

# MATERIAL SAFETY DATA SHEET: MAGNESIUM PHOSPHIDE- MAGTOXIN® SPOT FUMIGANT, FUMI-CEL®, FUMI-STRIP®

PROPER DOT SHIPPING NAME: MAGNESIUM PHOSPHIDE, CL 4.3 UN2011 PG I DANGEROUS WHEN WET, POISON LABELS APPLY

## SECTION I - PRODUCT INFORMATION

### Manufacturer:

DEGESCH America, Inc. Telephone: (540) 234-9281/1-800-330-2525  
153 Triangle Dr. Telefax: (540) 234-8225  
P. O. Box 116 Internet address: <http://www.degeschamerica.com>  
Weyers Cave, VA 24486 USA E-Mail: [degesch@degeschamerica.com](mailto:degesch@degeschamerica.com)

### EMERGENCY TELEPHONE NOS.:

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

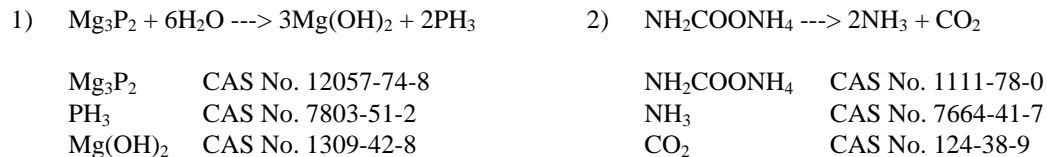
**Packaging:** Magtoxin is available in porous blister packs called the Magtoxin Prepac Spot Fumigant. Fumi-Cel is produced by impregnating magnesium phosphide into polyethylene in the form of a 117g plate, each plate liberating 33g of hydrogen phosphide. The Fumi-Strip is formed by attaching together, end-to-end, 20 of the Fumi-Cel plates. Fumi-Cel and Fumi-Strip do not liberate carbon dioxide and ammonia. All metal phosphide products are packed in gas-tight containers.

Date of Revision: July 2000

## SECTION II - HAZARDOUS INGREDIENTS INFORMATION

### Identity:

Magtoxin Spot Fumigant, Fumi-Cel, Fumi-Strip, Magnesium Phosphide,  $Mg_3P_2$  - Reacts with water to produce phosphine (hydrogen phosphide,  $PH_3$ ) as shown in Equation 1. Magtoxin is formulated with 66% magnesium phosphide and also contains ammonium carbamate and inert ingredients. Ammonium carbamate releases ammonia and carbon dioxide as shown in Equation 2. The Fumi-Cel and Fumi-Strip formulation does not contain ammonium carbamate.



### NFPA Chemical Hazard Ratings:

Flammability Hazard 4  
Health Hazard 4  
Reactivity Hazard 2  
Special Hazard W

### SARA Physical and Health Hazards:

Fire  
Reactivity  
Immediate (Acute)

### Inhalation Exposure Limits:

Component	OSHA PEL	ACGIH TLV		NIOSH
	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:

$Mg_3P_2$  >1000°C  
 $PH_3$  -87.7°C

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

$Mg_3P_2$  N/A  
 $PH_3$  1.17

**Vapor Pressure:**

Mg<sub>3</sub>P<sub>2</sub> 0mm Hg  
 PH<sub>3</sub> 40mm Hg @ -129.4°C

**Solubility in Water:**

Mg<sub>3</sub>P<sub>2</sub> Insoluble, reacts  
 PH<sub>3</sub> 26cc in 100 ml water at 17°C

**Appearance and Odor:**

Magtoxin and magnesium phosphide are a dark charcoal gray. The paper covering the polyethylene matrix of the Fumi-Cel and Fumi-Strip is yellow-orange in color. The hydrogen phosphide (phosphine, PH<sub>3</sub>) gas produced by these products has an odor described as similar to garlic, carbide or decaying fish.

**Specific Gravity:**

Mg<sub>3</sub>P<sub>2</sub> 2.06

**Melting Point:**

AIP >1000°C  
 PH<sub>3</sub> -133.5°C

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

Magnesium phosphide and Magtoxin 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.

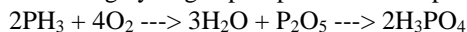
**Protective Clothing:**

Wear gloves when handling Magtoxin.

**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 magnesium phosphide or aluminum 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:**

Magnesium phosphide is stable to most chemical reactions, except for hydrolysis. Magtoxin, Fumi-Cel and Fumi-Strip will react with moist air, liquid water, acids and some other liquids to produce toxic and flammable hydrogen phosphide gas. Magnesium phosphide is more reactive than aluminum phosphide and will liberate hydrogen phosphide more rapidly and more completely at lower temperatures and humidities.

**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 magnesium phosphide is very low. The LD<sub>50</sub> via the dermal route is estimated to be 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:**

Magnesium phosphide is a highly acute toxic substance. The LC<sub>50</sub> of hydrogen phosphide gas is about 190 ppm for a one-hour inhalation exposure. The acute oral toxicity of the Magtoxin formulation was found to be 9.1 mg/kg of body weight. Magnesium phosphide and phosphine are not known to cause chronic poisoning.

**Carcinogenicity:**

Magnesium phosphide and phosphine are not known to be carcinogenic and are not listed as such by NTP, IARC or OSHA.

**Signs and Symptoms of Exposure:**

Magnesium phosphide fumigant products 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 about 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 magnesium 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 magnesium phosphide pellets 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 magnesium 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 – SPILL OR LEAK PROCEDURES**

**Spill Cleanup Procedures:**

If possible, dispose of spilled Magtoxin, Fumi-Cel or Fumi-Strip 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, pouches 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 0.5kg (1 lb.) to a bucket. If on-site wet deactivation is not feasible, transport the uncovered buckets in open vehicles to a suitable area. Respiratory protection will most likely be required during cleanup of spilled magnesium phosphide fumigants. If the concentration of hydrogen phosphide is unknown, NIOSH/MSHA approved SCBA or its equivalent must be worn. Small amounts of spillage, from about 2 to 4 kg (4 to 9 lbs.) may be spread out over the ground in an open area to be deactivated by atmospheric moisture. Alternatively, spilled magnesium phosphide fumigants may be deactivated by the wet method as described in the following.

### **Wet Deactivation of Spilled Magnesium Phosphide Products:**

1. Spilled magnesium phosphide fumigants, Magtoxin, Fumi-Cel and Fumi-Strip, may be deactivated with water. Do not use detergent for the deactivation of these products. Fill the container in which the deactivation is to be performed with water to within a few inches of the top.
2. The spilled material is added slowly to the water. Magtoxin Prepacs, Fumi-Cel or Fumi-Strips may ignite during wet deactivation if they are allowed to float to the surface. Add weights or otherwise ensure that they stay submerged until deactivation is complete. At no time should the deactivation container be covered.
3. Due to the reactivity of magnesium phosphide, additions of spilled product to the water should be made slowly and carefully. This should be done in open air and respiratory protection will probably be required.
4. Allow the mixture to stand, with occasional stirring, for about six hours. Do not cover the container. The mixture will then be safe for disposal.
5. Dispose of the deactivated material, with or without preliminary decanting, at a sanitary landfill or other suitable site approved by local authorities. Where permissible, the deactivation water containing spent dust may be poured into a storm sewer or out onto the ground.

### **For Assistance:**

Contact - DEGESCH America, Inc.  
Telephone: (540) 234-9281/1-800-330-2525  
Fax: (540) 234-8225  
Internet address: <http://www.degeschamerica.com>  
E-Mail: [degesch@degeschamerica.com](mailto:degesch@degeschamerica.com)  
or  
Chemtrec: (800) 424-9300

### **Disposal of Spent Magtoxin, Prepacs, Fumi-Cel and Fumi-Strip:**

When being disposed of, spilled or partially reacted magnesium phosphide fumigants are considered hazardous wastes under existing Federal Regulations. If properly exposed, the grayish-white residual dust from Magtoxin and spent Fumi-Cel or Fumi-Strip will not be a hazardous waste and normally contain only a very small amount of unreacted magnesium phosphide. This waste will be safe for disposal. Properly exposed material is not a hazardous waste. However, the residuals from incompletely exposed magnesium phosphide fumigants may require special care.

Since tins, pails and pouches used to package these products are not contacted by metal phosphides, they are not required to be triple rinsed or dry deactivated. Empty tins and pails may be offered for recycling or reconditioning, or punctured and disposed of in a sanitary landfill, or by other procedures approved by state and local authorities.

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 fumigant or residual dust, as in a closed container, or collection and storage of large quantities of fumigant may result in a fire or explosion hazard. Small amounts of hydrogen phosphide may be given off from unreacted magnesium phosphide, and confinement of the gas may result in a flash.
2. In open areas, small amounts of spent residual dust may be disposed of on site by burial or by spreading over the land surface away from inhabited buildings.
3. Residuals from magnesium phosphide fumigants may also be collected and disposed of at a sanitary landfill, incinerator or other approved sites or by other procedures approved by Federal, State or Local authorities.
4. From 1 to 2 kg (2 to 4 lbs.) of spent fumigant may be collected for disposal in an open 1-gallon bucket. **Caution:** Do not collect dust in large drum, dumpsters, plastic bags or other containers where confinement may occur. Transport the buckets in an open vehicle for disposal or deactivation.

### **Deactivation of Partially Spent Magtoxin, Fumi-Cel and Fumi-Strip:**

Magtoxin Prepacs, Fumi-Cels or Fumi-Strips which are only partially spent may be rendered inactive by either a "dry" or "wet" deactivation method. The "dry" method entails holding the Prepacs, Cels or Strips out of doors in locked, 30-gallon wire baskets which are available from DEGESCH America, Inc., or your supplier. Protect the partially spent magnesium phosphide fumigants from rain. The deactivated products may then be taken to an approved site for incineration or burial at periodic intervals or whenever the wire container is full. **Caution:** Storage of partially spent magnesium phosphide in closed containers

may result in a fire hazard.

Alternatively, partially spent Prepacs, Fumi-Cels and Fumi-Strips may be treated by the "wet" deactivation method as follows:

1. Fill the container in which the deactivation is to be performed with water to within a few inches of the top. Detergent is not necessary for the deactivation of spent magnesium phosphide fumigants.
2. The spent material is added slowly to the water. Magtoxin Prepacs, Fumi-Cels or Fumi-Strips may ignite during wet deactivation if they are allowed to float to the surface. Add weights or otherwise ensure that they stay submerged until deactivation is complete.
3. Partially spent Magtoxin Prepacs, Fumi-Cels or Fumi-Strips may react quite vigorously during wet deactivation if they were exposed under cold and/or dry conditions or if the fumigation period was shortened. It is suggested that a small portion of the product be tested prior to immersing large amounts of material in water if it is suspected that the product contains considerable unreacted magnesium phosphide.
4. Due to the reactivity of magnesium phosphide, additions to the water should be made slowly and carefully. Deactivation should be carried out in open air and respiratory protection may be required.
5. Allow the mixture to stand for about six hours. Do not cover the container.
6. Dispose of the deactivated material, with or without preliminary decanting, at a sanitary landfill or other suitable site approved by local authorities. Where permissible, deactivation water containing spent dust may be poured into a storm sewer or out onto the ground.

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

Store Magtoxin, Fumi-Cel and Fumi-Strip 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 magnesium phosphide fumigants.
2. Do not pile up large quantities of magnesium phosphide products during fumigation or disposal.
3. Once exposed, do not confine the fumigant or otherwise allow hydrogen phosphide concentration to exceed the LEL.
4. Open containers of Magtoxin, Fumi-Cel or Fumi-Strip 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. See EPA approved labeling for additional precautions and directions for use.
6. Magtoxin, Fumi-Cel and Fumi-Strip 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.

**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 contact with magnesium phosphide is likely to occur.

**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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