1 Identification Of The Substance /Preparation And Of The Company

Product Name
0-100ppm Hydrogen Sulphide, 0-500PPM Carbon Monoxide, 0-2.5% Methane, 15-18% Oxygen in Nitrogen

Product Use
Calibration Gas Mixture

Company Name/Address
See Heading and /or footer

Emergency Tel.
0400959760

Other Names
Not available

2 Composition/Information On Ingredients

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Proportion</th>
<th>CAS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrogen Sulphide</td>
<td>0-100ppm</td>
<td>7783-06-4</td>
</tr>
<tr>
<td>Carbon Monoxide</td>
<td>0-500ppm</td>
<td>630-08-0</td>
</tr>
<tr>
<td>Methane</td>
<td>0-2.5%</td>
<td>74-82-8</td>
</tr>
<tr>
<td>Oxygen</td>
<td>15-18%</td>
<td>7782-44-7</td>
</tr>
<tr>
<td>Nitrogen</td>
<td>Balance</td>
<td>7727-37-9</td>
</tr>
</tbody>
</table>

10000 ppm = 1%

3 Hazards Identification

Not classified as hazardous according to criteria of Australian National Occupational Health & Safety Commission (NOHSC), Australia.

Classified as dangerous goods, according to the Australian Code for the Transport of Dangerous Goods by Road and Rail.

Risk Phrases:
Not applicable

Safety Phrases:
Not applicable

Chronic Effects
Prolonged or repeated exposure to the hydrogen sulphide component may lead to symptoms, which include fatigue, headache, dizziness, hoarseness, cough and irritability. Repeated exposure to the carbon monoxide component of the mixture, may cause subtle behavioral changes and increase reaction times. It may also increase the risk of heart problems, and is suspected to be a cause of some reproductive effects; (low birth weight, neurological problems and congenital heart disease).

Inhalation
Gas mixture may be an irritant to the mucous membrane and respiratory tract. For Hydrogen Sulphide component the following should be noted: At concentrations of 0.13 ppm to 30 ppm, the odor is obvious and unpleasant. At 50 ppm, marked dryness and irritation of the nose and throat occurs. Prolonged exposure may cause a runny nose, cough, hoarseness, shortness of breath and pneumonia. AT 100-200 ppm, there is a temporary loss of smell. At 200 to 250 ppm, H$_2$S causes severe irritation as well as symptoms such as headache, nausea, vomiting and dizziness. Prolonged exposure may cause lung damage (build-up of fluid in the lungs). Exposure for 4 to 8 hours can cause death. Concentrations of 300-500 ppm cause these effects sooner and more severely. Death can occur in 1 to 4 hours. At 500 ppm, excitement, headache, dizziness, staggering, unconsciousness and respiratory failure occur in 5 minutes to 1 hour. Death can occur in 30 minutes to 1 hour. Exposures above 500 ppm rapidly cause unconsciousness and death. Severe exposures which do not result in death may cause long-term symptoms such as memory loss, paralysis of facial muscles or nerve tissue damage. Methane component can act as an asphyxiant, and the carbon monoxide component reduces the oxygen carrying capacity of the blood, by displacing oxygen. Health effects are related to the level of carbon monoxide in the blood. This level depends on the length of exposure, the concentration of CO in the air and
the workload. Transient headache occurs at (50-200 ppm); severe headache (above 200 ppm); nausea and possible collapse (above 400 ppm); increased irregular heartbeat (above 1,200 ppm); loss of consciousness and death (above 2,000 ppm). At concentrations above 5,000 ppm death may occur in minutes. The symptoms described above may appear sooner or at lower concentrations than expected, in cases of heavy workload and/or breathing rate.

Ingestion
Not applicable to gases; unlikely route of exposure.

Skin
Continuous exposure may cause frostbite slight irritation.

Eye
Can cause inflammation and irritation of the eyes at very low airborne concentrations. May cause frostbite injuries in contact with eyes or physical injury arising from sudden or uncontrolled gas release.

Other information
For exposure to the hydrogen sulphide component irritation of mucous membranes can lead to pulmonary oedema and conjunctival lesions. Eye exposure over several hours or days to hydrogen sulphide alone may result in ‘gas eyes’ or ‘sore eyes’ with symptoms of itching, irritation, tearing and burning. Above 50 ppm hydrogen sulphide, there is intense tearing, blurring and of vision and pain when looking at lights. Most symptoms disappear when exposure ceases. However, in serious cases the eye may be permanently damaged. Olfactory desensitization occurs with continued hydrogen sulphide exposure, and hence capacity for intoxication. Cellular respiration is inhibited, and subsequent pulmonary paralysis, collapse and death may ensue. When handled as this data sheet indicates and in accordance with all regulations, the amount of carbon monoxide present a health hazard, and methane is a simple asphyxiant. Whilst being non-toxic as supplied, the release of large amounts of mixture either through accident or poor work practice, could displace atmospheric oxygen to hazardous levels, or lead to a build up of carbon monoxide in confined and/or poorly ventilated spaces to hazardous levels. Due caution must be exercised and all exposure standards for components rigorously observed, and atmospheric oxygen levels maintained at 18%.

4 First Aid Measures

Inhalation
Prompt medical attention is mandatory in all cases of overexposure to carbon monoxide and hydrogen sulphide, or asphyxiant containing substances. Remove the source of contamination or move the victim to fresh air. Ensure the airways are clear and have qualified person give oxygen through a face mask if breathing is difficult. Apply artificial respiration if not breathing. Seek medical attention.

Ingestion
Ingestion is not considered a potential route of exposure

Skin
If swelling, redness, blistering or irritation occurs seek medical advice. Flush contaminated area with lukewarm, gently running water for at least several minutes. Cut around any clothing that may stick to affected skin and remove rest of garment. Wash skin with copious amounts of soap and water. Completely decontaminate clothing, shoes, etc., before re-use, or discard. Seek medical attention if effects persists.

Eye
Immediately flush contaminated eye with lukewarm water gently flowing for several minutes, after removing any contact lenses, and holding the eyelids opens. Seek immediate medical attention.

First aid facilities
Eyewash station, safety shower and normal washroom facilities.

Advice to doctor
Treat symptomatically.

Other information
Administration of oxygen at an elevated pressure; (2-2.5 atmospheres), or treatment in a hyperbaric chamber, has been shown to be beneficial for carbon monoxide exposure.
5 Fire Fighting Measures

**Extinguishing Media**
Water spray, dry chemical, 'alcohol' foam or carbon dioxide.

**Specific Methods**
Fire-fighters should wear full protective clothing and self contained breathing apparatus (SCBA) operated in positive pressure mode. H$_2$S component may collect in lower, poorly ventilated areas once released, travel some distance along the ground to a source of ignition and flash back. Use water to keep fire-exposed containers cool, to flush spills away from populated area and to dilute spills to non-combustible mixtures. Gas mixtures should not be flammable at this concentration of hydrogen sulphide, however if any fire is extinguished and gas continues to escape, an explosive mixture could form.

**Specific Hazards**
H$_2$S containing gas has the potential to be toxic. Fight fires from safe distance or protected location and stay upwind.

**Hazardous Combustion Products**
Combustion products may include sulphur dioxide, water and sulphur.

**Sensitivity to Static Discharge**
Sensitive

**Flash Point**
Not applicable

**Ignition Temperature**
Hydrogen Sulphide: 260°C, Carbon monoxide: 625°C

**Flammable Limits**
- **UEL**
  - Hydrogen Sulphide: 44.0%, Carbon monoxide component: 74%, Methane Component: 15%
- **LEL**
  - Hydrogen Sulphide: 4.0%, Carbon monoxide component: 12.5%, Methane Component: 5%

6 Accidental Release Measures

Evacuate the spill area of unnecessary personnel. As a precautionary measure, eliminate all ignition sources. In enclosed areas rescue personnel should wear AS 1715/1716 approved self contained breathing apparatus. Allow gas to escape to the external atmosphere, or preferably in a fume cupboard or well ventilated, remote area. Do not touch any spilled material. Prevent mixture from entering confined spaces. Leak checking may be done by pressure drop test or by using soapy water on joints and outlets. Shut cylinder valve to stop gas leaks from equipment if possible and safe to do so. If cylinder of cylinder valve is leaking then put on personal protective equipment, shut the cylinder valve, depressurise the equipment, disconnect cylinder from equipment and move the cylinder to a well ventilated area, preferably outdoors, and position to allow gas rather than liquid to escape. If not possible, allow any liquid to vaporise. Use of a flammable gas monitor will warn of gas build-up in locality. Notify all relevant local, state and federal government occupational and environmental authorities. If possible, repair the leak or allow the cylinder to vent in external atmosphere. Mark empty cylinders 'defective'. Return all faulty cylinders to supplier/manufacturer.
7 Handleing And Storage

Only properly trained personnel should handle compressed gases. Supplier identification labels must not be removed or defaced. Ascertain the identity of the gas before using it. A knowledge of cylinder color codes and the properties and hazards associated with each gas is required prior to using the product. Before using compressed gases, establish plans to cover any emergency situations that might arise. Before connecting the cylinder for use ensure that back feed from the system into the cylinder is prevented, if necessary by the use of a check valve or traps. Before connecting cylinder, check the complete gas system for suitability particularly for pressure rating. (a reducing regulator may be necessary for low pressure lines), and materials compatibility, etc. When doubt exists as to the correct handling procedure for a particular gas contact the supplier.

Handling

Personnel should never work alone with substance containing significant amounts of H₂S. Co-Workers must be in view at all times and be equipped and trained to perform rescue. If H₂S is released accidentally, immediately put on a respirator and leave the area until the severity of the release is determined. If necessary to enter an area contaminated with H₂S, follow precautions for confined space entry including use of a supplied-air respirator with full facepiece, the 'buddy system,' safety belts' and lifelines. Post 'NO SMOKING' signs in area of use. Do not use near welding operations, flames or hot surfaces. Prevent release of gas into workplace air. Use only in well-ventilated areas. Ground all cylinders. Transport cylinders by hand truck or cart designed for that purpose. Do not lift cylinders by their caps and do not handle them with oily hands. Secure cylinders in place, in an upright position at all times. Do not roll, slide or drop cylinders or permit them to strike each other. Leave valve cap on cylinder until cylinder is secured and ready for use, and avoid contact with oil or grease with the valve. Open and shut all valves at least once a day to prevent valve 'freezing.' Use a pressure reducing regulator when connecting cylinder to lower pressure (<750 psi) piping or systems. Use a check valve or trap in the discharge line to prevent hazardous back flow into the cylinder. Close all valves securely when not in use.

Storage

Storage of compressed gas cylinders shall be in compliance with State or Territory regulations. Cylinders shall be stored in a cool, dry, well ventilated area out of direct sunlight and way from heat and ignition sources. Store away from incompatible materials (oxidizers etc) on a level, fire-proof floor. No part of cylinders shall be exposed to temperatures above 55°C. Outside or detached storage is preferred. Cylinders should be moved by hand-truck or cart designed for that purpose. Inspect periodically for deficiencies such as damage or leaks. Consider leak detection and alarm systems, as required. Restrict access to storage area. Avoid any contact with oil or grease particularly to the cylinder valves. Anhydrous hydrogen sulphide, (Dewpoint <-40°C), can rapidly corrode or embrittle many metals, (eg. hard or stressed steels), but can be handles in aluminum, Inconel, Stellite and 304 and 316 stainless steels.

8 Exposure Control/Personal Protection

National Exposure standards

<table>
<thead>
<tr>
<th>Name</th>
<th>STEL (mg/m³)</th>
<th>STEL (ppm)</th>
<th>TWA (mg/m³)</th>
<th>TWA (ppm)</th>
<th>Foot-note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methane</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carbon</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monoxide</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hydrogen Sulphide</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Other Exposure Information

No exposure standards have been established for this product by the Australian National Occupational Health and Safety Commission (NOHSC), however, the exposure limits for individual ingredients are listed above.

Respiratory Protection

If engineering controls and work practices are not effective in controlling exposure to carbon monoxide and hydrogen sulphide component, then wear suitable AS1715/1716 approved respiratory protective equipment. Have appropriate personal protective equipment available for use in emergencies such as leaks or fire. A complete respiratory protection program including selection, fit testing, training, maintenance, inspection, cleaning and evaluation, must be instituted. Refer to the AS1715/1716 Standard.
RESPIRATORY PROTECTION GUIDELINES FOR HYDROGEN SULPHIDE GAS CONCENTRATIONS UP TO:

100 ppm SAR; OR SCBA.
250 ppm SAR operated in a continuous flow mode.
300 ppm Full-facepiece SCBA; or full-facepiece SAR.

EMERGENCY OR PLANNED ENTRY IN UNKNOWN CONCENTRATION OR IDLH CONDITIONS:

Positive pressure, full-facepiece SCBA; or positive pressure, full-facepiece SAR with an auxiliary positive pressure SCBA.

ESCAPE: Gas mask with canister to protect against H₂S; or escape-type SCBA. NOTE: The IDLH concentration for H₂S is 300 ppm. Substance can cause eye irritation and damage, and will require eye protection equipment. Recommendations apply only to approved respirators. Air purifying respirators do not protect against oxygen-deficient atmospheres.

A leak detector and alarm system should be considered as supplementary control system.

RESPIRATORY PROTECTION GUIDELINES FOR CARBON MONOXIDE CONCENTRATIONS IN AIR:

UP TO 350ppm:  SAR; or SCBA.
UP TO 875PPM:  SAR operated in a continuous flow mode.
UP 10 1500ppm:  Full-facepiece SCBA; or full-facepiece SAR; or gas mask with cannister to protect against carbon monoxide.

EMERGENCY OR PLANNED ENTRY INTO UNKNOWN CONCENTRATION OR IDLH CONDITIONS:

Positive pressure, full-facepiece SCBA; or positive pressure, full-facepiece SAR with an auxiliary positive pressure SCBA.

ESCAPE: Gas mask with canister to protect against carbon monoxide; or escape-type SCBA:

NOTE:  The IDLH concentration for carbon monoxide is 1500ppm

NOTE:  End of Service Life Indicator required

ABBREVIATIONS:  SAR = supplied-air respirator, SACA = self-contained breathing apparatus, IDLH = Immediately Dangerous to Life or Health

NOTE:  In these recommendations the IDLH concentration is defined as the maximum concentration which would not cause any escape-impairing symptoms or irreversible health effects to a person exposed for 30 minutes if the respirator failed.

Eye Protection
The use of chemical goggles or safety glasses with side shield protection complying with AS/NZS 1337 is recommended.

Hand Protection
Chemical resistant or thermal protection gloves complying with AS/NZS 2161 is recommended.

Footwear
Personnel engaged in the movement of gas cylinders shall be provided with safety footwear.

Body Protection
Overalls or similar protection apparel.

Eng. Controls
Engineering control methods include mechanical ventilation (dilution and local exhaust), process or personnel enclosure, control of process conditions, and process modification. Because of the potential hazard associated with the hydrogen sulphide component of this substance, stringent control measures such as enclosure or isolation may be necessary. Use a non-sparking, grounded, corrosion-resistant ventilation system separate from other exhaust ventilation systems. Exhaust through scrubber directly to the outside atmosphere. Supply sufficient replacement air to make up for the air removed by exhaust systems. Ensure that control systems are properly designed and maintained, and comply with occupational, environmental, fire, and other applicable regulations. Provide supplied air or self-contained breathing apparatus for emergency or non-routine situations where gas levels is excessive.
9 Physical and Chemical Properties

Appearance Colorless gas, with offensive odor at normal room temperature.

Melting Point
- Hydrogen Sulphide: -85°C
- Carbon monoxide component: -207°C

Boiling Point
- Hydrogen Sulphide: -60.3°C
- Carbon monoxide component: -191.4°C
- Methane: -161.4°C

Solubility in Water
- Hydrogen Sulphide: 437mL of gas in 100ml (0°C); 186 ml of gas in 100ml (40°C)
- Carbon monoxide: 0.035 m³/kg (0°C)

Solubility in Organic Solvents Soluble in hydrocarbon solvents and ether.

Specific Gravity Not Available

Vapour Pressure
- Hydrogen Sulphide: 1875 kPa (20°C)

Vapour Density (Air = 1)
- Hydrogen Sulphide: 1.21 (air = 1)
- Carbon monoxide component: 0.968 (Air = 1)

Odour Threshold
- Hydrogen Sulphide: 0.13 ppm

Specific Properties of Risk
- For Hydrogen Sulphide odour of rotten eggs from 0.13 ppm to 100 ppm. Paralyses sense of smell above 100 ppm Hydrogen Sulphide

Flash Point Not Available

Flammability Non flammable gas

Ignition Temperature
- Hydrogen Sulphide: 260°C
- Carbon monoxide: 652°C

Flammable Limits
- LEL: Hydrogen Sulphide: 4.0%, Carbon monoxide: 12.5%
- UEL: Hydrogen Sulphide: 44.0%, Carbon monoxide: 74%

10 Stability and reactivity

Stability Stable

Hazardous Polymerization Will not occur
H₂S component is strongly oxidizing and highly reactive, avoid following: nitrates, peroxides, perchlorates, metals (e.g. Copper and lead) and metal oxides (e.g. Nickel oxide). Carbon monoxide can also react strongly with oxidizing agents and several metals (e.g. nickel).

Hazardous Reaction

Hydrogen Sulphide will explode or burn over a wide range of air mixtures. It also becomes dangerously reactive when mixed with concentrated nitric acid or sulphuric acid, or other strong oxidizers. Vapours combust spontaneously when mixed with vapours of chloride, oxygen difluoride or nitrogen trifluoride. When heated above 90°C, carbon monoxide can react strongly with oxidizing agents (e.g. nitrates, perchlorates) and several metals (e.g. nickel). Can be used in a lot of common metals up to 3450 kpa. At greater pressures toxic and corrosive metal carbonyl compounds are formed. (See supplier).

11 Toxicological Information

Toxicology Information

Carbon monoxide acts as a chemical asphyxiant by reducing the oxygen transport properties of the blood. It reacts with the hemoglobin forming carboxyhemoglobin thus preventing the hemoglobin from transporting oxygen. Persons in ill health where such illness would be aggravated by exposure to these mixtures should not be allowed to work with or handle these products.

Inhalation

Gas mixture may be an irritant to the mucous membrane and respiratory tract. For Hydrogen Sulphide component the following should be noted: At concentrations of 0.13 ppm to 30 ppm, the odor is obvious and unpleasant. At 50 ppm, marked dryness and irritation of the nose and throat occurs. Prolonged exposure may cause a runny nose, cough, hoarseness, shortness of breath and pneumonia. At 100-200 ppm, there is a temporary loss of smell. At 200 to 250 ppm, H₂S causes severe irritation as well as symptoms such as headache, nausea, vomiting and dizziness. Prolonged exposure may cause lung damage (build-up of fluid in the lungs). Exposure for 4 to 8 hours can cause death. Concentrations of 300-500 ppm cause these effects sooner and more severely. Death can occur in 1 to 4 hours. At 500 ppm, excitement, headache, dizziness, staggering, unconsciousness and respiratory failure occur in 5 minutes to 1 hour. Death can occur in 30 minutes to 1 hour. Exposures above 500 ppm rapidly cause unconsciousness and death. Severe exposures which do not result in death may cause long-term symptoms such as memory loss, paralysis of facial muscles or nerve tissue damage. Methane component can act as an asphyxiant, and the carbon monoxide component reduces the oxygen carrying capacity of the blood, by displacing oxygen. Health effects are related to the level of carbon monoxide in the blood. This level depends on the length of exposure, the concentration of CO in the air and the workload. Transient headache occurs at 50-200 ppm); severe headache (above 200 ppm); nausea and possible collapse (above 400 ppm); increased irregular heartbeat (above 1,200 ppm); loss of consciousness and death (above 2,000 ppm). At concentrations above 5,000 ppm death may occur in minutes. The symptoms described above may appear sooner or at lower concentrations than expected, in cases of heavy workload and/or breathing rate.

Ingestion

Not applicable to gases; unlikely route of exposure.

Skin

May cause frostbite injuries or slight irritation in contact with skin.

Eye

Can cause inflammation and irritation of the eyes, even at very low airborne concentrations. May also cause frostbite injuries in contact with eyes or physical injury arising from sudden or uncontrolled gas release.

Chronic Effects

Repeated exposure to the carbon monoxide or hydrogen sulphide component of the mixture, may cause subtle behavioral changes, fatigue, headache, dizziness, hoarseness, cough and irritability and increase reaction times. It may also increase the risk of heart problems, and is suspected to be a cause of some reproductive effects; (low birth weight, neurological problems and congenital heart disease).
12 Ecological Information

Mobility Not available
Persistence/ Degradability Not available
Bioaccumulation Not available
Etoxicity Not available

13 Disposal Considerations

Waste treatment and disposal procedures must be performed by trained, experienced personnel with appropriate protective equipment in approved treatment facilities, and in accordance with all federal, state and local government requirements. Reuse or recycling may also be possible and should be investigated. Alternately, return properly labeled cylinders to the supplier with all valve outlet plugs, caps and protection caps secured, for proper disposal.

14 Transport Information

This material is classified as Clas 2.2 Dangerous goods (Non-flammable Non-toxic Gas) according to the Australian Code for the Transport of Dangerous Goods by Road and Rail. Dangerous Goods of Class 2.2 (Non-flammable Non-toxic Gas) are incompatible in a placard load with any of the following:

- Class 1, Explosive
- Class 4.2, Spontaneously Combustible Substance
- Class 5.2, Organic Peroxide

U.N. Number 1956
Proper Shipping Name COMPRESSED GAS, N.O.S – (CONTAINS METHANE IN NITROGEN)
DG Class 2.2
Hazchem Code 2T
Packaging Method 3.8.2

Packing Group
EPG Number 2C1
IREG Number 06
15 Regulatory information

Risk Phrase

Poisons Schedule Not Scheduled

16 Other Information

Contact 24 HOUR EMERGENCY CONTACT: The Operator: 0400959760

Person/Point

Address CAC GAS & Instrumentation Pty Ltd
Promtel
Unit 10, Junction Estate
2 Duck Street, Auburn, NSW, 2144

Manufacturers Advice

References

SDS History

Poisons Schedule