

# Poison Facts:

## Medium Chemicals: Phosphine

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### **Properties of the Chemical**

Phosphine is a colorless, flammable gas with a fish- or garlic-like odor. It is heavier than air.

### **Uses of the Chemical**

Phosphine is used as an insecticide and rodenticide. It is available as aluminum phosphide or other salts in tablets, pellets and powder in bags. These are usually referred to as phosphine generators in which the salts are exposed to moisture in the air, and phosphine gas is then released.

### **Absorption, Distribution, Metabolism and Excretion (ADME)**

Phosphine is absorbed readily through the lungs and produces early symptoms in the brain and liver, suggesting that it is rapidly distributed at least to these organs. After peak exposure, phosphine is excreted in the expired air, and some is oxidized to phosphite and hypophosphite ions, which are excreted in the urine. Metal phosphides may hydrolyze to produce phosphine, which may be absorbed through the intestine after ingestion. Some zinc phosphide has been shown to reach the liver and kidneys intact after ingestion and to hydrolyze slowly in the tissues to phosphine and zinc salts. Hydrolysis of metal phosphides on the skin could lead to the evolution of gaseous phosphine, which can then be absorbed by inhalation. Little percutaneous absorption of metal phosphides occurs. Phosphine inhibits the cytochrome oxidase. The organs with the greatest oxygen requirements will be the most sensitive to damage. These include the brain, kidneys, heart and liver.

### **Clinical Effects of Acute Exposure**

Earliest symptoms are usually restlessness and fatigue, disturbances of speech, vision and gait, nausea, abdominal pain, vomiting and diarrhea, headache, thirst and chills. Respiratory symptoms include dyspnea, tightness of the chest and delayed-onset pulmonary edema. These may be followed by seizures and coma. Death may occur from heart failure within four days or be delayed one to two weeks.

### **In-Field Treatment Prior to Arrival at a Health Care Facility**

Move patient from the contaminated area to fresh air. Irrigate eyes and skin that are irritated. Administer oxygen if available.

**Special note to first responders:**

- Wear a positive-pressure Self-Contained Breathing Apparatus (SCBA).
- Because patients can exhale phosphine gas, do not provide direct mouth-to-mouth resuscitation.

**Treatment of Exposures in a Health Care Facility**

If a patient has ingested phosphide tablets, DO NOT induce vomiting. Gastric lavage and/or activated charcoal may be of benefit if initiated quickly – generally within one hour. Health care personnel should be protected from the phosphine gas produced when the tablets react with water. Adequate ventilation should be provided.

For inhalations, administer oxygen and assist ventilation as required. Treat bronchospasm with inhaled beta2 agonists as needed. Monitor vital signs and pulse oximetry. Obtain arterial blood gases and chest x-rays in patients with respiratory symptoms. Continuous cardiac monitoring and an ECG should be performed in patients with significant exposure. Also, monitor electrolytes, as hypomagnesemia, hypermagnesemia and hypokalemia may occur.

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**For more poison prevention and first aid information, call the**

Poison Control Center

Serving the Residents of Kansas

Toll-free Hotline

1-800-222-1222

THE UNIVERSITY OF KANSAS HOSPITAL

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