1. IDENTIFICATION OF THE MATERIAL AND SUPPLIER

1.1 Product identifier
Product name: OXYGEN, HYDROGEN, AND METHANE IN CARBON DIOXIDE
Synonym(s): 2319 - SDS NUMBER • PRODUCT CODE: 288- • SPECIAL GAS MIXTURE

1.2 Uses and uses advised against
Use(s): CALIBRATION • INDUSTRIAL APPLICATIONS

1.3 Details of the supplier of the product
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)

1.4 Emergency telephone number(s)
Emergency: 1800 653 572 (24/7) (Australia only)

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture
CLASSIFIED AS HAZARDOUS ACCORDING TO AUSTRALIAN WHS REGULATIONS

GHS classification(s):
- Flammable Gases: Category 1
- Gases Under Pressure: Compressed gas

2.2 Label elements
Signal word: DANGER
Pictogram(s):

Hazard statement(s)
- H220: Extremely flammable gas.
- H280: Contains gas under pressure; may explode if heated.

Prevention statement(s)
- P210: Keep away from heat/sparks/open flames/hot surfaces. No smoking.

Response statement(s)
- P377: Leaking gas fire: Do not extinguish, unless leak can be stopped safely.
- P381: Eliminate all ignition sources if safe to do so.

Storage statement(s)
- P410 + P403: Protect from sunlight. Store in a well-ventilated place.

Disposal statement(s)
None allocated.
2.3 Other hazards
Asphyxiant. Effects are proportional to oxygen displacement.

3. COMPOSITION/ INFORMATION ON INGREDIENTS

3.1 Substances / Mixtures

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>CAS Number</th>
<th>EC Number</th>
<th>Content (v/v)</th>
</tr>
</thead>
<tbody>
<tr>
<td>METHANE</td>
<td>74-82-8</td>
<td>200-812-7</td>
<td>&lt;65%</td>
</tr>
<tr>
<td>OXYGEN</td>
<td>7782-44-7</td>
<td>231-956-9</td>
<td>&lt;21%</td>
</tr>
<tr>
<td>HYDROGEN</td>
<td>1333-74-0</td>
<td>215-605-7</td>
<td>&lt;15%</td>
</tr>
<tr>
<td>CARBON DIOXIDE</td>
<td>124-38-9</td>
<td>204-696-9</td>
<td>Remainder</td>
</tr>
</tbody>
</table>

4. FIRST AID MEASURES

4.1 Description of first aid measures
Eye
None required.

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. Contact a Poisons Information Centre on 13 11 26 (Australia Wide) or a doctor.

Skin
None required.

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

First aid facilities
No information provided.

4.2 Most important symptoms and effects, both acute and delayed
In high concentrations may cause asphyxiation. Symptoms may include loss of mobility / consciousness. Victim may not be aware of asphyxiation. Low concentrations of CO2 cause increased respiration and headache.

4.3 Immediate medical attention and special treatment needed
Treat symptomatically.

5. FIRE FIGHTING MEASURES

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

5.2 Special hazards arising from the substance or mixture
Extremely flammable. Eliminate all ignition sources including cigarettes, open flames, spark producing switches/tools, heaters, naked lights, pilot lights, mobile phones etc. when handling.

5.3 Advice for firefighters
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.

5.4 Hazchem code
2SE
2 Fine Water Spray.
S Risk of violent reaction or explosion. Wear full fire kit and breathing apparatus. Dilute spill and run-off.
E Evacuation of people in and around the immediate vicinity of the incident should be considered.

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
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.
6.2 Environmental precautions
Prevent from entering sewers, basements and workpits, or any place where its accumulation can be dangerous.

6.3 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.

6.4 Reference to other sections
See Sections 8 and 13 for exposure controls and disposal.

7. HANDLING AND STORAGE

7.1 Precautions for safe 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.

7.2 Conditions for safe storage, including any incompatibilities
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.

7.3 Specific end use(s)
No information provided.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

8.1 Control parameters
Exposure standards

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Reference</th>
<th>TWA ppm</th>
<th>TWA mg/m³</th>
<th>STEL ppm</th>
<th>STEL mg/m³</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon dioxide</td>
<td>SWA (AUS)</td>
<td>5000</td>
<td>9000</td>
<td>30000</td>
<td>54000</td>
</tr>
<tr>
<td>Carbon dioxide in coal mines</td>
<td>SWA (AUS)</td>
<td>12500</td>
<td>22500</td>
<td>30000</td>
<td>54000</td>
</tr>
<tr>
<td>Hydrogen</td>
<td>SWA (AUS)</td>
<td>Asphyxiant</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methane</td>
<td>SWA (AUS)</td>
<td>Asphyxiant</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Biological limits
No biological limit values have been entered for this product.

8.2 Exposure controls
Engineering controls
Avoid inhalation. Use in well ventilated areas. Where an inhalation risk exists, mechanical explosion proof extraction ventilation is recommended. Flammable/explosive vapours may accumulate in poorly ventilated areas. Maintain vapour levels below the recommended exposure standard.

PPE
Eye / Face: Wear safety glasses.
Hands: Wear leather 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

9.1 Information on basic physical and chemical properties
Appearance: COLOURLESS GAS
Odour: ODOURLESS
9.1 Information on basic physical and chemical properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flammability</td>
<td>EXTREMELY FLAMMABLE</td>
</tr>
<tr>
<td>Flash point</td>
<td>NOT AVAILABLE</td>
</tr>
<tr>
<td>Boiling point</td>
<td>NOT RELEVANT</td>
</tr>
<tr>
<td>Melting point</td>
<td>NOT RELEVANT</td>
</tr>
<tr>
<td>Evaporation rate</td>
<td>NOT APPLICABLE</td>
</tr>
<tr>
<td>pH</td>
<td>NOT APPLICABLE</td>
</tr>
<tr>
<td>Vapour density</td>
<td>NOT AVAILABLE</td>
</tr>
<tr>
<td>Specific gravity</td>
<td>NOT APPLICABLE</td>
</tr>
<tr>
<td>Solubility (water)</td>
<td>INSOLUBLE</td>
</tr>
<tr>
<td>Vapour pressure</td>
<td>NOT AVAILABLE</td>
</tr>
<tr>
<td>Upper explosion limit</td>
<td>15.4 % (Methane)</td>
</tr>
<tr>
<td>Lower explosion limit</td>
<td>5 % (Methane)</td>
</tr>
<tr>
<td>Partition coefficient</td>
<td>NOT AVAILABLE</td>
</tr>
<tr>
<td>Autoignition temperature</td>
<td>NOT AVAILABLE</td>
</tr>
<tr>
<td>Decomposition temperature</td>
<td>NOT AVAILABLE</td>
</tr>
<tr>
<td>Viscosity</td>
<td>NOT AVAILABLE</td>
</tr>
<tr>
<td>Explosive properties</td>
<td>NOT AVAILABLE</td>
</tr>
<tr>
<td>Oxidising properties</td>
<td>NOT AVAILABLE</td>
</tr>
<tr>
<td>Odour threshold</td>
<td>NOT AVAILABLE</td>
</tr>
<tr>
<td>Relative density</td>
<td>1.55 (Carbon Dioxide) (Air = 1)</td>
</tr>
<tr>
<td>% Volatiles</td>
<td>100 %</td>
</tr>
</tbody>
</table>

9.2 Other information

10. STABILITY AND REACTIVITY

10.1 Reactivity
Carefully review all information provided in sections 10.2 to 10.6.

10.2 Chemical stability
Stable under recommended conditions of storage.

10.3 Possibility of hazardous reactions
Polymerization will not occur.

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

10.5 Incompatible materials
Moist carbon dioxide is corrosive, hence acid resistant materials are required (e.g. stainless steel). Certain properties of some plastics and rubbers may be affected by carbon dioxide (i.e. embrittlement, leaching of plasticisers, etc).

10.6 Hazardous decomposition products
This material will not decompose to form hazardous products other than that already present.

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

<table>
<thead>
<tr>
<th>Effect</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute toxicity</td>
<td>Based on available data, the classification criteria are not met. Low concentrations of carbon dioxide cause increased respiration and headache.</td>
</tr>
<tr>
<td>Skin</td>
<td>Not classified as a skin irritant.</td>
</tr>
<tr>
<td>Eye</td>
<td>Not classified as an eye irritant.</td>
</tr>
<tr>
<td>Sensitization</td>
<td>Not classified as causing skin or respiratory sensitisation.</td>
</tr>
<tr>
<td>Mutagenicity</td>
<td>Not classified as a mutagen.</td>
</tr>
<tr>
<td>Carcinogenicity</td>
<td>Not classified as a carcinogen.</td>
</tr>
<tr>
<td>Reproductive</td>
<td>Not classified as a reproductive toxin.</td>
</tr>
<tr>
<td>STOT – single exposure</td>
<td>Asphyxiant. Effects are proportional to oxygen displacement. Over exposure may result in dizziness, drowsiness, weakness, fatigue, breathing difficulties and unconsciousness.</td>
</tr>
<tr>
<td>STOT – repeated exposure</td>
<td>Not classified as causing organ effects from repeated exposure.</td>
</tr>
</tbody>
</table>

Not classified as causing aspiration.
12. ECOLOGICAL INFORMATION

12.1 Toxicity
No information provided.

12.2 Persistence and degradability
No information provided.

12.3 Bioaccumulative potential
No information provided.

12.4 Mobility in soil
No information provided.

12.5 Other adverse effects
When discharged to the atmosphere, carbon dioxide may contribute to the greenhouse effect.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods
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

<table>
<thead>
<tr>
<th>LAND TRANSPORT (ADG)</th>
<th>SEA TRANSPORT (IMDG / IMO)</th>
<th>AIR TRANSPORT (IATA / ICAO)</th>
</tr>
</thead>
<tbody>
<tr>
<td>14.1 UN Number</td>
<td>1954</td>
<td>1954</td>
</tr>
<tr>
<td>14.2 Proper Shipping Name</td>
<td>COMPRESSED GAS, FLAMMABLE, N.O.S. (Contains methane)</td>
<td>COMPRESSED GAS, FLAMMABLE, N.O.S. (Contains methane)</td>
</tr>
<tr>
<td>14.3 Transport hazard class</td>
<td>2.1</td>
<td>2.1</td>
</tr>
<tr>
<td>14.4 Packing Group</td>
<td>None Allocated</td>
<td>None Allocated</td>
</tr>
</tbody>
</table>

14.5 Environmental hazards
No information provided

14.6 Special precautions for user

<table>
<thead>
<tr>
<th>Hazchem code</th>
<th>GTEPG</th>
<th>EMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>2SE</td>
<td>2A1</td>
<td>F-D, S-U</td>
</tr>
</tbody>
</table>

Other information
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.

15. REGULATORY INFORMATION

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

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).
OXYGEN, HYDROGEN, AND METHANE IN CARBON DIOXIDE

Classifications
Safework Australia criteria is based on the Globally Harmonised System (GHS) of Classification and Labelling of Chemicals.

The classifications and phrases listed below are based on the Approved Criteria for Classifying Hazardous Substances [NOHSC: 1008(2004)].

Hazard codes
F+  Extremely flammable

Risk phrases
R12  Extremely Flammable.

Safety phrases
S16  Keep away from sources of ignition - No smoking.

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 valve 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
EMS  Emergency Schedules (Emergency Procedures for Ships Carrying Dangerous Goods)
GHS  Globally Harmonized System
GTEPG  Group Text Emergency Procedure Guide
IARC  International Agency for Research on Cancer
LC50  Lethal Concentration, 50% / Median Lethal Concentration
LD50  Lethal Dose, 50% / Median Lethal Dose
mg/m³  Milligrams per Cubic Metre
OEL  Occupational Exposure Limit
pH  relates to hydrogen ion concentration using a scale of 0 (high acidic) to 14 (highly alkaline).
ppm  Parts Per Million
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
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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 ]