MATERIAL SAFETY DATA SHEET

SECTION 1 | IDENTIFICATION OF THE MATERIAL AND SUPPLIER

Product Name: Apparent Phosphine Fumigation Tablets

Other Names: Metal phosphide. Group 24A Insecticide.
Use: An insecticide for the control of pests of storage silos.
Company: Apparent Pty Ltd.
Address: Suite G.08, 762 Toorak Road, Glen Iris VIC 3146
PO Box 3092, Cotham PO, Kew, Vic 3101
ACN/ABN: 143 724 136
Telephone Number: 03 9817 5536 Fax Number: 03 9817 7845
Emergency Contact: 0411 227 338
Email: wwardell@bigpond.net.au

SECTION 2 | HAZARDS IDENTIFICATION

Classified as hazardous according to criteria of Safe Work Australia. Classified as a Dangerous Good according to the ADG Code

Risk Phrases:
- R23 Toxic by inhalation.
- R28 Very Toxic if swallowed.
- R15/29 Contact with water liberates toxic, highly flammable gas.

Safety Phrases:
- S2 Keep out of reach of children.
- S13 Keep away from food, drink and other animal foodstuffs.
- S20 When using do not eat or drink.
- S38 In case if insufficient ventilation, wear suitable respiratory equipment.

SECTION 3 | COMPOSITION/INFORMATION ON INGREDIENTS

Ingredients:

<table>
<thead>
<tr>
<th>CHEMICAL</th>
<th>CAS NUMBER</th>
<th>PROPORTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminium phosphide</td>
<td>20859-73-8</td>
<td>67 % w/w</td>
</tr>
<tr>
<td>Other ingredients (including water) determined not to be hazardous</td>
<td></td>
<td>Balance</td>
</tr>
</tbody>
</table>

SECTION 4 | FIRST AID MEASURES

FIRST AID

Inhalation: If inhalation occurs, contact a Poisons Information Centre. Phone 131 126. **Urgent hospital treatment is likely to be needed.** Remove source of contamination or move victim to fresh air. DO NOT give direct mouth-to-mouth resuscitation. To protect rescuer, use air-viva, oxy-viva or one-way mask. Resuscitate in a well-ventilated area. If breathing is difficult, oxygen may be beneficial if administered by trained personnel, preferably on a doctor’s advice. DO NOT allow victim to move about unnecessarily. Symptoms of pulmonary oedema can be delayed up to 48 hours after exposure.

Ingestion: If swallowed, rinse mouth thoroughly with water and contact a Poisons Information Centre. Phone 13 11 26. **Urgent hospital treatment is likely to be needed.** Give activated charcoal if instructed. DO NOT give direct mouth-to-mouth resuscitation if swallowed. To protect rescuer, use air-viva, oxy-viva or one-way mask. Resuscitate in a well-ventilated area.
SECTION 4  FIRST AID MEASURES (Continued)

Eye contact: As product is a tablet no effects are expected. If irritation does occur, flush contaminated eye(s) with lukewarm, gently flowing water until the product is removed.

Skin contact: Irritation is unlikely. However, if irritation does occur, flush with lukewarm, gently flowing water until chemical is removed.

Advice to Doctor: Major Health Hazards: Aluminium phosphide is not absorbed dermally; the main routes of exposure are through inhalation and ingestion. It is highly toxic via both these routes. Aluminium phosphide ingested orally reacts with water and stomach acids to produce phosphine gas, which is toxic.

SECTION 5  FIRE FIGHTING MEASURES

Extinguishing media: WATER MUST NOT BE ALLOWED TO COME INTO CONTACT WITH THE PRODUCT SINCE A DANGEROUS REACTION WILL TAKE PLACE. Product is not flammable, but phosphine gas is flammable. Extinguish fire using carbon dioxide, foam or dry agent. DO NOT use water.

Hazards from combustion products: This product will probably cause the fire to intensify as contents ignite. On burning will emit very toxic fumes. Firefighters to wear self-contained breathing apparatus and suitable protective clothing if risk to of exposure to vapour or smoke. Product is unlikely to be explosive if kept dry. However water and many liquids cause immediate release of phosphine from the product. Uncontrolled release of phosphine may result in fire or explosion and release of gas will pose a serious risk of injury to firefighters and bystanders.

Precautions for fire-fighters and special protective equipment: Isolate fire area. Evacuate downwind residents. Wear full protective clothing and self contained breathing apparatus. Do not breathe smoke or vapours generated.

SECTION 6  ACCIDENTAL RELEASE MEASURES

Emergence procedures / Material and methods for containment and cleanup procedures: Accidental release: Wear full protective equipment including face mask, face shield, gauntlets and self contained breathing apparatus.

Stop leak if safe to do so, and contain spill. Avoid using sawdust or other combustible material. Because of the toxicity of this product, special personal care should be taken in any cleanup operation. In the case of spillage, contain and absorb spilled material with absorbent material such as sand, clay or cat litter and dispose of waste as indicated below or according to the Australian Standard 2507 - Storage and Handling of Pesticides. Sweep up and shovel or collect recoverable product into labelled containers for recycling or salvage, and dispose of promptly. Keep out animals and unprotected persons.

SECTION 7  HANDLING AND STORAGE

Precautions for Safe Handling: No smoking, eating or drinking should be allowed where material is used or stored. Keep exposure to this product to a minimum, and minimise the quantities kept in work areas. Avoid contact or contamination of product with incompatible materials, especially liquids, listed in Section 10.

When using, open container in the open air. Keep away from water and liquids. Keep away from naked flames. Forms toxic gas. Use the entire contents in one operation, if not possible, seal container thoroughly with waterproof adhesive tape or air tight closure. Wash hands after use. When opening the container or using the product wear elbow length PVC gloves and full face piece respirator with combined dust and gas cartridge (canister) or supplied air respirator.

The product may react while sealed with the moisture in the air in the container, liberating toxic phosphine gas. Phosphine may react spontaneously with oxygen.
Consequently there is a chance that when the lid is removed from a package that has been stored for a lengthy period, a flash may take place. Therefore make sure that when removing the lid, it be done in a well ventilated area, with no flammable materials close by.

**Conditions for Safe Storage:** This product is a Schedule 7 Poison (S7). Observe all relevant regulations regarding sale, transport and storage of this class of poison. Store in the closed, original container in a cool, dry, well ventilated locked area, out of the reach of children and unauthorised persons and away from all dwellings, animals, food, feedstuffs, seed and fertilisers. DO NOT store or carry container in vehicle cabins (this includes glove compartments, luggage compartments or other common air-spaces).

Keep away from water and liquids. Water and many liquids cause immediate release of phosphine from the product. Uncontrolled release of phosphine may result in fire or explosion and release of gas will pose a serious risk of injury to workers and bystanders.

**SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION**

**Exposure Guidelines:**
The following exposure limit has been assigned by Safe Work Australia to the ingredients in this product.

<table>
<thead>
<tr>
<th>Chemical</th>
<th>TWA*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phosphine gas</td>
<td>0.42 mg/kg</td>
</tr>
<tr>
<td>(Phosphine gas is liberated from this product by moisture (even moist air)).</td>
<td></td>
</tr>
</tbody>
</table>

\[ a = \text{TWA - Time-weight Average} \]

**Biological Limit Values:**
No biological limit allocated.

**Engineering controls:**
Use in ventilated areas. Use fans or self contained breathing apparatus if ventilation is not adequate. Keep containers closed when not in use.

**Personal Protective equipment (PPE):**
When opening the container or using the product wear elbow length PVC gloves and full face piece respirator with combined dust and gas cartridge (canister) or supplied air respirator. Wash hands after use.

**Respiratory Protection:** If there is a significant chance that dusts are likely to build up in the area where this product is being used, use a suitable Dust Mask. Use a P3 mask, designed for use against all particulates including highly toxic materials.

**SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES**

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance:</td>
<td>White tablets/pellets.</td>
</tr>
<tr>
<td>Odour:</td>
<td>Produces phosphine gas which has a carbide like smell.</td>
</tr>
<tr>
<td>Boiling point:</td>
<td>No data available.</td>
</tr>
<tr>
<td>Freezing point:</td>
<td>Just below 0°C.</td>
</tr>
<tr>
<td>Solubility in Water:</td>
<td>Decomposes in water to produce phosphine gas.</td>
</tr>
<tr>
<td>pH:</td>
<td>Not available.</td>
</tr>
<tr>
<td>Specific Gravity:</td>
<td>Approximately 1.1</td>
</tr>
<tr>
<td>Flammability:</td>
<td>Not flammable (Phosphine gas is flammable).</td>
</tr>
<tr>
<td>Poisons Schedule:</td>
<td>S7.</td>
</tr>
</tbody>
</table>

**SECTION 10 STABILITY AND REACTIVITY**

**Chemical Stability:** Product should be stable in storage for at least 2 years after manufacture. Some settling might occur, and containers should be agitated at least once every 12 months to resuspend any sediment.

**Conditions to avoid:** This product should be kept in a cool place. Containers should be kept dry. Keep containers and surrounding areas well ventilated. Handle and open containers carefully.

**Incompatible materials:** Water, acids, bases.
SECTION 10 STABILITY AND REACTIVITY

Hazardous decomposition products: Water and many liquids cause immediate release of phosgene gas from the product. In a fire, oxides of phosphorus and other phosphorus compounds and aluminium compounds may be formed.

Hazardous reactions: Water and many liquids cause immediate release of phosgene gas from the product. Keep product dry.

SECTION 11 TOXICOLOGICAL INFORMATION

No specific data is available for this product as no toxicity tests have been conducted on this product. Information presented is our best judgement based on similar products and/or individual components. As with all products for which limited data is available, caution must be exercised through the use of protective equipment and handling procedures to minimise exposure.

Potential Health Effects:
Aluminium phosphide is not absorbed dermally. The main routes of exposure are through ingestion and inhalation. It is highly toxic via both these routes. Aluminium phosphide ingested orally reacts with water and stomach acids to produce phosgene gas. Phosgene generated in the gastrointestinal tract is readily absorbed in to the bloodstream, and it is readily absorbed through the lung epithelium. Phosgene may cause denaturing of oxyhaemoglobin (the carrier for systemic distribution of oxygen) as well as enzymes important for respiration and metabolism, and may also have effects on cellular membranes. Inhaled aluminium phosphide dust undergoes the same reaction in the moist air sacs of the lung, although at a lower rate, resulting in similar local and systemic effects.

ACUTE EFFECTS

Swallowed: The reported rodent oral LD₅₀ is 11.5 mg/kg for pure aluminium phosphide. This product is very toxic if swallowed. Symptoms of mild to moderate acute aluminium phosphide toxicity include nausea, abdominal pain, tightness in chest, excitement, restlessness, agitation and chills. Symptoms of more severe toxicity include diarrhoea, cyanosis, difficulty breathing, pulmonary oedema, respiratory failure, tachycardia (rapid pulse) and hypotension (low blood pressure), dizziness and/or death. Convulsions have been reported in lab animals exposed to high concentrations of phosgene. Severe exposure may also result in proteinuria or glucosuria (low molecular weight proteins or glucose in the urine) indicating kidney damage. Data from a cohort of occupationally-exposed Indian agricultural fumigation workers undergoing single exposures of approximately 1-3 mg/m³ (0.71 - 2.22 ppm) revealed reversible (within 2 weeks) symptoms of mild acute exposure.

Eye: This product may be irritating to the eyes, but is unlikely to cause anything more than mild transient discomfort.

Skin: This product may be irritating to the skin, but is unlikely to cause anything more than mild transient discomfort.

Inhaled: Inhalation of phosgene gas is toxic. Inhaled aluminium phosphide dust undergoes the same reaction in the moist air sacs of the lung, although at a lower rate, resulting in similar local and systemic effects.

Chronic toxicity: Rats fed aluminium phosphide-fumigated food averaging 0.51 ppm phosgene residues showed no differences from the control animals with respect to blood or urine chemistry and no observable differences in tissue structure. It was reported that workers had probably encountered similar exposures on an intermittent basis (in some cases over as long as a 20 year period) and had yet to show signs of toxicity, which suggests that chronic effects may be minor or have a very long latency period. Inhalation studies were conducted on the effects of phosgene gas on male and female rats exposed at levels of 0.5, 1.5, 4.5, 7.5 and 15 mg/m³ for six hours per day over a 13 week period. Results indicated that 15 mg/m³ was lethal to 4 of 10 female rats after three days of exposure. Significant treatment-related effects on body weight and decreased food consumption were seen across all treatment groups and sexes, but were reversible. Decreases in red-blood cell counts, haemoglobin, haematocrit and increased platelet counts were seen in male rats of the 4.5 mg/m³ group. Dose-related changes in blood urea nitrogen and other clinical parameters were also seen across exposure groups. Microscopic lesions were found in the outer cortex of the kidneys of rats exposed to 15 mg/m³, but not at lower exposure levels. All of these effects were reversible following a four-week recovery period.
SECTION 11 TOXICOLOGICAL INFORMATION (Continued)

Reproductive Effects: Examination of test animals revealed reversible damage to seminal vesicles in male rats exposed to 1.5 mg/m³ phosphine. Pregnancy rates for female rats exposed to 4.5 mg/m³ on days 6-10 of gestation were comparable to those in the unexposed group. No adverse effects on uterine implantation were seen in the 0.3, 3 and 4.5 mg/m³ exposure groups, although a statistically significant elevation in resorptions was seen in the 0.015 mg/m³ exposure group. However, this effect may not be dose-related as it there was not increased effect with increased dose. The available evidence for reproductive effects in animals suggest that reproductive effects are not likely in humans under normal conditions.

Teratogenic Effects: No effects on foetal birth weights or sex ratios were seen in offspring of rats exposed for six hours a day on days 6-10 of gestation. The available evidence suggests that teratogenic effects are not likely in humans under normal conditions.

Mutagenic Effects: No evidence was available regarding the ability of aluminium phosphide or phosphine to cause mutations. Studies of human lymphocyte cultures exposed under laboratory conditions showed significant increases in phosphine-induced total chromosomal aberrations (e.g. gaps, deletions, breaks or exchanges) with increasing phosphine concentrations. In the same study, analysis of lymphocyte cultures drawn from fumigators (using phosphine exclusively) exposed to phosphine showed significant increases in the same types of chromosomal aberrations.

Carcinogenic Effects: No data are currently available.

Organ Toxicity: Acute toxicity resulting from aluminium phosphide exposure is apparent most immediately in the heart and lungs; it may also affect the central nervous system, liver and kidneys.

Fate in Humans & Animals: Aluminium phosphide rapidly reacts with water to form highly toxic phosphine gas. It has been reported that aluminium phosphide may be absorbed directly into the bloodstream, although this is probably a very minor route of entry. That phosphine which is not expired through the lungs may be metabolized to phosphates, hypophosphite and phosphite.

SECTION 12 ECOLOGICAL INFORMATION

Environmental Toxicology: No data is available on this product. Exposure of turkeys and hens to 211 and 224 mg/m³ for 74 and 59 minutes respectively resulted in laboured breathing, swelling of organs, tonic-clonic convulsions and death. Due to the mechanism of action it is expected that other bird species will be affected at similar levels of exposure. As phosphine is rapidly dissipated in open air such exposure to birds is highly unlikely. Acute LC₅₀ in rainbow trout is 41 µg/L, indicating very high toxicity. No data were available on other fish or aquatic species. Exposure to fish is unlikely as aluminium phosphide will rapidly react to form phosphine gas, which although slightly soluble in water, will mainly bubble up into the air and be released. No data were available for other species.

Environmental Fate: Aluminium phosphide will break down spontaneously in the presence of water to form a phosphide gas, and so it is non-persistent and non-mobile in the soil environment, and poses no risk to groundwater. It is highly unlikely that aluminium phosphide or phosphine will be found in surface waters.

SECTION 13 DISPOSAL CONSIDERATIONS

Spills and Disposal: Persons involved in cleanup require adequate respiratory and skin protection - see section 8. In case of spillage, contain tablets and dispose of waste as indicated below or in accordance to the Australian Standard 2507- Storage and Handling of Pesticides. Keep out animals and unprotected persons. Keep material out of streams and sewers. Vacuum or shovel waste into an approved drum. To decontaminate spill area, tools and equipment, swamp with dilute acid or soapy water in open air until bubbling ceases and then add the solution to the drums of wastes already collected and label contents. Dispose of drummed wastes, including decontamination solution in accordance with the requirements of Local or State Waste Management Authorities.

After fumigation with the product on trays/sheets remove the spent tablets/pellets and ensure residual phosphide is destroyed before disposal, by swarming with dilute acid or soapy water in open air until bubbling ceases. Dispose of deactivated residues below 500 mm in an approved disposal pit specifically marked and set up for this purpose, clear of waterways, desirable vegetation and tree roots.
SECTION 13  DISPOSAL CONSIDERATIONS (Continued)

Disposal of empty containers: Triple rinse the empty containers with soapy water to ensure residual phosphide is destroyed. Dispose of rinsings in an approved disposal pit. Destroy empty containers by breaking, crushing or puncturing them. Dispose of the containers at a local authority landfill. If no local authority landfill is available, bury the containers below 500 mm in an approved disposal pit. DO NOT burn empty containers or product.

SECTION 14  TRANSPORT INFORMATION

Road & Rail Transport: This product is classified as a Dangerous Goods under the Australian Code for the Transport of Dangerous Goods by Road and Rail. UN 1397, Class 4.3 (Dangerous when wet), subclass 6.1 (toxic) Packing Group I, Proper Shipping Name ALUMINUM PHOSPHIDE. Hazchem code 4WE.

This product is a Schedule 7 Poison (S7) and must be stored, transported and sold in accordance with the relevant Health Department regulations.

SECTION 15  REGULATORY INFORMATION

Under the Standard for Uniform Scheduling of Medicines and Poisons (SUSMP), this product is a schedule 7 poison. This product is registered under the Agricultural and Veterinary Chemicals Code Act 1994. Product Registration No. 67374. This product is classified as a Hazardous Substance under the criteria of Safe Work Australia. T*: Very toxic. This product is classified as a Dangerous Good according to the ADG Code (7th Ed).

SECTION 16  OTHER INFORMATION

Issue Date: 3 July 2012. (First issue).

Key to abbreviations and acronyms used in this MSDS:
Carcinogen An agent which is responsible for the formation of a cancer.
Genotoxic Capable of causing damage to genetic material, such as DNA.
HSIS Hazardous Substances information System.
Lacrimation The production, secretion, and shedding of tears.
Lavage A general term referring to cleaning or rinsing.
Mutagen An agent capable of producing a mutation.
Pneumonitis A general term that refers to inflammation of lung tissue.
PPE Personal protective equipment.
Teratogen An agent capable of causing abnormalities in a developing foetus.
TWA The Time Weighted Average airborne concentration over an eight-hour working day, for a five day working week over an entire working life.

Safe Work Australia: Formally known as Australian Safety & Compensation Council (ASCC) which was formally known as the National Occupational Health & Safety Commission (NOHSC).

References

This MSDS summarises our best knowledge of the health and safety hazard information of the product and how to safely handle and use the product in the workplace. Each user should read this MSDS and consider the information in the context of how the product will be handled and used in the workplace including in conjunction with other products.