

Permethrin

The Pesticide Label: Labels provide directions for the proper use of a pesticide product. *Be sure to read the entire label before using any product.* A signal word, on each product label, indicates the product's short-term toxicity.

CAUTION- low toxicity

WARNING- moderate toxicity

DANGER- high toxicity

What is permethrin?

- Permethrin is an insecticide (kills or controls insects) registered with the US EPA and first marketed in 1977.
- Permethrin is a pyrethroid. It is a synthetic chemical similar to the natural insecticide pyrethrum which comes from the chrysanthemum plant, but it remains effective for longer periods of time.

How does permethrin work?

- Pyrethroids work by quickly paralyzing the nervous system of insects.
- Permethrin kills insects when it contacts them or when they eat it. It has repellent effects also.
- It is effective against all stages of insect growth, particularly larvae.

What products contain permethrin?

- household insect foggers and sprays
- flea dips and sprays for cats and dogs
- ornamental garden and turf products
- repellent/insecticide for clothing
- mosquito abatement products
- termite treatments
- agricultural pesticide products
- lice shampoos and body lotions for scabies control (regulated by U.S. Food & Drug Administration)

What is the toxicity of permethrin?

Animals

- Rats fed high doses of permethrin exhibited tremors,

salivation, hyperactivity, hyperexcitability, urination, defecation and incoordination (1). See **Laboratory Testing** box.

- In a study involving newborn and adult rats, the newborn rats were found to be more sensitive to permethrin than the adults. The enzymes that break down permethrin in the body are not completely developed in the newborn rats. The incomplete development of the liver enzymes made the newborn animals more sensitive to permethrin than mature animals (2).

Laboratory Testing: Before pesticides are registered by the US EPA, they must undergo laboratory testing for short-term and long-term health effects. Laboratory animals are purposely fed high enough doses to cause toxic effects. From these tests, scientists judge how these chemicals might affect humans in cases of accidental overexposure. Toxic effects are not expected when pesticides are used properly since the amount of a pesticide that people and pets may be exposed to is low compared to the doses fed to laboratory animals.

Humans:

- Permethrin has low to moderate toxicity to humans for short-term exposures.
- Results of animal studies suggest that human newborns may be more sensitive to permethrin than adults.
- Permethrin acts similarly to the insecticide pyrethrum (from the chrysanthemum plant). Pyrethrum can cause skin or respiratory reactions in

people with hayfever or in people who are sensitive to ragweed and pollen. These reactions may include irritation or inflammation of the skin (contact dermatitis) or sneezing, nasal stuffiness, or asthmatic breathing. Although there is no clear evidence that pyrethroids (such as permethrin) cause allergic-type reactions, it is important to recognize this possibility (3).

- Exposure to permethrin may occasionally produce numbing, tingling, and burning sensations of the skin. These sensations are reversible and usually go away within 12 hours (4).

Effects of permethrin on human health and the environment depend on how much permethrin is present and the length and frequency of exposure. Effects also depend on the health of a person or the condition of the environment when exposure occurs.

Does permethrin break down and leave the body?

Animals

- In studies involving cows, goats, and rats, permethrin was broken down and almost completely eliminated from the body within 12 days (5).

Humans

- When permethrin was fed to two human volunteers, 18-39% was eliminated from their bodies in 24 hours (1). Based on animal studies, permethrin is not expected to accumulate in the body.

Is permethrin likely to cause cancer?

Animals

- US EPA has classified permethrin as a possible carcinogen because there is limited evidence of cancer in animals (6).
- There was no evidence of cancer in long-term studies in which laboratory rats were fed large daily doses of permethrin. In mice, long-term feeding studies of permethrin showed a slight increase in lung tumors in males (5). See **Cancer** box.

Humans

- Human cancer data are not available.

Cancer: The U.S. EPA has strict guidelines that require testing of pesticides for their potential to cause cancer. These studies involve feeding laboratory animals large daily doses of the pesticide for up to 2 years. These animals are compared with a group of animals that did not receive the chemical. Animal studies help show whether a chemical is a potential human carcinogen. If a pesticide does not cause cancer in animal tests, then the EPA considers it unlikely the pesticide will cause cancer in humans.

Does permethrin cause developmental or birth defects?

Animals

- Permethrin did not interfere with pregnancy or cause birth defects in animal studies with rats, rabbits, or mice (1).

Humans

- Human data on reproductive and developmental toxicity are not available.

What happens to permethrin in the environment?

- The typical half-life of permethrin in soil is 30 days (7). Permethrin breaks down more rapidly in soil with higher levels of organic matter (humus) (1). See **Half-life** box.

Half-life is the time required for half of the compound to degrade or be eliminated from the body.

1 half-life = 50% remaining
2 half-lives = 25% remaining
3 half-lives = 12% remaining
4 half-lives = 6% remaining
5 half-lives = 3% remaining

Remember that the amount of chemical remaining after a half-life will always depend on the amount of the chemical originally applied.

- Permethrin has an extremely low potential to move in soil. It is unlikely to contaminate groundwater because it binds tightly to soil particles (4). In water and on soil surfaces, permethrin is degraded by sunlight (1).
- The average half-life of permethrin on foliage is 10 days (1).

What effect does permethrin have on wildlife?

- Permethrin has been found to be highly toxic to fish in laboratory experiments. Products for agricultural and commercial outdoor use are limited to Certified Applicators and bear specific precautions and directions to avoid contamination of water. However, when permethrin products are used properly (i.e. according to the label) around the home or other residential sites, they pose little risk to aquatic life.
- Permethrin is highly toxic to bees in laboratory conditions. However, when used properly, permethrin has a strong repellent effect in the environment and should pose little risk to bees (1).
- Permethrin is of low toxicity to birds (1).

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Selected References:

- (1) World Health Organization. 1990. Environmental Health Criteria 94. *Permethrin*. International Programme on Chemical Safety. Geneva, Switzerland.
- (2) Cantalamessa, F. 1993. Acute toxicity of two pyrethroids, permethrin and cypermethrin, in neonatal and adult rats. *Arch Toxicol* 67:510-513.
- (3) Wagner, S.L. 1994. Allergy from Pyrethrin or Pyrethroid Insecticides. *Journal of Agromedicine* 1(1):39-45.
- (4) FMC Corporation. Princeton, PA. Dagnet FT MSDS, 5-24-95.
- (5) World Health Organization. 1990. IARC Monographs on the Evaluation of Carcinogenic Risks to Humans. Occupational Exposures in Insecticide Application, and Some Pesticides. *Permethrin*. Volume 53, October 1990.
- (6) U.S. EPA Office of Pesticide Programs Tracking Report. February 19, 1997.
- (7) R.D. Wauchope, T.M. Buttler, A.G. Hornsby, P.W.M. Augustijn Beckers, J.P. Burt. 1992. The SCS/ARS/CES Pesticide Properties Database for Environmental Decision-Making. *Reviews of Environmental Contamination and Toxicology* 123:1-156.