheduling of Medicines and Poisons |
| SWA | Safe Work Australia |
| TLV | Threshold Limit Value |
| TWA | Time Weighted Average |

Revision history

| Revision | Description |
|----------|-----------------------|
| 2.0 | Included Risk Phrase. |
| 1.0 | Initial SDS creation |

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Report status This document has been compiled by RMT on behalf of the manufacturer, importer or supplier of the product and serves as their Safety Data Sheet ('SDS').

It is based on information concerning the product which has been provided to RMT by the manufacturer, importer or supplier 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, importer or supplier.

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End of SDS