

# Calcium carbide

sc-278804

## Material Safety Data Sheet

Hazard Alert Code  
Key:

EXTREME

HIGH

MODERATE

LOW

### Section 1 – CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME  
calcium carbide

STATEMENT OF HAZARDOUS NATURE

CONSIDERED A HAZARDOUS SUBSTANCE ACCORDING TO OSHA 29 CFR 1910.1200.

NFPA



### SUPPLIER

Santa Cruz Biotechnology, Inc.  
2145 Delaware Avenue  
Santa Cruz, California 95060  
800.457.3801 or 831.457.3800

### EMERGENCY

ChemWatch  
Within the US & Canada: 877-715-9305  
Outside the US & Canada: +800 2436 2255  
(1-800-CHEMCALL) or call +613 9573 3112

### SYNONYMS

CaC<sub>2</sub>, acetylenogen, "calcium acetylide"

### Section 2 – HAZARDS IDENTIFICATION

#### CHEMWATCH HAZARD RATINGS

	Min	Max
Flammability:	4	
Toxicity:	1	
Body Contact:	2	
Reactivity:	1	
Chronic:	2	

Min/Nil=0  
Low=1  
Moderate=2  
High=3  
Extreme=4



#### CANADIAN WHMIS SYMBOLS



#### EMERGENCY OVERVIEW

##### RISK

Contact with water liberates extremely flammable gases.

Extremely flammable.  
May cause long-term adverse effects in the aquatic environment.

#### POTENTIAL HEALTH EFFECTS

##### ACUTE HEALTH EFFECTS

###### SWALLOWED

■ The material has NOT been classified as "harmful by ingestion".  
This is because of the lack of corroborating animal or human evidence.

###### EYE

■ Although the material is not thought to be an irritant, direct contact with the eye may cause transient discomfort characterized by tearing or conjunctival redness (as with windburn).  
Slight abrasive damage may also result.

###### SKIN

■ The material is not thought to produce adverse health effects or skin irritation following contact (as classified using animal models).

Nevertheless, good hygiene practice requires that exposure be kept to a minimum and that suitable gloves be used in an occupational setting.

■ Open cuts, abraded or irritated skin should not be exposed to this material.

■ Entry into the blood-stream, through, for example, cuts, abrasions or lesions, may produce systemic injury with harmful effects.

Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.

■ Solution of material in moisture on the skin, or perspiration, may markedly increase skin corrosion and accelerate tissue destruction.

###### INHALED

■ Inhalation of vapours may cause drowsiness and dizziness.

This may be accompanied by narcosis, reduced alertness, loss of reflexes, lack of coordination and vertigo.

■ There is some evidence to suggest that the material can cause respiratory irritation in some persons.

The body's response to such irritation can cause further lung damage.

■ No symptoms occur from the presence of 2.

5% acetylene in air (the LEL); at 10–20% a reversible narcosis can occur.

■ The only signs during exposure to phosphine may be mild respiratory irritation although some victims report dyspnea, weakness, tremor and convulsions.

Phosphine is a very toxic gas.

■ Inhalation of dust induces violent coughing and painful nasal irritation.

■ The vapor may produce extreme discomfort of the upper respiratory tract.

###### CHRONIC HEALTH EFFECTS

■ Limited evidence suggests that repeated or long-term occupational exposure may produce cumulative health effects involving organs or biochemical systems.

Long term exposure to high dust concentrations may cause changes in lung function i.e. pneumoconiosis; caused by particles less than 0.5 micron penetrating and remaining in the lung.

Chronic phosphine poisoning is said to resemble chronic phosphorus poisonings which produces stomach pains, vomiting and diarrhoea. Chronic poisoning, characterised by anemia, bronchitis, gastrointestinal disturbances and visual, speech and motor disturbances may result from continued exposure to low concentrations.

Chronic exposure may produce systemic poisoning characterised by cachexia (general ill-health and malnutrition), anaemia, bronchitis, and necrosis of the mandible, the so-called "phossy" or Lucifer's" jaw. Other bones may also be involved as demonstrated by chronic systemic administration to animals which produces dense growth lines in all extremities proximal to the epiphyses (phosphoschicht).

### Section 3 – COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
calcium carbide	75–20–7	>98
NOTE: Reacts with water or in moist air to evolve		
<a href="#">acetylene</a>	74–86–2	
<a href="#">phosphine</a>	7803–51–2	
<a href="#">calcium hydroxide</a>	1305–62–0	

### Section 4 – FIRST AID MEASURES

###### SWALLOWED

■

- Immediately give a glass of water.
- First aid is not generally required. If in doubt, contact a Poisons Information Center or a doctor.

###### EYE

■ If this product comes in contact with eyes:

- Wash out immediately with water.
- If irritation continues, seek medical attention.

## SKIN

■ If skin or hair contact occurs:

- Flush skin and hair with running water (and soap if available).
- Seek medical attention in event of irritation.

## INHALED

■

- If fumes or combustion products are inhaled remove from contaminated area.
- Other measures are usually unnecessary.

## NOTES TO PHYSICIAN

■ Treat symptomatically.

For severe acute or short term repeated exposures to phosphine:

- There is no antidote. Clinical manifestations include headache, fatigue, nausea, vomiting, cough, dyspnea, paresthesias, jaundice, ataxia, intention tremor, weakness and diplopia.
- i Care is supportive and all obviously symptomatic patients should be monitored in an intensive care setting. Watch for dysrhythmias. ii Replace fluids/electrolytes. iii Follow blood chemistries (calcium, phosphorus, glucose, prothrombin time, CBC) at least daily. iv Follow renal and hepatic function at least daily. Avoid any alcohol intake.

## Section 5 – FIRE FIGHTING MEASURES

Vapour Pressure (mmHG):	Not available.
Upper Explosive Limit (%):	Not available.
Specific Gravity (water=1):	2.22
Lower Explosive Limit (%):	Not available.

## EXTINGUISHING MEDIA

■

- DO NOT use halogenated fire extinguishing agents.

DO NOT USE WATER, CO2 OR FOAM ON SUBSTANCE ITSELF

For SMALL FIRES:

- Dry chemical, soda ash or lime.

For LARGE FIRES:

- DRY sand, dry chemical, soda ash;

## FIRE FIGHTING

■

- Alert Emergency Responders and tell them location and nature of hazard.
- May be violently or explosively reactive.

When any large container (including road and rail tankers) is involved in a fire, consider evacuation by 800 metres in all directions.

## GENERAL FIRE HAZARDS/HAZARDOUS COMBUSTIBLE PRODUCTS

■

- May ignite on contact with air, moist air or water.
- May react vigorously or explosively on contact with water.

Combustion products include: carbon monoxide (CO), carbon dioxide (CO<sub>2</sub>), other pyrolysis products typical of burning organic material.

Non-flammable in the dry state, but on contact with water liberates flammable acetylene gas. Impure carbide may evolve highly toxic phosphine. Contact with water, acid or acid fumes evolves heat and flammable vapours.

## FIRE INCOMPATIBILITY

■ Avoid contamination with oxidizing agents i.e. nitrates, oxidizing acids, chlorine bleaches, pool chlorine etc. as ignition may result.

## PERSONAL PROTECTION

Glasses:

Chemical goggles.

Gloves:

Respirator:

Type ABG-P Filter of sufficient capacity

## Section 6 – ACCIDENTAL RELEASE MEASURES

### MINOR SPILLS



- Material from spill may be contaminated with water resulting in generation of gas which subsequently may pressure closed containers.
- Hold spill material in vented containers only and plan for prompt disposal.
- Eliminate all ignition sources.
- Cover with DRY earth, sand or other non-combustible material.

### MAJOR SPILLS



- Clear area of personnel and move upwind.
- Alert Emergency Responders and tell them location and nature of hazard.

## Section 7 – HANDLING AND STORAGE

### PROCEDURE FOR HANDLING



- Avoid all personal contact, including inhalation.
- Wear protective clothing when risk of overexposure occurs.

Empty containers may contain residual dust which has the potential to accumulate following settling. Such dusts may explode in the presence of an appropriate ignition source.

- Do NOT cut, drill, grind or weld such containers.
- In addition ensure such activity is not performed near full, partially empty or empty containers without appropriate workplace safety authorisation or permit.

### RECOMMENDED STORAGE METHODS

■ Storage containers must be hermetically sealed; the product must be stored under an inert, dry gas.

For low viscosity materials and solids: Drums and jerricans must be of the non-removable head type. Where a can is to be used as an inner package, the can must have a screwed enclosure.

### STORAGE REQUIREMENTS

■ DO NOT store near acids, or oxidizing agents.

KEEP DRY! Packages must be protected from water ingress.

### FOR MINOR QUANTITIES:

- Store in an indoor fireproof cabinet or in a room of noncombustible construction and
- provide adequate portable fire-extinguishers in or near the storage area.

## Section 8 – EXPOSURE CONTROLS / PERSONAL PROTECTION

### EXPOSURE CONTROLS

Source	Material	TWA ppm	TWA mg/m <sup>3</sup>	STEL ppm	STEL mg/m <sup>3</sup>	Peak ppm	Peak mg/m <sup>3</sup>	TWA F/CC	Notes
US NIOSH Recommended Exposure Limits (RELs)	acetylene (Acetylene)					2500	2662		
Canada – Yukon Permissible Concentrations for Airborne Contaminant Substances	acetylene (Acetylene)		(See Table 7)						
US – Oregon Permissible Exposure Limits (Z-1)	acetylene (Acetylene)	1,000	–						Bold print identifies substances for which the Oregon Permissible Exposure Limits (PELs) are different than the federal Limits.

Canada – Saskatchewan Occupational Health and Safety Regulations – Contamination Limits	acetylene (Diesel fuel as total hydrocarbons, (vapour))	100	150			Skin
Canada – Saskatchewan Occupational Health and Safety Regulations – Contamination Limits	acetylene (Aliphatic hydrocarbon gases, Alkane [C1-C4])	1000	1250			
Canada – Alberta Occupational Exposure Limits	phosphine (Phosphine)	0.3	0.4	1	1.4	
Canada – British Columbia Occupational Exposure Limits	phosphine (Phosphine)	0.3		1		
US – Minnesota Permissible Exposure Limits (PELs)	phosphine (Phosphine)	0.3	0.4	1	1	
US OSHA Permissible Exposure Levels (PELs) – Table Z1	phosphine (Phosphine)	0.3	0.4			
US ACGIH Threshold Limit Values (TLV)	phosphine (Phosphine)	0.3		1		TLV Basis: upper respiratory tract irritation; headache; gastrointestinal irritation; central nervous system impairment
US NIOSH Recommended Exposure Limits (RELs)	phosphine (Phosphine)	0.3	0.4	1	1	
US – Tennessee Occupational Exposure Limits – Limits For Air Contaminants	phosphine (Phosphine)	0.3	0.4	1	1	
US – Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants	phosphine (Phosphine)	0.3	0.4			
US – Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants	phosphine (Phosphine)	0.3	0.4	1	1	
US – California Permissible Exposure Limits for Chemical Contaminants	phosphine (Phosphine; PH3)	0.3	0.4	1	1	
US – Idaho – Limits for Air Contaminants	phosphine (Phosphine)	0.3	0.4			

Canada – Quebec Permissible Exposure Values for Airborne Contaminants (English)	phosphine (Phosphine)	0.3	0.42	1	1.4	
Canada – Saskatchewan Occupational Health and Safety Regulations – Contamination Limits	phosphine (Phosphine)	0.3		1		
US – Hawaii Air Contaminant Limits	phosphine (Phosphine)	0.3	0.4	1	1.4	
US – Alaska Limits for Air Contaminants	phosphine (Phosphine)	0.3	0.4	1	1	
Canada – Yukon Permissible Concentrations for Airborne Contaminant Substances	phosphine (Phosphine)	0.3	0.4	1	1	
US – Washington Permissible exposure limits of air contaminants	phosphine (Carbonyl chloride-(Phosgene))	0.1		0.3		
US – Washington Permissible exposure limits of air contaminants	phosphine (Phosphine)	0.3		1		
Canada – Nova Scotia Occupational Exposure Limits	phosphine (Phosphine)	0.3		1		TLV Basis: upper respiratory tract irritation; headache; gastrointestinal irritation; central nervous system impairment
Canada – Prince Edward Island Occupational Exposure Limits	phosphine (Phosphine)	0.3		1		TLV Basis: upper respiratory tract irritation; headache; gastrointestinal irritation; central nervous system impairment
US – Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants	phosphine (Phosphine)	0.3	0.4			
US – Michigan Exposure Limits for Air Contaminants	phosphine (Phosphine)	0.3	0.4	1	1	
US – Oregon Permissible Exposure Limits (Z-1)	phosphine (Phosphine)	0.3	0.4			
Canada – Northwest Territories Occupational Exposure Limits (English)	phosphine (Phosphine)	0.3	0.42	1	1.3	

Canada – Alberta Occupational Exposure Limits	calcium hydroxide (Calcium hydroxide)	5	
Canada – British Columbia Occupational Exposure Limits	calcium hydroxide (Calcium hydroxide)	5	
US – Minnesota Permissible Exposure Limits (PELs)	calcium hydroxide (Calcium hydroxide)	5	
US NIOSH Recommended Exposure Limits (RELs)	calcium hydroxide (Calcium hydroxide)	5	
US OSHA Permissible Exposure Levels (PELs) – Table Z1	calcium hydroxide (Calcium hydroxide – Total dust)	15	
US OSHA Permissible Exposure Levels (PELs) – Table Z1	calcium hydroxide (Calcium hydroxide – Respirable fraction)	5	
US ACGIH Threshold Limit Values (TLV)	calcium hydroxide (Calcium hydroxide)	5	TLV Basis: eye, upper respiratory tract & skin irritation
US – Tennessee Occupational Exposure Limits – Limits For Air Contaminants	calcium hydroxide (Calcium hydroxide Respirable fraction)	5	
US – Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants	calcium hydroxide (Calcium hydroxide)	5	
US – Tennessee Occupational Exposure Limits – Limits For Air Contaminants	calcium hydroxide (Calcium hydroxide Total dust)	15	
US – California Permissible Exposure Limits for Chemical Contaminants	calcium hydroxide (Calcium hydroxide)	5	
US – Idaho – Limits for Air Contaminants	calcium hydroxide (Calcium hydroxide – Total dust)	15	
US – Idaho – Limits for Air Contaminants	calcium hydroxide (Calcium hydroxide – Respirable fraction)	5	
US – Alaska Limits for Air Contaminants	calcium hydroxide (Calcium hydroxide)	5	
US – Michigan Exposure Limits for Air Contaminants	calcium hydroxide	5	
US – Oregon Permissible Exposure Limits (Z-1)	calcium hydroxide (Calcium hydroxide Total Dust)	– 10	Bold print identifies substances for which the Oregon Permissible Exposure Limits (PELs) are different than the federal Limits.

US – Hawaii Air Contaminant Limits	calcium hydroxide (Calcium hydroxide)		5		
Canada – Yukon Permissible Concentrations for Airborne Contaminant Substances	calcium hydroxide (Calcium hydroxide)	–	5	–	10
US – Washington Permissible exposure limits of air contaminants	calcium hydroxide (Calcium hydroxide)		5		10
Canada – Saskatchewan Occupational Health and Safety Regulations – Contamination Limits	calcium hydroxide (Calcium hydroxide)		5		10
US – Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants	calcium hydroxide (Calcium hydroxide- Total dust)		15		
US – Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants	calcium hydroxide (Calcium hydroxide – Respirable fraction)		5		
Canada – Quebec Permissible Exposure Values for Airborne Contaminants (English)	calcium hydroxide (Calcium hydroxide)		5		
Canada – Prince Edward Island Occupational Exposure Limits	calcium hydroxide (Calcium hydroxide)		5		TLV Basis: eye, upper respiratory tract & skin irritation
US – Oregon Permissible Exposure Limits (Z-1)	calcium hydroxide (Calcium hydroxide Respirable Fraction)	–	5		Bold print identifies substances for which the Oregon Permissible Exposure Limits (PELs) are different than the federal Limits.
Canada – Northwest Territories Occupational Exposure Limits (English)	calcium hydroxide (Calcium hydroxide)		5		10
Canada – Nova Scotia Occupational Exposure Limits	calcium hydroxide (Calcium hydroxide)		5		TLV Basis: eye, upper respiratory tract & skin irritation
The following materials had no OELs on our records					
• calcium carbide: CAS:75–20–7					

PERSONAL PROTECTION





#### RESPIRATOR

- type abg-p filter of sufficient capacity.

Consult your EHS staff for recommendations

#### EYE



- Safety glasses with side shields.
- Chemical goggles.

#### HANDS/FEET

■ Suitability and durability of glove type is dependent on usage. Important factors in the selection of gloves include: such as:

- frequency and duration of contact,
- chemical resistance of glove material,
- glove thickness and
- dexterity

Select gloves tested to a relevant standard (e.g. Europe EN 374, US F739).

- When prolonged or frequently repeated contact may occur, a glove with a protection class of 5 or higher (breakthrough time greater than 240 minutes according to EN 374) is recommended.
- When only brief contact is expected, a glove with a protection class of 3 or higher (breakthrough time greater than 60 minutes according to EN 374) is recommended.
- Contaminated gloves should be replaced.

Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly.

Application of a non-perfumed moisturiser is recommended.

Wear chemical protective gloves, eg. PVC.

#### OTHER



- Overalls.
- Eyewash unit.
- Some plastic personal protective equipment (PPE) (e.g. gloves, aprons, overshoes) are not recommended as they may produce static electricity.
- For large scale or continuous use wear tight-weave non-static clothing (no metallic fasteners, cuffs or pockets), non sparking safety footwear.

#### ENGINEERING CONTROLS



- Local exhaust ventilation is required where solids are handled as powders or crystals; even when particulates are relatively large, a certain proportion will be powdered by mutual friction.
- Exhaust ventilation should be designed to prevent accumulation and recirculation of particulates in the workplace.

## Section 9 – PHYSICAL AND CHEMICAL PROPERTIES

### PHYSICAL PROPERTIES

Solid.

State	Divided solid	Molecular Weight	64.10
Melting Range (°F)	837	Viscosity	Not Applicable
Boiling Range (°F)	4172	Solubility in water (g/L)	Reacts
Flash Point (°F)	Not available.	pH (1% solution)	Not available.
Decomposition Temp (°F)	Not Available	pH (as supplied)	Not applicable
Autoignition Temp (°F)	>617 dustlayer	Vapour Pressure (mmHG)	Not available.
Upper Explosive Limit (%)	Not available.	Specific Gravity (water=1)	2.22

Lower Explosive Limit (%)	Not available.	Relative Vapor Density (air=1)	Not available.
Volatile Component (%vol)	Not available.	Evaporation Rate	Not available

#### APPEARANCE

Greyish-black, irregular hard solid with garlic like odour. HAZARD. When wet with water reacts vigorously (with exotherm) evolving highly flammable acetylene gas; MAY generate sufficient heat to ignite gas. Residue is alkali lime (calcium hydroxide). Also vigorously with acids. Material is a energetic reducing agent when heated.

Terrestrial fate An estimated Koc value of 38, determined from a log Kow of 0.37 indicates that acetylene is expected to have very high mobility in soil. Volatilisation of acetylene from moist soil surfaces is expected to be an important fate process given an estimated Henry's Law constant of 0.022 atm-cu m/mole derived from its vapor pressure, 4.04 x10+4 mm Hg , and water solubility, 1,200 mg/L. Acetylene will volatilise from dry soil surfaces based upon its vapor pressure. A 0% theoretical BOD in 28 days using an activated sludge inoculum and the Japanese MITI test suggests that biodegradation is not expected to be an important environmental fate process in soil.

Material	Value
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### Section 10 – CHEMICAL STABILITY

#### CONDITIONS CONTRIBUTING TO INSTABILITY



- May heat spontaneously
- Identify and remove sources of ignition and heating.

#### STORAGE INCOMPATIBILITY



- Contact with acids produces toxic fumes

Segregate from alcohol, water.

Acetylene:

- is unstable and shock sensitive in the liquid state
- decomposes violently following cylinder failure
- may polymerise due to heating
- may explode due to heating with or without contact with air
- may decompose in air due to heating and elevated pressures, causing powerful detonation
- is a strong reducing agent that reacts with oxidisers (i.e. chlorine, fluorine), especially under the influence of light
- forms shock-sensitive acetylide compounds with powdered active metals, copper, copper salts, mercury, mercury salts, silver, silver salt; moisture, certain acids and alkaline materials may enhance the formation of copper acetylides
- reacts with chlorine to form acetylene chloride
- reacts with bromine, caesium hydride, cobalt, halogens, iodine, mercuric nitrate, nitric acid, potassium, rubidium hydride, trifluoromethyl hypofluorite, sodium hydride, ferrosilicon, ozone

Calcium carbide

- forms explosive acetylene gas on contact with water, moist air, steam or alcohols
- reacts violently with acid, acid fumes (e.g hydrogen chloride), copper salts, strong oxidisers (bromine, chlorine, iodine etc.), iron trichloride, tin dichloride
- may explode when mixed with silver nitrate or sodium peroxide
- is incompatible with oxidisers, hydrogen chloride, methanol, copper salt solutions, lead fluoride, magnesium, selenium, stannous chloride,
- reacts with sulfur vapour at 500 deg C with incandescence
- Phosphine gas may react with certain metals and cause corrosion, especially at elevated temperatures and humidities.
- Metals such as copper, brass, and other copper alloys, aluminium and precious metals such as gold and silver are susceptible to corrosion by phosphine. Small electric motors smoke detectors, brass sprinkler heads, batteries and battery chargers, fork lifts, temperature monitoring systems, switching gears, communication devices, computers, calculators and other electrical equipment may be damaged by this gas.
- Phosphine will also react with certain metallic salts and therefore sensitive items such as photographic film, some inorganic pigments, etc., should not be exposed to the gas.
- Other incompatible materials include natural rubber, neoprene, polyethylene, PVC.
- Even small amounts of oxygen in phosphine give an explosive mixture in which autoignition occurs at low pressures.
- Pure phosphine does not spontaneously ignite in air below 150 deg. C. unless it is thoroughly dried, when it ignites in cold air. The presence of diphosphanes in phosphine as normally prepared causes it to ignite spontaneously in air, even below -15 deg. C. Traces of oxidants promote pyrophoricity (e.g dinitrogen trioxide, nitrous acid or similar oxidants).
- Lower flammability limit of pure phosphine in moist air (0.39 vol% water vapour) at 1037 mbar is 2.1% at 10 deg. C and 1.8% at 50 deg. C.

- Ignition occurs on contact of phosphine with chlorine or bromine or their aqueous solutions (hypochlorous or hypobromous acids).
- Passage of phosphine into silver nitrate solution causes ignition or explosion depending on gas rate.
- Interaction of phosphine with boron trichloride is energetic.
- Mercury(II) nitrate solution gives a complex phosphide, explosive when dry.
- In contact with chlorine, phosphine ignites at ambient temperatures.

Avoid reaction with oxidizing agents.

- NOTE: May develop pressure in containers; open carefully. Vent periodically.

For incompatible materials – refer to Section 7 – Handling and Storage.

## Section 11 – TOXICOLOGICAL INFORMATION

calcium carbide

### TOXICITY AND IRRITATION

■ unless otherwise specified data extracted from RTECS – Register of Toxic Effects of Chemical Substances.

#### CALCIUM HYDROXIDE:

#### PHOSPHINE:

■ Asthma-like symptoms may continue for months or even years after exposure to the material ceases. This may be due to a non-allergenic condition known as reactive airways dysfunction syndrome (RADS) which can occur following exposure to high levels of highly irritating compound. Key criteria for the diagnosis of RADS include the absence of preceding respiratory disease, in a non-atopic individual, with abrupt onset of persistent asthma-like symptoms within minutes to hours of a documented exposure to the irritant. A reversible airflow pattern, on spirometry, with the presence of moderate to severe bronchial hyperreactivity on methacholine challenge testing and the lack of minimal lymphocytic inflammation, without eosinophilia, have also been included in the criteria for diagnosis of RADS. RADS (or asthma) following an irritating inhalation is an infrequent disorder with rates related to the concentration of and duration of exposure to the irritating substance. Industrial bronchitis, on the other hand, is a disorder that occurs as result of exposure due to high concentrations of irritating substance (often particulate in nature) and is completely reversible after exposure ceases. The disorder is characterised by dyspnea, cough and mucus production.

#### CALCIUM CARBIDE:

■ No significant acute toxicological data identified in literature search.

No acute or chronic human exposure data available.

#### ACETYLENE:

TOXICITY	IRRITATION
Inhalation (human) TLo: 20 pph=20%	No data available
Inhalation (human) LLo: 50 pph/5 mins.	

#### ■ For acetylene:and methylacetylene

Acute toxicity: With decades of production and use, the acute toxicity of acetylene is well understood to be that of a simple asphyxiant. Data regarding the acute inhalation toxicity to animals and humans clearly show that acetylene is of a very low acute toxicity. Overall, the data support a rat LC50 > 100,000 ppm.

In humans, acetylene is not acutely toxic below its lower explosive limit of 2.5% (25,000 ppm). Inhalation of 10% acetylene (100,000 ppm) for 1 hour does not cause acute toxicity. Inhalation of 33% or 35% has caused unconsciousness within 7 and 5 minutes, respectively. Two deaths and a near fatality occurred after inhalation of 40% acetylene during manufacture with calcium carbide . The cause of these deaths was attributed to the phosphate and arsine impurities in crude acetylene and carbon monoxide present in the work area.

In rats, a concentration of 78% acetylene (780,000 ppm) produced anesthesia in 15 minutes, and inhalation of 90% for 2 hours caused respiratory failure . Inhalation of 850,000 ppm caused increased respiratory volume and frequency and induced anesthesia in dogs, with rapid recovery . Therefore, the LC50 value in this study was greater than 850,000 ppm.

It has been well established that acetylene behaves in mammalian systems primarily as a central nervous depressant and asphyxiant at high dose levels (100,000 ppm in air or above). It produces varying degrees of temporary and reversible narcosis when administered with oxygen in concentrations of => 100,000 ppm (10% in air). Experimental data shows the lungs rapidly excrete acetylene. The gas also diffuses rapidly from the peritoneal and pleural cavities and diffuses through the skin. Therefore, acetylene is unlikely to persist in the body, even after repeated exposure to low concentrations that may be encountered in the workplace

Repeat dose toxicity: Rats, mice, guinea pigs, rabbits and dogs were exposed to acetylene (in oxygen) at anaesthetic concentrations (25–80%) for a number of days/ hours.

At the lower concentrations (concentrations were not stated) the animals appeared only slightly sleepy. At higher concentrations the majority of animals fell asleep after 15–20 minutes. In general, these animals were not in deep narcosis. The rats, rabbits, guinea pigs and dogs generally recovered from narcosis in a short time. However, the mice did not survive treatment. Some of the animals died spontaneously. In treated animals that survived to termination, there was no evidence of cellular injury to the parenchymatous cells of the heart, lungs, liver, kidneys, or spleen. Since repeated exposure of rats to a concentration (25%) greatly exceeds any concentration that would be expected to occur in routine human working conditions acetylene is not thought to produce organ toxicity in humans

,The repeated dose toxicity of the analog methylacetylene has been studied in rats and dogs. Animals were exposed to 28,700 ppm methylacetylene 6 hr/day, 5 days/week for 6 months. Rats and dogs reached an early plane of anesthesia (within 30 minutes) and generally recovered rapidly after each exposure. Forty percent of the rats and none of the dogs died over the course of the study. Gross pathology of the rats that died was limited to the lungs, which appeared dark red and remained distended when the thorax was opened. In exposed rats that survived to termination, the lungs also were discolored and remained distended. Microscopic pathology of the lungs showed definite pulmonary irritation. The

remaining organs appeared to be within normal limits. There was no effect of treatment on any haematological, urine or biochemical index of toxicity in the dogs. The gross appearance of all organs examined and microscopic examinations of the lung, liver, kidney, heart, spleen and GI tract in exposed dogs were normal. It was concluded that methylacetylene is of low repeated dose toxicity and the site of toxicity was limited to the lungs, even at extremely high concentrations (28,700 ppm).

Genetic toxicity:

Mutagenicity: Overall, the weight-of-evidence on acetylene and its surrogate (methylacetylene) indicate that acetylene is not mutagenic

Chromosomal aberration Available information suggests that exposure to acetylene would not result in chromosomal damage.

PHOSPHINE:

TOXICITY	IRRITATION
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CALCIUM HYDROXIDE:

Oral (rat) LD50: 7340 mg/kg	Eye (rabbit): 10 mg – SEVERE
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■ The material may produce severe irritation to the eye causing pronounced inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis.

CARCINOGEN

	US – Rhode Island Hazardous Substance List	IARC	
VPVB_(VERY~	US – Maine Chemicals of High Concern List	Carcinogen	EU Carcinogen
SKIN			
acetylene	Canada – Alberta Occupational Exposure Limits – Skin	Substance Interaction	1

## Section 12 – ECOLOGICAL INFORMATION

May cause long-term adverse effects in the aquatic environment.  
This material and its container must be disposed of as hazardous waste.

Ecotoxicity

Ingredient	Persistence: Water/Soil	Persistence: Air	Bioaccumulation	Mobility
calcium carbide	No Data Available	No Data Available	LOW	
acetylene	LOW	No Data Available	LOW	HIGH
phosphine	LOW	No Data Available	LOW	HIGH
calcium hydroxide	No Data Available	No Data Available	LOW	

## Section 13 – DISPOSAL CONSIDERATIONS

US EPA Waste Number & Descriptions

A. General Product Information

Reactivity characteristic: use EPA hazardous waste number D003 (waste code R).

B. Component Waste Numbers

When phosphine is present as a solid waste as a discarded commercial chemical product, off-specification species, as a container residue, or a spill residue, use EPA waste number P096 (waste code T).

Disposal Instructions

All waste must be handled in accordance with local, state and federal regulations.

! Legislation addressing waste disposal requirements may differ by country, state and/ or territory. Each user must refer to laws operating in their area. In some areas, certain wastes must be tracked.

A Hierarchy of Controls seems to be common – the user should investigate:

- Reduction
- Reuse
- Recycling
- Disposal (if all else fails)

This material may be recycled if unused, or if it has not been contaminated so as to make it unsuitable for its intended use. Shelf life considerations should also be applied in making decisions of this type. Note that properties of a material may change in use, and recycling or reuse may not always be appropriate.

DO NOT allow wash water from cleaning equipment to enter drains. Collect all wash water for treatment before disposal.

- Recycle wherever possible.
- Consult manufacturer for recycling options or consult Waste Management Authority for disposal if no suitable treatment or disposal facility can be identified.

For small spills destroy material by cautiously adding to a large volume of water in a well-ventilated area, preferably should be transported in unsealed containers to a secure landfill after 24 hours.

Section 14 – TRANSPORTATION INFORMATION



DOT:

Symbols:	None	Hazard class or Division:	4.3
Identification Numbers:	UN1402	PG:	I
Label Codes:	4.3	Special provisions:	A1, A8, B55, B59, IB4, IP1, N34, T9, TP7, TP33
Packaging: Exceptions:	None	Packaging: Non-bulk:	211
Packaging: Exceptions:	None	Quantity limitations: Passenger aircraft/rail:	Forbidden
Quantity Limitations: Cargo aircraft only:	15 kg	Vessel stowage: Location:	B
Vessel stowage: Other:	52		

Hazardous materials descriptions and proper shipping names:

Calcium carbide

Air Transport IATA:

ICAO/IATA Class:	4.3	ICAO/IATA Subrisk:	None
UN/ID Number:	1402	Packing Group:	I
Special provisions:	None		

Cargo Only

Packing Instructions:	15 kg	Maximum Qty/Pack:	Forbidden
Passenger and Cargo		Passenger and Cargo	
Packing Instructions:	487	Maximum Qty/Pack:	Forbidden
Passenger and Cargo Limited Quantity		Passenger and Cargo Limited Quantity	
Packing Instructions:	Forbidden	Maximum Qty/Pack:	Forbidden

■ Air transport may be forbidden if this material is flammable, corrosive or toxic gases may be released under normal conditions of transport.

Shipping Name: CALCIUM CARBIDE

Maritime Transport IMDG:

IMDG Class:	4.3	IMDG Subrisk:	None
UN Number:	1402	Packing Group:	I
EMS Number:	F-G , S-N	Special provisions:	None
Limited Quantities:	0		

Shipping Name: CALCIUM CARBIDE

Section 15 – REGULATORY INFORMATION

calcium carbide (CAS: 75–20–7) is found on the following regulatory lists; "Canada Domestic Substances List (DSL)", "Canada Toxicological Index Service – Workplace Hazardous Materials Information System – WHMIS (English)", "International Agency for Research on Cancer (IARC) – Agents Reviewed by the IARC Monographs", "International Council of Chemical Associations (ICCA) – High Production Volume List", "OECD Representative List of High Production Volume (HPV) Chemicals", "US – California Occupational Safety and Health Regulations (CAL/OSHA) – Hazardous Substances List", "US – Massachusetts Oil & Hazardous Material List", "US – New Jersey Right to Know Hazardous Substances", "US – Pennsylvania – Hazardous Substance List", "US – Rhode Island Hazardous Substance List", "US CWA (Clean Water Act) – List of Hazardous Substances", "US CWA (Clean Water Act) – Reportable Quantities of Designated Hazardous Substances", "US Department of Transportation (DOT) List of Hazardous Substances and Reportable Quantities – Hazardous Substances Other Than Radionuclides", "US DOE Temporary Emergency Exposure Limits (TEELs)", "US EPA High Production Volume Program Chemical List", "US List of Lists – Consolidated List of Chemicals Subject to EPCRA, CERCLA and Section 112(r) of the Clean Air Act", "US Toxic Substances Control Act (TSCA) – Inventory" Regulations for ingredients

acetylene (CAS: 74–86–2) is found on the following regulatory lists;

"Canada – Alberta Occupational Exposure Limits", "Canada – British Columbia Occupational Exposure Limits", "Canada – Nova Scotia Occupational Exposure Limits", "Canada – Prince Edward Island Occupational Exposure Limits", "Canada – Quebec Permissible Exposure Values for Airborne Contaminants (English)", "Canada – Saskatchewan Industrial Hazardous Substances", "Canada – Yukon Permissible Concentrations for Airborne Contaminant Substances", "Canada Domestic Substances List (DSL)", "Canada National Pollutant Release Inventory (NPRI)", "Canada Toxicological Index Service – Workplace Hazardous Materials Information System – WHMIS (English)", "Canada Transport Dangerous Goods – Schedule 3", "International Air Transport Association (IATA) Dangerous Goods Regulations", "International Council of Chemical Associations (ICCA) – High Production Volume List", "OECD Representative List of High Production Volume (HPV) Chemicals", "US – California Occupational Safety and Health Regulations (CAL/OSHA) – Hazardous Substances List", "US – California Permissible Exposure Limits for Chemical Contaminants", "US – Connecticut Hazardous Air Pollutants", "US – Massachusetts Oil & Hazardous Material List", "US – Minnesota Hazardous Substance List", "US – New Jersey Right to Know Hazardous Substances", "US – Oregon Permissible Exposure Limits (Z-1)", "US – Pennsylvania – Hazardous Substance List", "US – Rhode Island Hazardous Substance List", "US – Washington Permissible exposure limits of air contaminants", "US ACGIH Threshold Limit Values (TLV)", "US Department of Homeland Security Chemical Facility Anti-Terrorism Standards – Chemicals of Interest", "US Department of Transportation (DOT), Hazardous Material Table", "US Department of Transportation (DOT), Hazardous Material Table : Goods Forbidden for Transport", "US DOE Temporary Emergency Exposure Limits (TEELs)", "US EPA High Production Volume Program Chemical List", "US List of Lists – Consolidated List of Chemicals Subject to EPCRA, CERCLA and Section 112(r) of the Clean Air Act", "US NFPA 45 Fire Protection for Laboratories Using Chemicals – Flammability Characteristics of Common Compressed and Liquefied Gases", "US NIOSH Recommended Exposure Limits (RELs)", "US Postal Service (USPS) Hazardous Materials Table: Postal Service Mailability Guide", "US -Texas Air Monitoring Comparison Values for Evaluating Carbonyls", "US Toxic Substances Control Act (TSCA) – Inventory"

phosphine (CAS: 7803–51–2) is found on the following regulatory lists;

"Canada – Alberta Occupational Exposure Limits", "Canada – British Columbia Occupational Exposure Limits", "Canada – Northwest Territories Occupational Exposure Limits (English)", "Canada – Nova Scotia Occupational Exposure Limits", "Canada – Prince Edward Island Occupational Exposure Limits", "Canada – Quebec Permissible Exposure Values for Airborne Contaminants (English)", "Canada – Saskatchewan Occupational Health and Safety Regulations – Contamination Limits", "Canada – Yukon Permissible Concentrations for Airborne Contaminant Substances", "Canada Domestic Substances List (DSL)", "Canada Ingredient Disclosure List (SOR/88–64)", "Canada Toxicological Index Service – Workplace Hazardous Materials Information System – WHMIS (English)", "US – Alaska Limits for Air Contaminants", "US – California Air Toxics ""Hot Spots"" List (Assembly Bill 2588) Substances for which emissions must be quantified", "US – California Occupational Safety and Health Regulations (CAL/OSHA) – Hazardous Substances List", "US – California OEHHA/ARB – Chronic Reference Exposure Levels and Target Organs (CRELs)", "US – California Permissible Exposure Limits for Chemical Contaminants", "US – California Toxic Air Contaminant List Category II", "US – Connecticut Hazardous Air Pollutants", "US – Hawaii Air Contaminant Limits", "US – Idaho – Limits for Air Contaminants", "US – Massachusetts Oil & Hazardous Material List", "US – Michigan Exposure Limits for Air Contaminants", "US – Minnesota Hazardous Substance List", "US – Minnesota Permissible Exposure Limits (PELs)", "US – New Jersey Right to Know Hazardous Substances", "US – Oregon Hazardous Materials", "US – Oregon Permissible Exposure Limits (Z-1)", "US – Pennsylvania – Hazardous Substance List", "US – Rhode Island Hazardous Substance List", "US – Tennessee Occupational Exposure Limits – Limits For Air Contaminants", "US – Vermont Hazardous Constituents", "US – Vermont Hazardous Waste – Acutely Hazardous Wastes", "US – Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants", "US – Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants", "US – Washington Dangerous waste constituents list", "US – Washington Discarded Chemical Products List – ""P"" Chemical Products", "US – Washington Permissible exposure limits of air contaminants", "US – Wyoming List of Highly Hazardous Chemicals, Toxics and Reactives", "US – Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants", "US ACGIH Threshold Limit Values (TLV)", "US CERCLA Priority List of Hazardous Substances", "US Clean Air Act – Hazardous Air Pollutants", "US Department of Homeland Security Chemical Facility Anti-Terrorism Standards – Chemicals of Interest", "US Department of Transportation (DOT) List of Hazardous Substances and Reportable Quantities – Hazardous Substances Other Than Radionuclides", "US DOE Temporary Emergency Exposure Limits (TEELs)", "US EPA Acute Exposure Guideline Levels (AEGs) – Final", "US EPA Carcinogens Listing", "US EPCRA Section 313 Chemical List", "US List of Lists – Consolidated List of Chemicals Subject to EPCRA, CERCLA and Section 112(r) of the Clean Air Act", "US NFPA 45 Fire Protection for Laboratories Using Chemicals – Flammability Characteristics of Common Compressed and Liquefied Gases", "US NIOSH Recommended Exposure Limits (RELs)", "US OSHA List of Highly Hazardous Chemicals, Toxics and Reactives", "US OSHA Permissible Exposure Levels (PELs) – Table Z1", "US RCRA (Resource Conservation & Recovery Act) – Hazardous Constituents – Appendix VIII to 40 CFR 261", "US RCRA (Resource Conservation & Recovery Act) – List of Hazardous Wastes", "US SARA Section 302 Extremely Hazardous Substances", "US Toxic Substances Control Act (TSCA) – Inventory", "USA: Chemical Facility Anti-Terrorism Standards – List Appendix A – 6CFR 27"

calcium hydroxide (CAS: 1305–62–0, 1332–69–0) is found on the following regulatory lists;

"Canada – Alberta Occupational Exposure Limits", "Canada – British Columbia Occupational Exposure Limits", "Canada – Northwest Territories Occupational Exposure Limits (English)", "Canada – Nova Scotia Occupational Exposure Limits", "Canada – Prince Edward Island Occupational Exposure Limits", "Canada – Quebec Permissible Exposure Values for Airborne Contaminants (English)", "Canada – Saskatchewan Industrial Hazardous Substances", "Canada – Saskatchewan Occupational Health and Safety Regulations – Contamination Limits", "Canada – Yukon Permissible Concentrations for Airborne Contaminant Substances", "Canada Domestic Substances List (DSL)", "Canada Ingredient Disclosure List (SOR/88–64)", "Canada Toxicological Index Service – Workplace Hazardous Materials Information System – WHMIS (English)", "CODEX General Standard for Food Additives (GSFA) – Additives Permitted for Use in Food in General, Unless Otherwise Specified, in Accordance with GMP", "IMO IBC Code Chapter 17: Summary of minimum requirements", "IMO MARPOL 73/78 (Annex II) – List of Noxious Liquid Substances Carried in Bulk", "International Council of Chemical Associations (ICCA) – High Production Volume List", "OECD Representative List of High Production Volume (HPV) Chemicals", "US – Alaska Limits for Air Contaminants", "US – California Occupational Safety and Health Regulations (CAL/OSHA) – Hazardous Substances List", "US – California Permissible Exposure Limits for Chemical Contaminants", "US – Connecticut Hazardous Air Pollutants", "US – Hawaii Air Contaminant Limits", "US – Idaho – Limits for Air Contaminants", "US – Michigan Exposure Limits for Air

Contaminants", "US – Minnesota Hazardous Substance List", "US – Minnesota Permissible Exposure Limits (PELs)", "US – New Jersey Right to Know Hazardous Substances", "US – Oregon Permissible Exposure Limits (Z-1)", "US – Pennsylvania – Hazardous Substance List", "US – Rhode Island Hazardous Substance List", "US – Tennessee Occupational Exposure Limits – Limits For Air Contaminants", "US – Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants", "US – Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants", "US – Washington Permissible exposure limits of air contaminants", "US – Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants", "US ACGIH Threshold Limit Values (TLV)", "US DOE Temporary Emergency Exposure Limits (TEELs)", "US Food Additive Database", "US NIOSH Recommended Exposure Limits (RELs)", "US OSHA Permissible Exposure Levels (PELs) – Table Z1", "US Toxic Substances Control Act (TSCA) – Inventory"

## Section 16 – OTHER INFORMATION

Ingredients with multiple CAS Nos

Ingredient Name	CAS
calcium hydroxide	1305–62–0, 1332–69–0

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■ Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references.

A list of reference resources used to assist the committee may be found at:  
[www.chemwatch.net/references](http://www.chemwatch.net/references).

■ The (M)SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

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