



**MATERIAL SAFETY DATA SHEET: ALUMINUM PHOSPHIDE**

	<u>U.S. EPA Reg. No.</u>	<u>Canada Reg. No.</u>
PHOSTOXIN® TABLETS	72959-4	15736
PHOSTOXIN® PELLETS	72959-5	15735
PHOSTOXIN® TABLET PREPAC	72959-9	16438
PHOSTOXIN® PREPAC ROPES	72959-8	20252
DETIA® FUMEX BAGS, BELTS AND BLANKETS	72959-10	
DETIAPHOS TABLETS	72959-4	
DETIAPHOS PELLETS	72959-5	

**PROPER DOT SHIPPING NAME: ALUMINUM PHOSPHIDE, 4.3 UN1397 PG I DANGEROUS WHEN WET, POISON LABELS APPLY**

**SECTION I - PRODUCT INFORMATION**

**Manufacturer:**

DEGESCH America, Inc.  
153 Triangle Dr.  
P. O. Box 116  
Weyers Cave, VA 24486 USA

Telephone: (540) 234-9281 / (800) 330-2525  
Fax: (540) 234-8225  
Internet Address: www.degeschamerica.com  
E-mail: degesch@degeschamerica.com

**EMERGENCY TELEPHONE NOS.:**

Emergency – Chemtrec (800) 424-9300  
Emergency and Information – DEGESCH America, Inc. (540) 234-9281 / (800) 330-2525

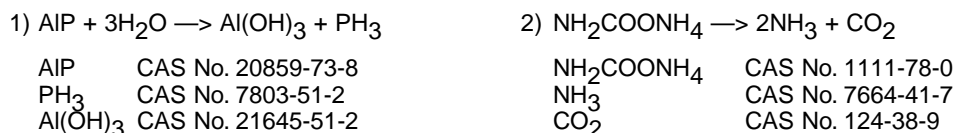
Phostoxin and DetiaPhos are available as 0.6g pellets and 3.0g tablets. Tabletized Phostoxin is also available in gas permeable packages called Prepacs and Ropes. These products are packed in gas-tight containers. Detia® Fumex is available as 34g bags. Fumex is also packed as bag belts, each equivalent to 4 bags and bag blankets, equivalent to 100 bags.

Date of Revision: November 2002

**SECTION II - HAZARDOUS INGREDIENTS INFORMATION**

**Identity:**

Phostoxin, Fumex, DetiaPhos and Aluminum Phosphide (AIP) – react with water to produce phosphine, hydrogen phosphide, PH<sub>3</sub> as shown in Equation 1. Phostoxin and DetiaPhos is formulated with 55% aluminum phosphide and also contains ammonium carbamate (AC) and inert ingredients. Ammonium carbamate releases ammonia and carbon dioxide as shown in Equation 2. Detia Fumex bags do not contain ammonium carbamate.



**NFPA Chemical Hazard Ratings:**

Flammability Hazard 4  
Health Hazard 4  
Reactivity Hazard 2  
Special Hazard ⚠

**SARA Physical and Health Hazards:**

Fire  
Reactivity  
Immediate (Acute)

**Inhalation Exposure Limits:**

Component	<u>OSHA PEL</u>	<u>ACGIH TLV</u>		<u>NIOSH</u>
	TWA (ppm)	TWA (ppm)	STEL (ppm)	IDLH (ppm)
Hydrogen Phosphide*	0.3	0.3	1.0	50
Ammonia	50	25	35	300
Carbon Dioxide	5,000	5,000	30,000	40,000

\*EPA limits are 0.3 ppm TWA during fumigation and 0.3 ppm ceiling at all other times.

**SECTION III - PHYSICAL CHARACTERISTICS**

**Boiling Point:**

AIP >1000 °C  
PH<sub>3</sub> -87.7 °C

**Specific Gravity of Vapors (Air = 1):**

AIP N/A  
PH<sub>3</sub> 1.17

**Vapor Pressure:**

AIP 0mm Hg  
PH<sub>3</sub> 40mm Hg @-129.4 °C  
AC 100mmHg@26.7 °C

**Solubility in Water:**

AIP Insoluble, reacts  
PH<sub>3</sub> 26cc in 100 ml water at 17 °C  
AC Very soluble, reacts

**Appearance and Odor:**

The Phostoxin, DetiaPhos and Fumex formulations, and aluminum phosphide have a greenish-gray color and the hydrogen phosphide (phosphine, PH<sub>3</sub>) gas produced by these chemicals has an odor described as similar to garlic, carbide or decaying fish.

**Specific Gravity:**

AIP 2.85

**Melting Point:**

AIP >1000°C  
PH<sub>3</sub> -133.5°C

**SECTION IV - FIRE AND EXPLOSION HAZARD DATA****Flash Point:**

Aluminum phosphide, Phostoxin, DetiaPhos and Fumex are not themselves flammable. However, they react readily with water to produce hydrogen phosphide (phosphine, PH<sub>3</sub>) gas which may ignite spontaneously in air at concentrations above its LEL of 1.8% v/v. UEL of hydrogen phosphide is not known.

**Extinguishing Media:**

Suffocate flames with sand, carbon dioxide or dry extinguishing chemicals.

**Special Fire Fighting Procedures:**

Do not use water on metal phosphide fires.

**Respiratory Protection:**

Wear NIOSH/MSHA approved SCBA or equivalent respiratory protection.

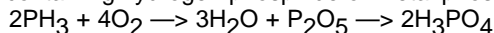
**Protective Clothing:**

Wear gloves when handling Phostoxin and DetiaPhos tablets, pellets or dust.

**Unusual Fire and Explosion Hazards:**

Hydrogen phosphide-air mixtures at concentrations above the lower flammable limit of 1.8% v/v, PH<sub>3</sub> may ignite spontaneously. Ignition of high concentrations of hydrogen phosphide can produce a very energetic reaction. Explosions can occur under these conditions and may cause severe personal injury. **Never allow the buildup of hydrogen phosphide to exceed explosive concentrations.** Open containers of metal phosphides in open air only and never in a flammable atmosphere. Do not confine spent or partially spent dust from metal phosphide fumigants as the slow release of hydrogen phosphide from these materials may result in the formation of an explosive atmosphere. Spontaneous ignition may occur if large quantities of aluminum phosphide or magnesium phosphide are piled in contact with liquid water. This is particularly true if quantities of these materials are placed in moist or spoiled grain which can provide partial confinement of the hydrogen phosphide gas liberated by hydrolysis.

Fires containing hydrogen phosphide or metal phosphides will produce phosphoric acid by the following reaction:

**SECTION V - REACTIVITY DATA****Stability:**

Phostoxin, DetiaPhos, Fumex and aluminum phosphide are stable to most chemical reactions, except for hydrolysis. They will react with moist air, liquid water, acids and some other liquids to produce toxic and flammable hydrogen phosphide gas. Hydrogen phosphide may react vigorously with oxygen and other oxidizing agents.

**Incompatibility:**

Avoid contact with water and oxidizing agents.

**Corrosion:**

Hydrogen phosphide gas may react with certain metals and cause corrosion, especially at higher temperatures and relative humidities. Metals such as copper, brass and other copper alloys, 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. Hydrogen phosphide will also react with certain metallic salts and, therefore, sensitive items such as photographic film, some inorganic pigments, etc., should not be exposed.

**Hazardous Polymerization:**

Will not occur.

**SECTION VI - HEALTH HAZARD INFORMATION****Routes of Entry:**

The dermal toxicity of aluminum phosphide is very low. The LD<sub>50</sub> via the dermal route is greater than 5,000 mg per kilogram for a 1-hour exposure. Primary routes of exposure are inhalation and ingestion.

**Acute and Chronic Health Hazards:**

Phostoxin, DetiaPhos and Fumex are highly acute toxic substances. The LC<sub>50</sub> for hydrogen phosphide gas is about 180 ppm for a 1-hour inhalation exposure. The acute oral toxicity of the Phostoxin, DetiaPhos and Fumex formulations was found to be 11.5 mg/kg of body weight. Aluminum phosphide and phosphine are not known to cause chronic poisoning.

**Carcinogenicity:**

Aluminum phosphide and phosphine are not carcinogenic and are not listed as such by NTP, IARC or OSHA.

**Signs and Symptoms of Exposure:**

Aluminum phosphide tablets, pellets, bags and dust react with moisture from the air, acids and many other liquids to release

hydrogen phosphide (phosphine, PH<sub>3</sub>) gas. Mild exposure by inhalation causes malaise (indefinite feeling of sickness), ringing in the ears, fatigue, nausea and pressure in the chest which is relieved by removal to fresh air. Moderate poisoning causes weakness, vomiting, pain just above the stomach, chest pain, diarrhea and dyspnea (difficulty in breathing). Symptoms of severe poisoning may occur within a few hours to several days resulting in pulmonary edema (fluid in lungs) and may lead to dizziness, cyanosis (blue or purple skin color), unconsciousness, and death.

#### **Emergency and First Aid Procedures:**

Symptoms of overexposure are headache, dizziness, nausea, difficult breathing, vomiting, and diarrhea. In all cases of overexposure get medical attention immediately. Take victim to a doctor or emergency treatment facility.

#### If the gas or dust from aluminum phosphide is inhaled:

Get exposed person to fresh air. Keep warm and make sure person can breathe freely. If breathing has stopped, give artificial respiration by mouth-to-mouth or other means of resuscitation. Do not give anything by mouth to an unconscious person.

#### If aluminum phosphide pellets, tablets or powder are swallowed:

Drink or administer one or two glasses of water and induce vomiting by touching back of throat with finger, or if available, syrup of ipecac. Do not give anything by mouth if victim is unconscious or not alert.

#### If powder or granules of aluminum phosphide get on skin or clothing:

Brush or shake material off clothes in a well ventilated area. Allow clothes to aerate in a ventilated area prior to laundering. Do not leave contaminated clothing in occupied and/or confined areas such as automobiles, vans, motel rooms, etc. Wash contaminated skin thoroughly with soap and water.

#### If dust from pellets or tablets gets in eyes:

Flush with plenty of water. Get medical attention.

## **SECTION VII - PRECAUTIONS FOR SAFE HANDLING**

### **Spill Cleanup Procedures:**

If possible, dispose of spilled Phostoxin, DetiaPhos and Fumex by use according to label instructions. Freshly spilled material which has not been contaminated by water or foreign matter may be replaced into original containers. Punctured flasks or containers may be temporarily repaired using aluminum tape. If the age of the spill is unknown or if the product has been contaminated with soil, debris, water, etc., gather up the spillage in small open buckets having a capacity no larger than about 1 gallon. Do not add more than about 1 to 1.5 kg (2 to 3 lbs.) to a bucket. If on-site wet deactivation is not feasible, transport the uncovered buckets in open vehicles to a suitable area. Wear gloves when handling Phostoxin tablets and pellets.

Respiratory protection may be required during cleanup of spilled material. If the concentration of hydrogen phosphide is unknown, NIOSH/MSHA approved SCBA or its equivalent must be worn.

Small amounts of spillage, from about 4 to 8 kg (9 to 18 lbs.) may be spread out over the ground in an open area to be deactivated by atmospheric moisture. Alternatively, spilled Phostoxin and Fumex may be deactivated by the wet method as described in the following:

### **Wet Deactivation of Spilled Phostoxin and Fumex:**

1. Deactivating solution is prepared by adding the appropriate amount of low sudsing detergent to water in a drum or other suitable container. A 2% solution or 4 cups of detergent in 30 gallons is suggested. The container should be filled with deactivating solution to within a few inches of the top.
2. The material is added slowly to the deactivating solution and stirred so as to thoroughly wet all of the product. This should be carried out in open air and respiratory protection may be required. At no time should the deactivation drum be covered.
3. No more than about 45 to 50 lbs. of Phostoxin, DetiaPhos or Fumex should be added to 15 gallons of water-detergent mixture. Prepacs, Ropes, and Fumex may ignite during wet deactivation if they are allowed to float to the surface. Add weights or otherwise ensure that Phostoxin and Fumex stay submerged until deactivation is completed.
4. Allow the mixture to stand, with occasional stirring, for about 36 hours. The resultant slurry of dust or packaged product will then be safe for disposal.
5. Dispose of the slurry of deactivated material, with or without preliminary decanting, at a sanitary landfill or other suitable site approved by local authorities. Where permissible, this slurry may be poured into a storm sewer or out onto the ground.

### **For Assistance:**

Contact - DEGESCH America, Inc.

Telephone: (540) 234-9281 / (800) 330-2525

Fax: (540) 234-8225

Internet address: [www.degeschamerica.com](http://www.degeschamerica.com)

E-Mail: [degesch@degeschamerica.com](mailto:degesch@degeschamerica.com)

or

Chemtrec: (800) 424-9300

### **Disposal of Spent Phostoxin, DetiaPhos and Fumex:**

When being disposed of, spilled or partially reacted Phostoxin, DetiaPhos and Fumex are considered hazardous wastes under existing Federal Regulations. If properly exposed, the grayish-white residual dust after a fumigation **will not be a hazardous waste** and normally contains only a very small amount of unreacted aluminum phosphide. This waste will be safe for disposal. However, the spent residual dust from incompletely exposed Phostoxin, DetiaPhos or Fumex may require special care.

Triple rinse tablet and pellet flasks and stoppers with water. Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or by other procedures approved by state and local authorities. Rinsate may be disposed of in a storm sewer, sanitary landfill or by other approved procedures. Or, it is permissible to remove lids and expose empty flasks to atmospheric conditions until the residue in the flasks is reacted. Then puncture and dispose of in a sanitary landfill or other approved site, or by other procedures approved by state and local authorities. Since containers for Prepacs, Ropes, and Fumex are contacted only by phosphine gas, they need not be triple rinsed prior to disposal.

Some local and state waste disposal regulations may vary from the following recommendations. Disposal procedures should be reviewed with appropriate authorities to ensure compliance with local regulations. Contact your State Pesticide or Environmental Control Agency or Hazardous Waste Specialist at the nearest EPA Regional Office for guidance.

1. Confinement of partially spent residual materials, as in a closed container, or collection and storage of large quantities of dust may result in a fire or explosion hazard. Small amounts of hydrogen phosphide may be given off from unreacted aluminum phosphide, and confinement of the gas may result in a flash.
2. In open areas, small amounts of spent residual dust or spent packaged products may be disposed of on site by burial or by spreading over the land surface away from inhabited buildings.
3. Residual dust from Phostoxin, DetiaPhos and Fumex may also be collected and disposed of at a sanitary landfill, or other approved sites or by other procedures approved by Federal, State or Local authorities.
4. From 3 to 5 kg (7 to 10 lbs.) of spent dust from 2 to 3 flasks of Phostoxin or 80 to 130 Fumex bags may be collected for disposal in a 1-gallon bucket. Larger amounts, up to about one-half case, may be collected in burlap, cotton or other types of porous cloth bags for transportation in an open vehicle to the disposal site. Do not collect dust from more than 7 flasks of tablets, 10 flasks of pellets (about 11 kg or 25 lbs.) or 300 bags in a single bag. Do not pile cloth bags together. Do not use this method for partially spent or "green" dust. **Caution:** Do not collect dust in large drums, dumpsters, plastic bags or other containers where confinement may occur.

#### **Deactivation of Partially Spent Phostoxin Prepac and Ropes and Fumex Bags:**

Packaged products, such as Phostoxin Prepac, Ropes, and Fumex bags, which are only partially spent may be rendered inactive by either a "dry" or "wet" deactivation method. The "dry" method entails holding the Prepac, Ropes and bags out of doors in locked, 30-gallon wire baskets which are available from DEGESCH America, Inc., or your supplier. Protect the partially spent Phostoxin and Fumex from rain. The deactivated Prepac, Ropes, and Fumex may then be taken to an approved site for burial at periodic intervals or whenever the wire container is full. **Caution:** Storage of partially spent Prepac and Ropes in closed containers may result in a fire hazard upon opening the container.

Alternatively, partially spent Prepac, Ropes and bags and residual dust from phosphine fumigations may be treated by the "wet" deactivation method as follows:

1. Deactivating solution is prepared by adding the appropriate amount of low sudsing detergent or surface active agent to water in a drum or other suitable container. A 2% solution or 4 cups of detergent in 30 gallons is suggested. The container should be filled with deactivating solution to within a few inches of the top.
2. Immerse spent Prepac, Ropes and Fumex or slowly pour residual dust into the deactivating solution while stirring so as to thoroughly wet all of the spent material. Keep immersed for about 36 hours. This should be done in the open air and not in the fumigated structure. Dust from Phostoxin tablets or pellets should be mixed into no less than about 10 gallons of water-detergent solution for each case of spent material.
3. Dispose of the deactivated Prepac, Ropes, and Fumex or dust-water suspension, with or without preliminary decanting, at a sanitary landfill or other suitable site approved by local authorities. Where permissible, the slurry may be poured into a storm sewer or out onto the ground.
4. **Caution:** Respiratory protection may be required during wet deactivation. Do not cover the container at any time. Do not dispose of dust in a toilet. Do not allow quantities of dry, spent dust from Phostoxin to be collected or stored without deactivation.

#### **Precautions to be Taken in Handling and Storage:**

Store Phostoxin, DetiaPhos and Fumex products in a locked, dry, well-ventilated area away from heat. Post as a pesticide storage area. Do not store in buildings inhabited by humans or domestic animals.

#### **Other Precautions:**

1. Do not allow water or other liquids to contact Phostoxin, DetiaPhos or Fumex.
2. Do not pile up large quantities of Phostoxin, DetiaPhos or Fumex during fumigation or disposal.
3. Once exposed, do not confine Phostoxin, DetiaPhos or Fumex or otherwise allow hydrogen phosphide concentrations to exceed the LEL.
4. Open containers of Phostoxin, DetiaPhos or Fumex only in open air. Do not open in a flammable atmosphere. Hydrogen phosphide in the head space of containers may flash upon exposure to atmospheric oxygen.
5. Phostoxin, DetiaPhos and Fumex are restricted use pesticides due to acute inhalation toxicity of highly toxic hydrogen phosphide (phosphine, PH<sub>3</sub>) gas. For retail sale to and use only by certified applicators or persons under their direct supervision and only for those uses covered by the certified applicator's certification.
6. See EPA approved labeling for additional precautions and directions for use.

### **SECTION VIII - CONTROL MEASURES**

#### **Respiratory Protection:**

NIOSH/MSHA approved full-face mask with approved canister for phosphine (hydrogen phosphide, PH<sub>3</sub>) may be worn at concentrations up to 15 ppm. At levels above this or when the hydrogen phosphide concentration is unknown, NIOSH/MSHA approved SCBA or equivalent must be worn.

#### **Protective Clothing:**

Wear gloves when handling aluminum phosphide tablets, pellets or dust.

#### **Eye Protection:**

None required.

#### **Ventilation:**

Local ventilation is generally adequate to reduce hydrogen phosphide levels in fumigated areas to below the TLV/TWA. Exhaust fans may be used to speed the aeration of silos, warehouses, shipholds, containers, etc.

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