

# Poison Facts:

## Low Chemicals: Tetraethyl Pyrophosphate

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### **Properties of the Chemical**

Tetraethyl pyrophosphate is a colorless to pale amber liquid or solid with a faint fruity odor. It may burn, but it does not readily ignite. Tetraethyl pyrophosphate is miscible with water and most solvents.

### **Uses of the Chemical**

Tetraethyl pyrophosphate is used as an insecticide and rodenticide as a contact poison. It has also been used on fruit and vegetable crops. It was one of the first organic phosphate insecticides in the United States in 1946, but it has been largely replaced by other products.

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

The organophosphates are efficiently absorbed by oral, dermal and inhalation routes. Skin absorption is greater at higher ambient temperatures and is increased by the presence of dermatitis. Organophosphates are distributed to most organ systems and have been detected at higher levels in the fat and tissue than in the blood. Tetraethyl pyrophosphate is a potent inhibitor of cholinesterase. Signs and symptoms of poisoning develop after a latent period and may continue to increase after exposure has been discontinued.

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

The organophosphates are only minimally irritating to the skin, eyes or mucous membranes. However, they are absorbed through all routes. Every exposure can lead to systemic symptoms.

### **Effects can be divided into three categories:**

- **Muscarinic symptoms:** These include bradycardia, bronchospasm, bronchorrhea, salivation, lacrimation, diaphoresis, vomiting, diarrhea, urination and miosis.
- **Nicotinic symptoms:** These include tachycardia, hypertension, fasciculations, mydriasis, muscle cramps and weakness.
- **Central effects:** These include CNS depression, agitation, confusion, mydriasis delirium, coma, seizures and respiratory paralysis.

Adults are more likely to demonstrate the muscarinic effects, and children are more susceptible to the nicotinic effects.

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

- **Ocular exposures:** Immediately flush the eyes with water for 15 minutes, occasionally lifting the upper and lower lids.
- **Dermal exposures:** Immediately remove all contaminated clothing, and wash thoroughly with soap and water. Make sure to shampoo the hair if exposed.
- **Inhalation exposures:** Move the patient from the contaminated area. DO NOT use direct mouth-to-mouth resuscitation.
- **Ingestion exposures:** Give the patient small amounts of liquid. Do not give more than 1 cup to an adult or 1/2 cup to a child.

### **Special note to first responders:**

- Wear a positive-pressure Self-Contained Breathing Apparatus (SCBA).
- Wear chemical protective clothing that is specifically recommended by the manufacturer.

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

- **Ocular exposures:** Irrigate exposed eyes with room-temperature 0.9 percent saline for 15 to 30 minutes. Monitor for systemic symptoms.
- **Dermal exposures:** Wash exposed skin with soap and water for 15 to 30 minutes. Special care must be taken to avoid the exposure of health care personnel to the chemical. Monitor the patient for systemic symptoms.
- **Inhalation exposures:** Organophosphate vapors initially are irritating and may cause bronchospasm. However, the organophosphates are well-absorbed by inhalation, and after the initial irritation has resolved, the patient may develop systemic symptoms. Systemic symptoms involve increased bronchial secretions, followed by respiratory failure and non-cardiogenic pulmonary edema. Acute respiratory insufficiency is the main cause of death in exposed patients.
- **Ingestion exposures:** GI decontamination is needed for recent ingestions. The liquid forms of the organophosphates will frequently contain a hydrocarbon base. Protect the airway from aspiration.

Every exposure warrants monitoring of plasma and red blood cell cholinesterase activity. Obtain a serum amylase level, and monitor for prolonged QTc interval or PVCs. The treatment for systemic effects is 2-PAM and atropine. Call the Poison Control Center immediately for dosing information.

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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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