# Calcium phosphide

## sc-239469

**Material Safety Data Sheet**

| Hazard Alert Code Key: | EXTREME | HIGH | MODERATE | LOW |
|---|---|---|---|---|

## Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

**PRODUCT NAME**
Calcium phosphide

**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**
"Ca3P2 (or Ca2P2)", "calcium photophor", rodenticide, "signal fire additive"

## Section 2 - HAZARDS IDENTIFICATION

**CHEMWATCH HAZARD RATINGS**

| | Min | Max |
|---|---|---|
| Flammability | 1 | |
| Toxicity | 4 | |
| Body Contact | 2 | |
| Reactivity | 1 | |
| Chronic | 2 | |

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

**CANADIAN WHMIS SYMBOLS**

**EMERGENCY OVERVIEW**

**RISK**

In use, may form flammable/explosive vapour-air mixture.
Very toxic if swallowed.
Contact with water liberates toxic, extremely flammable gas.
Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

**POTENTIAL HEALTH EFFECTS**

**ACUTE HEALTH EFFECTS**

**SWALLOWED**

■ Severely toxic effects may result from the accidental ingestion of the material; animal experiments indicate that ingestion of less than 5 gram may be fatal or may produce serious damage to the health of the individual.
■ At sufficiently high doses, the material may be toxic to the heart.
■ Symptoms of exposure may be delayed.
■ At sufficiently high doses the material may be nephrotoxic(i.
e.
■ At sufficiently high doses the material may be hepatotoxic(i.
e.

**EYE**

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

**SKIN**

■ The material is not thought to be a skin irritant (as classified by EC Directives using animal models).
Abrasive damage however, may result from prolonged exposures.
■ Skin contact with the material may damage the health of the individual; systemic effects may result following absorption.
■ Reactions may not occur on exposure but response may be delayed with symptoms only appearing many hours later.
■ 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.

**INHALED**

■ The material is not thought to produce respiratory irritation (as classified by EC Directives using animal models).
Nevertheless inhalation of dusts, or fumes, especially for prolonged periods, may produce respiratory discomfort and occasionally, distress.
■ Inhalation of vapours may cause drowsiness and dizziness.
This may be accompanied by sleepiness, reduced alertness, loss of reflexes, lack of co-ordination, and vertigo.
■ Inhalation of dusts, generated by the material during the course of normal handling, may produce severe damage to the health of the individual.
Relatively small amounts absorbed from the lungs may prove fatal.
■ Phosphine is a very toxic gas and chiefly causes, exacerbation of asthma and other respiratory disorders, depression of the central nervous system and damaging effect on the lungs and blood (oxyhaemoglobin in mammals is converted by phosphine into a poisonous verdichromogen-like material ).
Inhalation of phosphine causes dose-dependent multi-systemic effect including incoordination, vomiting, low oxygen tension, rapid pulse, low blood pressure, gastric and chest pain, headache, dyspnoea, arrhythmias, myocardial injury and cardiovascular collapse.

**CHRONIC HEALTH EFFECTS**

■ Substance accumulation, in the human body, may occur and may cause some concern following repeated or

long-term occupational exposure.
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. Prime symptom is breathlessness; lung shadows show on X-ray.
Phosphine is a very toxic gas. It causes worsening stomach and chest pain, headache, depression of the brain, lung irritation, tremor, fatigue, nausea and vomiting, fluid accumulation in the lungs, headache, thirst, dizziness, chest pain, anaemia, bluing of the extremities, inco-ordination, vomiting, rapid or irregular pulse, low blood pressure and injury to the heart muscle with rhythm disturbances. Coma, convulsions and stoppage of heartbeat and breathing may precede death. Mortality from severe poisoning is high. Pre-existing asthma and scarring of the lungs will be made worse.

## Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

| NAME | CAS RN | % |
|---|---|---|
| calcium phosphide | 1305-99-3 | >98 |
| Reaction with water or moist air generates | | |
| phosphine | 7803-51-2 | Not spec |
| calcium hydroxide | 1305-62-0 | |

## Section 4 - FIRST AID MEASURES

**SWALLOWED**

- IF SWALLOWED, REFER FOR MEDICAL ATTENTION, WHERE POSSIBLE, WITHOUT DELAY.
- For advice, contact a Poisons Information Centre or a doctor.
- Urgent hospital treatment is likely to be needed.
- In the mean time, qualified first-aid personnel should treat the patient following observation and employing supportive measures as indicated by the patient's condition.

**EYE**

If this product comes in contact with the eyes

- Immediately hold eyelids apart and flush the eye continuously with running water.
- Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.
- Continue flushing until advised to stop by the Poisons Information Centre or a doctor, or for at least 15 minutes.
- Transport to hospital or doctor without delay.

**SKIN**

If skin contact occurs

- Immediately remove all contaminated clothing, including footwear.
- 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.
- Lay patient down. Keep warm and rested.
- Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures.
- Apply artificial respiration if not breathing, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary.

**NOTES TO PHYSICIAN**

■ For severe acute or short term repeated exposures to phosphine

- There is no antidote. Clinical manifestations include headache, fatigue, nausea, vomiting, cough, dyspnoea, paresthaesias, 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.

- The risk of pulmonary oedema after severe exposure requires observation for 24-48 hours but can appear several days later. Initial X-ray may be useful in assessing development of oedema. If oedema develops, nurse with trunk upright and administer oxygen at atmospheric pressure. Diuretics, morphine, theophylline derivatives are of little benefit since oedema is exudate rather than transudate. Bronchodilators by nebulizer or metered aerosol may reduce bronchospasm and dyspnoea. Where immediate respiratory symptoms suggest lower airway exposure, steroids may be beneficial, with intravenous injection of methylprednisolone up to 30 mg/kg body weight initially with subsequent smaller doses. Prophylactic antibiotics are indicated in all but mild cases. Intermittent positive pressure ventilation with bronchial toilet and suction may be important elements of treatment. [I.L.O. Health and Safety Guide No. 28]

## Section 5 - FIRE FIGHTING MEASURES

| | |
|---|---|
| Vapour Pressure (mmHG) | Not available |
| Upper Explosive Limit (%) | Not available |
| Specific Gravity (water=1) | 2.51 |
| Lower Explosive Limit (%) | Not available |

**EXTINGUISHING MEDIA**

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;
- OR withdraw and allow fire to burn itself out.

**FIRE FIGHTING**

- Alert Fire Brigade and tell them location and nature of hazard.
- May be violently or explosively reactive.
- Wear full protective clothing plus breathing apparatus.
- Prevent, by any means available, spillage from entering drains or water course.

When any large container (including road and rail tankers) is involved in a fire,
consider evacuation by 1500 metres in all directions.

**GENERAL FIRE HAZARDS/HAZARDOUS COMBUSTIBLE PRODUCTS**

WARNING In use may form flammable/ explosive vapour-air mixtures.

- May ignite on contact with air, moist air or water.
- May react vigorously or explosively on contact with water.
- May decompose explosively when heated or involved in fire.
- May REIGNITE after fire is extinguished.

Combustion products include phosphorus oxides (POx), metal oxides.

Dangerous when exposed to heat, flame or moisture. Contact with water or moisture generates highly flammable and poisonous phosphine gas, and sufficient heat to ignite combustible materials.

Gas forms explosive mixtures with air over a wide area.

**FIRE INCOMPATIBILITY**

- Segregate from alcohol, water.
- NOTE May develop pressure in containers; open carefully. Vent periodically.
- Keep dry

## Section 6 - ACCIDENTAL RELEASE MEASURES

**MINOR SPILLS**

Wet deactivation If available, prepare a 2% solution of low foam detergent as detergent solution will better wet the hydrophobic surface of the phosphide particles; otherwise use available water. A container should be filled with this solution to within a few centimetres of the top.

- 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.
- Then cover with plastic sheet to minimise spreading and to prevent exposure to rain or other sources of water.
- Use clean, non-sparking tools to collect absorbed material and place into loosely-covered metal or plastic containers ready for disposal.

**MAJOR SPILLS**

- Clear area of personnel and move upwind.
- Alert Fire Brigade and tell them location and nature of hazard.
- Eliminate all ignition sources (no smoking, flares, sparks or flames)
- Stop leak if safe to do so; prevent entry into waterways, drains or confined spaces.

## Section 7 - HANDLING AND STORAGE

**PROCEDURE FOR HANDLING**

- Avoid all personal contact, including inhalation.
- Wear protective clothing when risk of overexposure occurs.
- Use in a well-ventilated area.
- Avoid contact with moisture.

**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**

- Store below 38 deg. C.

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.

FOR PACKAGE STORAGE

- Store in original containers in approved flame-proof area.
- No smoking, naked lights, heat or ignition sources.

## Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

**EXPOSURE CONTROLS**

| Source | Material | TWA ppm | TWA mg/m³ | STEL ppm | STEL mg/m³ | Peak ppm | Peak mg/m³ | TWA F/CC | Notes |
|---|---|---|---|---|---|---|---|---|---|
| Canada - Ontario Occupational Exposure Limits | calcium phosphide (Particles (Insoluble or Poorly Soluble) Not Otherwise) | | 10 (I) | | | | | | |
| Canada - British Columbia Occupational Exposure Limits | calcium phosphide (Particles (Insoluble or Poorly Soluble) Not Otherwise Classified (PNOC)) | | 10 (N) | | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Canada - Ontario Occupational Exposure Limits | calcium phosphide (Specified (PNOS) / Particules (insolubles ou peu solubles) non précisées par ailleurs) | | 3 (R) | | | |
| US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants | calcium phosphide (Particulates not otherwise regulated Respirable fraction) | | 5 | | | |
| US - California Permissible Exposure Limits for Chemical Contaminants | calcium phosphide (Particulates not otherwise regulated Respirable fraction) | | 5 | | | (n) |
| US - Oregon Permissible Exposure Limits (Z-1) | calcium phosphide (Particulates not otherwise regulated (PNOR) (f) Total Dust) | - | 10 | | | Bold print identifies substances for which the Oregon Permissible Exposure Limits (PELs) are different than the federal Limits. PNOR means “particles not otherwise regulated.” |
| US - Michigan Exposure Limits for Air Contaminants | calcium phosphide (Particulates not otherwise regulated, Respirable dust) | | 5 | | | |
| US - Oregon Permissible Exposure Limits (Z-1) | calcium phosphide (Particulates not otherwise regulated (PNOR) (f) Respirable Fraction) | - | 5 | | | Bold print identifies substances for which the Oregon Permissible Exposure Limits (PELs) are different than the federal Limits. PNOR means “particles not otherwise regulated.” |
| US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants | calcium phosphide (Particulates not otherwise regulated (PNOR)(f)- Respirable fraction) | | 5 | | | |
| Canada - Alberta Occupational Exposure Limits | phosphine (Phosphine) | 0.3 | 0.4 | 1 | 1.4 | |
| Canada - British Columbia Occupational | phosphine (Phosphine) | 0.3 | | 1 | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Exposure Limits | | | | | | |
| 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 URT & GI irr; headache; CNS impair |
| 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 | phosphine (Phosphine) | 0.3 | | 1 | | |

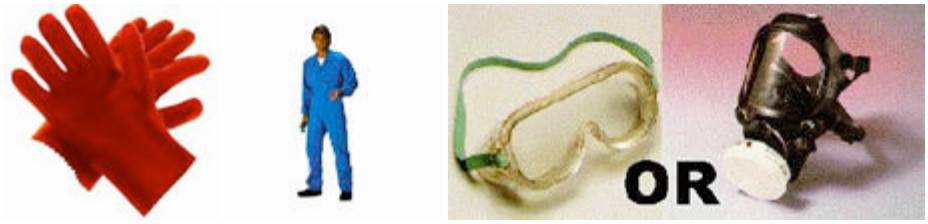
| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Safety Regulations - Contamination Limits | | | | | | | |
| US - Hawaii Air Contaminant Limits | phosphine (Phosphine) | 0.3 | 0.4 | 1 | 1.4 | | |
| US - Alaska Limits for Air Contaminants | phosphine (Phosphine) | 0.3 | 0.4 | 1 | 1 | | |
| Canada - 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 URT & GI irr; headache; CNS impair |
| 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 | phosphine (Phosphine) | 0.3 | 0.42 | 1 | 1.3 | | |

| | | | |
|---|---|---|---|
| Occupational Exposure Limits (English) | | | |
| 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, URT, & skin irr |
| 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 (Calcuim 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 - 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 | | | | |
| 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, URT, & skin irr |
| 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 |

**PERSONAL PROTECTION**




**RESPIRATOR**

- Type B-P Filter of sufficient capacity. (AS/NZS 1716 & 1715, EN 1432000 & 1492001, ANSI Z88 or national equivalent)

**EYE**

- Safety glasses with side shields
- Chemical goggles.
- Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lens or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience. Medical and first-aid personnel should be trained in their removal and suitable equipment should be readily available. In the event of chemical exposure, begin eye irrigation immediately and remove contact lens as soon as practicable. Lens should be removed at the first signs of eye redness or irritation - lens should be removed in a clean environment only after workers have washed hands thoroughly. [CDC NIOSH Current Intelligence Bulletin 59], [AS/NZS 1336 or national equivalent]

**HANDS/FEET**

- Wear chemical protective gloves, eg. PVC.
- Wear safety footwear or safety gumboots, eg. Rubber

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

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

**OTHER**

- Overalls.
- Eyewash unit.
- Barrier cream.
- Skin cleansing cream.

Rescue gear Two sets of SCUBA breathing apparatus
Rescue harness, lines etc

**ENGINEERING CONTROLS**

Engineering controls are used to remove a hazard or place a barrier between the worker and the hazard. Well-designed engineering controls can be highly effective in protecting workers and will typically be independent

of worker interactions to provide this high level of protection.
The basic types of engineering controls are
Process controls which involve changing the way a job activity or process is done to reduce the risk.
Enclosure and/or isolation of emission source which keeps a selected hazard "physically" away from the worker and ventilation that strategically "adds" and "removes" air in the work environment.

## Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

### PHYSICAL PROPERTIES

Solid.

| | | | |
|---|---|---|---|
| State | Divided solid | Molecular Weight | 182.18 |
| Melting Range (°F) | 2912 | Viscosity | Not Applicable |
| Boiling Range (°F) | Not applicable | Solubility in water (g/L) | Reacts |
| Flash Point (°F) | Not available | pH (1% solution) | Not applicable |
| Decomposition Temp (°F) | Not Available | pH (as supplied) | Not applicable |
| Autoignition Temp (°F) | Not available | Vapour Pressure (mmHG) | Not available |
| Upper Explosive Limit (%) | Not available | Specific Gravity (water=1) | 2.51 |
| Lower Explosive Limit (%) | Not available | Relative Vapour Density (air=1) | Not available |
| Volatile Component (%vol) | Not available | Evaporation Rate | Not available |

### APPEARANCE

Crystalline powder or lumps; reacts with water to generate the toxic and flammable gas, phosphine.

## Section 10 - CHEMICAL STABILITY

### CONDITIONS CONTRIBUTING TO INSTABILITY

- Presence of incompatible materials
- May heat spontaneously
- Identify and remove sources of ignition and heating.
- Incompatible material, especially oxidisers, and/or other sources of oxygen may produce unstable product(s).
- Avoid sources of water contamination (e.g. rain water, moisture, high humidity).

### STORAGE INCOMPATIBILITY

- Contact with acids produces toxic fumes
- Segregate from alcohol, water.
- 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.
- NOTE May develop pressure in containers; open carefully. Vent periodically.
- Metals and their oxides or salts may react violently with chlorine trifluoride and bromine trifluoride.
- These trifluorides are hypergolic oxidisers. They ignites on contact (without external source of heat or ignition) with recognised fuels - contact with these materials, following an ambient or slightly elevated temperature, is often violent and may produce ignition.
- The state of subdivision may affect the results.

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

## Section 11 - TOXICOLOGICAL INFORMATION

calcium phosphide

**TOXICITY AND IRRITATION**

■ unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances.
■ 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.
■ Not available. Refer to individual constituents.
■ The material may produce severe irritation to the eye causing pronounced inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis.

**CARCINOGEN**

| | | | |
|---|---|---|---|
| Non-arsenical insecticides (occupational exposures in spraying and application of) | International Agency for Research on Cancer (IARC) - Agents Reviewed by the IARC Monographs | Group | 2A |
| Phosphine | US EPA Carcinogens Listing | Carcinogenicity | D |
| phosphine | US ACGIH Threshold Limit Values (TLV) - Carcinogens | Carcinogen Category | D |
| phosphine | US - Rhode Island Hazardous Substance List | IARC | |
| phosphine | US - Maine Chemicals of High Concern List | Carcinogen | D |
| calcium hydroxide | US - Rhode Island Hazardous Substance List | IARC | |

## Section 12 - ECOLOGICAL INFORMATION

Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
This material and its container must be disposed of as hazardous waste.
Avoid release to the environment.
Refer to special instructions/ safety data sheets.

## 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.

- Containers may still present a chemical hazard/ danger when empty.
- Return to supplier for reuse/ recycling if possible.

Otherwise:

- If container can not be cleaned sufficiently well to ensure that residuals do not remain or if the container cannot be used to store the same product, then puncture containers, to prevent re-use, and bury at an authorised landfill.
- Where possible retain label warnings and MSDS and observe all notices pertaining to the product.

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. In most instances the supplier of the material should be consulted.

- DO NOT allow wash water from cleaning or process equipment to enter drains.
- It may be necessary to collect all wash water for treatment before disposal.
- In all cases disposal to sewer may be subject to local laws and regulations and these should be considered first.
- Where in doubt contact the responsible authority.

Under no circumstances should any drum which contains metal phosphide be totally sealed as it may react with moisture in the container, and explode, with the likelihood of spontaneous ignition. If large quantities need to be disposed, consider wet deactivation (see Minor Spills).

- Recycle wherever possible.
- Consult manufacturer for recycling options or consult local or regional waste management authority for disposal if no suitable treatment or disposal facility can be identified.
- Dispose of by: burial in a land-fill specifically licenced to accept chemical and / or pharmaceutical wastes or Incineration in a licenced apparatus (after admixture with suitable combustible material)
- Decontaminate empty containers. Observe all label safeguards until containers are cleaned and destroyed.

## Section 14 - TRANSPORTATION INFORMATION

DOT:

| | | | |
|---|---|---|---|
| Symbols: | None | Hazard class or Division: | 4.3 |
| Identification Numbers: | UN1360 | PG: | I |
| Label Codes: | 4.3, 6.1 | Special provisions: | A8, A19, N40 |
| 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: | E |
| Vessel stowage: Other: | 40, 52, 85 | | |

Hazardous materials descriptions and proper shipping names:
Calcium phosphide

**Air Transport IATA:**

| | | | |
|---|---|---|---|
| ICAO/IATA Class: | 4.3 | ICAO/IATA Subrisk: | 6.1 |
| UN/ID Number: | 1360 | Packing Group: | I |
| Special provisions: | None | | |
| Cargo Only | | | |
| Packing Instructions: | 487 | Maximum Qty/Pack: | 15 kg |
| Passenger and Cargo | | Passenger and Cargo | |
| Packing Instructions: | Forbidden | 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 PHOSPHIDE

**Maritime Transport IMDG:**

| | | | |
|---|---|---|---|
| IMDG Class: | 4.3 | IMDG Subrisk: | 6.1 |
| UN Number: | 1360 | Packing Group: | I |
| EMS Number: | F-G,S-N | Special provisions: | None |
| Limited Quantities: | 0 | Marine Pollutant: | Yes |

Shipping name:CALCIUM PHOSPHIDE

## Section 15 - REGULATORY INFORMATION

**calcium phosphide (CAS: 1305-99-3) is found on the following regulatory lists;**

"Canada Non-Domestic Substances List (NDSL)","US - New Jersey Right to Know Hazardous Substances","US Department of Homeland Security Chemical Facility Anti-Terrorism Standards - Chemicals of Interest","US EPA Acute Exposure Guideline Levels (AEGLs) - Final","US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory","USA: Chemical Facility Anti-Terrorism Standards - List Appendix A - 6CFR 27"

**Regulations for ingredients**

**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 - Delaware Pollutant Discharge Requirements - Reportable Quantities","US - Hawaii Air Contaminant Limits","US - Idaho - Limits for Air Contaminants","US - Louisiana Toxic Air Pollutants Supplemental List","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 - Washington Toxic air pollutants and their ASIL, SQER and de minimis emission values","US - Wisconsin Control of Hazardous Pollutants - Emission Thresholds, Standards and Control Requirements (Hazardous Air Contaminants)","US - Wisconsin Control of Hazardous Pollutants - Substances of Concern for Sources of Incidental Emissions of Hazardous 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 (AEGLs) - 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) - Chemical Substance 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","GESAMP/EHS Composite List - GESAMP Hazard Profiles","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","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 - Wisconsin Control of Hazardous Pollutants - Emission Thresholds, Standards and Control Requirements (Hazardous 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 FDA CFSAN GRAS Substances evaluated by the Select Committee on GRAS Substances (SCOGS)","US Food Additive Database","US NIOSH Recommended Exposure Limits (RELs)","US OSHA Permissible Exposure Levels (PELs) - Table Z1","US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory","US USDA National Organic Program - Nonagricultural (nonorganic) substances allowed as ingredients in or on processed products labeled as “organic” or “made with organic (specified ingredients or food group(s))”","US USDA National Organic Program - Synthetic substances allowed for use in organic crop production"

## Section 16 - OTHER INFORMATION

**LIMITED EVIDENCE**

■ Skin contact may produce health damage*.
■ Inhalation may produce severe health damage*.
■ Cumulative effects may result following exposure*.
■ Vapours potentially cause drowsiness and dizziness*.
* (limited evidence).

**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.

■ 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.

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