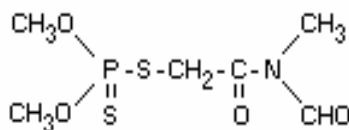


Formothion



Chemical name: formothion

Other names: *S*-[formyl(methyl)carbamoylmethyl] *O,O*-dimethyl phosphorodithioate
2-dimethoxyphosphinothioylthio-*N*-formyl-*N*-methylacetamide
S-[2-(formylmethylamino)-2-oxoethyl] *O,O*-dimethyl phosphorodithioate

Compound: C₆H₁₂NO₄PS₂

CAS Number: 2540-82-1

Pesticide type: acaricide, insecticide

Characteristics

Formothion is an organophosphate product introduced around 1962. A yellowish liquid with onion-like odour or crystalline mass. Extremely stable to acids but decomposes on distillation. It is incompatible with alkaline pesticides. It is a systemic and contact insecticide with activity as a contact and stomach poison. The compound is registered in more than 50 countries in Europe, South America, Africa, Asia and Australia.

Use

Used to control sucking pests, biting and chewing insects - spider mites, aphids, mealy bugs, whiteflies, fruit flies and many others. Used on tree fruits, vines, olives, hops, cereals, sugar cane, rice etc. Trade names include Aflix, Anthio, Sandoz S-6900, SAN 2441, SAN 69131.

Possible hazards and regulation

Products containing formothion bear the signal word Warning. Symptoms of poisoning include nausea, vomiting, dizziness, weakness, difficulty breathing and coughing after inhalation. It may also cause blurred vision, muscle spasms, loss of coordination and even death. Repeated exposure may cause personality changes, depression, anxiety or irritability.

Non-irritating to skin (other source indicates it as a skin irritant though). Eye irritant.

EPA toxicity class II – moderately toxic (not presently commercially produced in the US)

WHO classification O – obsolete as pesticide

Toxicity

Formothion is rapidly absorbed by the stomach of rats. It passes through the liver, kidney, pancreas. Most of it is excreted within 24 hours in urine. With oral doses of 10mg/kg in rats, the compound is readily absorbed from the stomach, followed by high level of radioactivity in the liver and kidney. 51% of the radioactivity excreted after 4 hours.

Toxicity to humans

One of the least toxic systemic organophosphates. It is considered to be endocrine disruptor and being a cholinesterase inhibitor it is listed on PAN Bad Actor Chemical list. No evidence that it affects reproduction. It does affect nervous system. No toxicity studies on humans available.

ADI 0,2 mg/kg/day (other sources 0,02)

Acute toxicity limits

LD50 is 365 – 500 mg/kg for rats, 410-420 mg/kg for rabbits, 102 mg/kg for mice, 210 mg/kg for cats, 560 mg/kg for guinea pigs.

Chronic toxicity:

Cholinesterase inhibitor affecting normal nervous system function. In rat feeding studies, 16 mg/kg/day caused growth impairment in males during the first year of a two year study. It caused slight tremors and muscle spasms.

NOAEL for rats has been established at 4 mg/kg/day.

Ecological effects

Slightly toxic to birds – oral LD50 for pigeons 630 mg/kg.

Slightly toxic to fish – LC50 (96 hours) for carp greater than 50 mg/l. When freshwater catfish were exposed to low sublethal concentrations, there was a significant reduction in DNA content in formothion treated fish. Also moderately toxic to aquatic invertebrates with acute 48 hour EC50 16,1 mg/l. Low toxicity to algae (acute 72 hour EC50 42,3 mg/l).

Highly toxic to bees with acute 48 hour LD50 0,15 µg/bee.

Carcinogenity: unlikely to cause carcinogenic effects in humans

Mutagenity: a number of studies indicate that it is not mutagenic

Bioaccumulation: low potential for bioaccumulation and bioconcentration

Mobility: mobile with high leachability

Persistence and degradability in environment:

Relatively non-persistent. Degradation in both soil and water is rapid. The half-life in soils is on average 1 to 14 days. No danger in residues accumulating in soil. In plants it is rapidly metabolized and transformed to dimethoate and omethoate.

Limits

Food:

Residues of formothion itself not detectable, the residue comprises dimethoate with omethoate usually degraded to dimethoate almost completely after 7 days).

USA: Strawberries – 0,3ppm, blackcurrant – 2ppm, citrus – 2ppm, tomatoes and peppers - 1ppm
Directive 2002/71/ES: citrus fruits 0,02 mg/kg, nuts 0,05 mg/kg, fruit and vegetables 0,02 mg/kg, tea 0,05 mg/kg, no limits for meat

Vyhlaška 381/2007 Sb.: tea 0,05 mg/kg, cereal 0,02 mg/kg, oilseeds 0,05 mg/kg, nuts 0,05 mg/kg

Water: Drinking water guidelines for pesticides in Australia – 50 µg/l health value.

WHO drinking water quality criteria: unlikely to occur in drinking water

Hazard Symbol : Xn harmful

Risk Phrases :

R21/22 Harmful in contact with skin and if swallowed

Safety Phrases :

S2 Keep out of the reach of children

S36/37 Wear suitable protective clothing and gloves

Links

<http://pmep.cce.cornell.edu/profiles/extoxnet/dienochlor-glyphosate/formothion-ext.html>

<http://www.inchem.org/documents/jmpr/jmpmono/v072pr19.htm>

<http://www.inchem.org/documents/jmpr/jmpmono/v073pr15.htm>

<http://www.inchem.org/documents/jmpr/jmpmono/v069pr18.htm>

<http://www.informaworld.com/smpp/content~db=all~content=a902632527>

<http://sitem.herts.ac.uk/aeru/footprint/en/Reports/361.htm>

<http://nj.gov/health/eoh/rtkweb/documents/fs/2439.pdf>

<http://extoxnet.orst.edu/pips/formothi.htm>

http://www.pesticideinfo.org/Detail_Chemical.jsp?Rec_Id=PC37913



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