

PARATHION

Overview

Parathion (C₁₀H₁₄NO₅PS) is an [organophosphate insecticide](#) primarily used on fruit, cotton, wheat, vegetables, and nut crops. ([#EPA](#)) It has been attributed to numerous mass human poisonings due to its high toxicity. ([#Timbrell, 2004](#))

Just the facts

Physical Information

Name: Parathion

Use: [insecticide](#)

Source:

Recommended daily intake:

Absorption: inhalation, oral, dermal

Sensitive individuals: humans and animals

Toxicity/symptoms: *Acute*: nausea, vomiting, abdominal cramps, diarrhea, excessive salivation, headache, weakness, difficult breathing, blurring or dimness of vision, convulsions, central nervous system depression, paralysis, coma, and respiratory failure

Chronic: depressed red blood cell cholinesterase activity, nausea, and headaches

Regulatory facts: *OSHA PEL (permissible exposure limit)* = 0.1 mg/m³ (skin) (averaged over an 8-hour workshift)

NIOSH IDLH (immediately dangerous to life or health) = 10 mg/m³

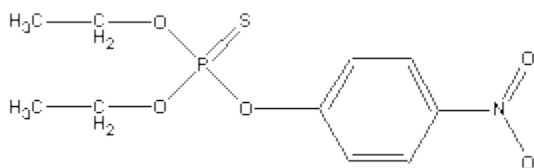
General facts:

Environmental:

Physical Information

Recommendations:

Chemical Structure



Structure retrieved from [University of Wisconsin](#)

Chemical Description

- ♣ Molecular weight: 291.27 g/mol
- ♣ Pure parathion is a pale yellow liquid, while the technical grades are brown.
- ♣ Parathion is practically insoluble in water, slightly soluble in petroleum oils, and miscible with many organic solvents.
- ♣ Parathion has a garlic-like odor, with an odor threshold of 0.47 milligrams per cubic meter (mg/m³).
- ♣ The vapor pressure: 3.78×10^{-5} mm Hg at 20 °C
- ♣ Log octanol/water partition coefficient (log K_{ow}): 3.83
- ♣ Boiling point (760 mm Hg): 707°F (375°C)
- ♣ Freezing point: 43°F (6.1°C)

SOURCES: [#EPA](#) and [#ATSDR](#)

Pharmacology and Metabolism

[Organophosphates](#) such as parathion cause an exaggerated pharmacological effect rather than a direct toxic action and the toxicity may be either cumulative, following chronic exposure, or acute after a single exposure. [Organophosphates](#) bind to the enzyme acetylcholinesterase (AChE) because of similarities with the natural substrate for the enzyme, a neurotransmitter present in the nervous system called [Acetylcholine](#) (ACh). Because [organophosphorous](#) compounds inhibit [AChE](#), ACh accumulates leading to excessive stimulation of the nerve. This leads to death of insects. (See [Cholinesterase Inhibitor](#)).

The same process occurs in humans and other mammals. However, [Organophosphates](#) have been

developed in such a way that some [Organophosphates](#) are relatively non-toxic in mammals at low exposure levels. At higher levels humans will suffer the same consequences as insects. ([#Timbrell, 2002](#))

Discovery and Development

Main Article: [Chemical Weapons](#)

Parathion was developed by the German trust [IG Farben](#) in the 1940s. [Dr. Gerhard Schrader](#) synthesized the [insecticide](#) while he was looking for chemicals that would increase agricultural yields needed to feed the Army during World War II. After the war the Western allies seized the chemical plants and scientists and parathion was thereafter marketed worldwide by different companies and under different brand names ([#Tucker, 2006](#)).

Health Effects

Parathion is extremely toxic from acute (short-term) inhalation, oral, and dermal exposures. Acute exposure of humans to parathion mainly affects the central nervous system. Symptoms of Acute Exposure:

- * blood
- * respiratory system
- * eyes
- * nausea
- * vomiting
- * abdominal cramps
- * diarrhea
- * excessive salivation
- * headache
- * weakness
- * difficult breathing
- * blurring or dimness of vision
- * convulsions
- * central nervous system depression
- * paralysis
- * coma
- * respiratory failure

Chronic (long-term) inhalation and oral exposure of humans and animals to parathion have been observed to result in depressed [cholinesterase inhibition](#), nausea, and headache ([#EPA](#)).

Source : <http://www.toxipedia.org/display/toxipedia/Parathion>