prallethrin

Review Date: 05/14/2012
CAS #: 23031-36-9

Type	Insecticide - synthetic pyrethroid that works on contact.
Controls	Controls a variety of insects (ants, cockroaches, fleas, ticks, etc.).
Mode of Action	Affects insect's nerve transmission by affecting the sodium channel.

Thurston County Review Summary:

Prallethrin is rated conditional by the Thurston County pesticide review criteria because there is data showing that prallethrin can cause mutagenicity, although the data did not support a dose related response (therefore the hazard is considered inconclusive). Prallethrin is also rated conditional because some of the labeled uses of prallethrin insecticides have calculated exposures that are rated high in hazard, moderate in hazard, and low in hazard (see the acute and chronic risk assessment sections of this review for more detail).

MOBILITY

Property	Value	Reference	Value Rating
Water Solubility (mg/L)	8	1	Low
Soil Sorption (Kd=mL/g)	Value not found		
Organic Sorption (Koc=mL/g)	2,533	1	Moderate

Mobility Summary:

Prallethrin is not very water soluble and adheres moderately to soil with organic material. The hazard for prallethrin to move off the site of application with rain or irrigation water is rated moderate.

PERSISTENCE

Property	Value	Reference	Value Rating
Vapor Pressure (mm Hg)	0.000035	1	Moderate
Biotic or Aerobic Half-life (days)	3	1	Low
Abiotic Half-life (days)	24 soil photolysis	4	Moderate
Terrestrial Field Test Half-life (days)	Value not found		
Hydrolysis Half-life (days)	Stable	1	High
Anaerobic Half-life (days)	37 aquatic	1	Moderate
Aquatic Field Test Half-life (days)	18	1	Moderate

Persistence Summary:

Prallethrin degrades rapidly by sunlight when it is in the air but slower when it is on vegetation, soil, or water. It is likely to take between one week and 2 months for prallethrin to degrade to half of the applied concentration (when it is on soil, water, or vegetation) which is rated moderate in hazard for persistence.

BIOACCUMULATION

Property	Value	Reference	Value Rating
Bioaccumulation Factor	Value could not be found		
Bioconcentration Factor	Value could not be found		
Octanol/Water Partition Coefficient	4.49	3	Moderate

Bioaccumulation Summary:

Bioconcentration studies for prallethrin could not be found. The octanol/water partition coefficient (log Kow = 4.49) indicates that prallethrin has a moderate potential to bind (and potentially accumulate) in fish or animal tissue. Rat metabolism studies found only 0.3% of administered prallethrin in tissues after 7 days, indicating that it is rapidly eliminated from animals (Reference 9). Although a bioconcentration study could not be found, the hazard for bioaccumulation is rated low because the likelihood for animal accumulation is low.

ACUTE WILDLIFE TOXICITY VALUES and Risk Assessment

Test Subject	Value	Reference	Value Rating
Mammalian (LD50)	460 mg/kg	3	Moderate
Avian (LD50)	>2,000 mg/kg	3	Low
Honey bee or insect (LD50)	0.026 ug/bee	3	High
Annelida -worms (LC50)	Value not found		
Fish (LC50)	0.012 mg/L	3	High
Crustacean (LC50)	0.006 mg/L	3	High
Mollusk (LC50)	Value not found		
Amphibian (LD50 or LC50)	Value not found		

Acute Toxicity Testing and Ecotoxicity Summary:

Single-dose toxicity testing indicates that prallethrin is low in toxicity to birds and moderately toxic to animals but highly toxic to bees, fish and other aquatic organisms. Risk to organisms from post-application exposures to prallethrin could not be located although several documents stated that use of prallethrin insecticides for public mosquito abatement programs did not exceed the EPA's level of concern. Prallethrin is due for a re-evaluation and registration by the EPA beginning in 2012 (the registration process can take several years) and at that time ecological risk assessments will be evaluated - after these documents are published, Thurston County will evaluate the risk to non-target organisms from prallethrin insecticides. Until the re-evaluation is made, risk to non-target organisms will be considered low with the knowledge that significant runoff of prallethrin into waterbodies could pose a risk to aquatic organisms (but expected uses from homeowners and Thurston County are not likely to cause significant runoff).

ACUTE HUMAN TOXICITY - Risk Assessment

Subject and Scenario	Route	Dose of Concern	Exposure	Margin of Safety	Reference	Value Rating
Adult broadcast carpet or space spray	Inhalation	0.0017 mg/kg/day	about 0.00038 mg/kg/day	4.5	4	Moderate
Child's hand-to-mouth after crack / crevice spray	Ingestion	0.05 mg/kg/day	about 0.00003 mg/kg/day	1600	4	Low
Person contacting pet after pet dip	Dermal (skin)	0.3 mg/kg/day	about 0.009 mg/kg/day	33	4	Low
Other risk assessment data weren't provided by EPA						

Acute Toxicity Risk Assessment Summary:

Residential applicator exposures were evaluated for indoor crack and crevice, broadcast carpet, space sprays, pet mousse, and pet shampoo. Potential exposures from applying pet mousse, making broadcast applications to carpet, or broadcast use of space sprays are rated moderate in hazard. All of the other residential application exposures evaluated by the EPA are rated low in hazard (Reference 4).

Post-application exposures were assessed for dermal, inhalation, and hand-to-mouth activities resulting in oral ingestion. Inhalation exposures were assessed for total release foggers and space sprays. A child's potential inhalation exposure following use of a diluted space spray is rated moderate in hazard (the same exposure to an adult is rated low in hazard). Undiluted products created exposures of hazard and so they are no longer registered for use by the EPA.

Potential dermal exposures range from moderate to low in hazard although the numerical data were not provided. The moderate hazard exposure was for the use of undiluted space sprays with a safety factor of 2.5 for kids (these products are no longer available) - the lowest hazard was for contact following a pet dip (safety factor of 33). Other dermal exposures are between a safety factor of 2.5 and 33 (but the data to interpret the hazard was not provided). All potential hand-to-mouth ingestion exposures were calculated to be low in hazard.

CHRONIC HUMAN TOXICITY HAZARDS

Property	Value	Adverse Effect	Reference	Rating
Carcinogenicity	Category E	Evidence of noncarcinogenicity for humans	7	Low
Mutagenicity	Mixed results	Chromasomal abberation	4	Moderate
Neurotoxicity - (NOAEL)	100 mg/kg/day	Delayed neurotoxicity	4	N/A
Endocrine Disruption	Not a known endocrine disruptor	- -	5 and 6	Low
Developmental Toxicity (NOAEL)	300 mg/kg/day	No developmental tox.	4	Low
Reproductive Toxicity (NOAEL)	31 mg/kg/day	Maternal NOAEL 6 mg/kg/day	4	Low
Chronic Toxicity (NOAEL)	5 mg/kg/day	trembling +	2	Check risk

Chronic Toxicity Hazard Summary:

The EPA reported that prallethrin induced chromasomal abberation in an in vitro Chinese hamster ovary cell assay but that the effect was not clearly dose-related. The EPA determined that prallethrin was not a mutagenicity concern. Until prallethrin is re-registered by the EPA and the mutagenicity potential is re-evaluated the hazard is rated moderate. Prallethrin is not considered a carcinogen, a developmental toxicant, or a reproductive toxicant.

CHRONIC HUMAN TOXICITY - Risk Assessment

Subject and Scenario	Route	Dose of Concern	Exposure	Margin of Safety	Reference	Value Rating
Adult bystander near a truck fogger application	Inhalation	0.0017 mg/kg/day	about 0.00017 mg/kg/day	10	8	Low
Adult bystander near an aerial fogger application	Inhalation	0.0017 mg/kg/day	about 0.000007 mg/kg/day	230	8	Low
Child bystander near an aerial fogger application	Inhalation	0.0017 mg/kg/day	about 0.00017 mg/kg/day	10	8	Low
Child bystander near an aerial fogger application	Inhalation	0.0017 mg/kg/day	about 0.000007 mg/kg/day	230	8	Low

Chronic Toxicity Risk Assessment Summary:

This section is being used to provide more risk assessment data for potential prallethrin exposures for mosquito abatement programs - not necessarily long-term exposures. The dose of concern for short- and long-term dermal exposures was calculated to be the same (0.3 mg/kg/day) as was the short- and long-term dose of concern from inhalation exposures (0.00174 mg/kg/day). Because of this, risk assessments for short-term exposures are the worst-case scenario (and if they are low in hazard so is the associated long-term exposure).

Risk to occupational applicators from potential exposures during the use of prallethrin insectcides for public mosquito abatement programs was assessed by the EPA. The calculated dose ranged from high in hazard (more than half of the dose of concern) to moderate in hazard (potential dose is calculated to be between one half and one tenth of the dose of concern) depending on application method. Mixing and loading prallethrin insecticides for a truck ground fogger application to 3,000 acres is calculated to be high in hazard (the applicator's risk is moderate if they did not mix and load).

Potential post-application inhalation exposures, following a fogger truck application used for mosquito abatement, are calculated to be 10-times to 230 times less than the dose of concern and are rated low in hazard (risk form aerial fogger applications are also rated low in hazard).

Metabolites and Degradation Products:

Names of the metabolites and degradation chemicals of prallethrin were not located.

Comments:

Prallethrin is an eye irritant (EPA Toxicity Category III) but not a skin irritant (EPA Toxicity Category IV) or a skin sensitizer (Reference 4).

References

1. USEPA. Office of Prevention, Pesticides and Toxic Substances. MEMORANDUM. Subject: Reassessment of the Environmental Risk and Data Requirements of Prallethrin, after Product Label Revision for MULTICIDE® Fogging Concentrate 2798. May 26, 2005.
2. USEPA. Office of Prevention, Pesticides and Toxic Substances. MEMORANDUM. Subject: Pyrethroids: Evaluation of Data from Developmental Neurotoxicity Studies and Consideration of Comparative Sensitivity. January 20. 2010.
3. International Union of Pure & Applied Chemistry. Pesticide Properties Database. prallethrin (Ref: OMS 3033). Accessed 5/16/2012.
4. World Health Organization. Specifications and Evaluations for Public Health Pesticides; Prallethrin. November 2004.
5. Scorecard - The Pollution Information Site. Health Effects / Endocrine Toxicants (Accessed 5/21/2012). http://scorecard.goodguide.com/health-effects.
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8. USEPA. Office of Prevention, Pesticides and Toxic Substances. MEMORANDUM. Subject: Prallethrin: Human Health Risk Assessment for the Public Health Use of Mosquito Adulticides Containing Prallethrin. (DP Barcode: D289335; Chemical Number: 128722). November 21, 2003.
9. Roberts, Terry and Hudson, David. "Metabolic Pathways of Agrochemicals: Part Two: Insecticides and Fungicides." The Royal Society of Chemistry 1999.