



# Pesticide Fact Sheet

Name of Chemical: ALLETHRIN STEREOISOMERS  
Reason for Issuance: REGISTRATION STANDARD  
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## 1. DESCRIPTION OF CHEMICALS

The following chemicals are all synthetic pyrethroid insecticides. That is, they are synthetic duplicates of a component of pyrethrum which is extracted from chrysanthemum flowers. Introduced in 1949, Allethrin was the first synthetic pyrethroid. Bioallethrin and S-bioallethrin were introduced in 1969 and 1972, respectively

- A. Common Name: Allethrin  
Generic Name: (2-methyl-1-propenyl) - 2-methyl-4-oxo-3-(2 propenyl)-2-cyclo-penten-1-yl ester or mixture of cis and trans isomers.  
Trade Name: Pynamin  
EPA Shaughnessy code: 004001 and 004002 (allethrin coil)  
Chemical Abstracts Service (CAS) Number: 584-79-2  
Producers: McLaughlin Gormley King  
Sumitomo Chemical Company  
Fairfield American
- B. Common Name: d-trans Allethrin, Bioallethrin  
Generic Name: d-trans-chrysanthemum monocarboxylic ester of d 1-2-allyl-4-hydroxy-3-methyl-2-cyclo-penten-1-one  
Trade Name: Bioallethrin  
EPA Shaughnessy Code: 004003  
Chemical Abstracts Service (CAS) Number: 584-79-2  
Producers: McLaughlin Gormley King  
Roussel Uclaf

- C. Common Name: S-bioallethrin; Esbiol  
 Generic Name: d-trans-chrysanthemum monocarboxylic  
 acid ester of d-2-allyl-4-hydroxy-3-  
 methyl-2-cyclopenten-1-one  
 Trade Name: Esbiol  
 EPA Shaughnessy Code: 004004  
 Chemical Abstracts Service (CAS) Number: 23434-00-6  
 Producers: McLaughlin Gormley King  
 Roussel Uclaf
- D. Common Name: D-cis/trans allethrin; Pynamin Forte  
 Generic Name: dl-3-allyl-2-methyl-4-oxo-2-cyclopentenyl  
 d-cis/trans chrysanthemate  
 Trade Name: Pynamin Forte  
 EPA Shaughnessy Code: 004005  
 Chemical Abstracts Service (CAS) Number: 42534-61-2  
 Producers: Sumitomo Chemical Co., Ltd.

## 2. USE PATTERNS AND FORMULATIONS

**Application Sites:** Broad spectrum insecticides and acaricides registered for use on terrestrial food crops (vegetables, citrus fruits, and orchard crops); terrestrial nonfood uses (ornamental plants, turf, recreational areas, and forest trees); greenhouse food and nonfood crops (ornamentals and vegetables); indoor and outdoor domestic dwellings; postharvest use on fruit, vegetables and grains, and stored food; commercial and industrial uses (food handling establishments).

**Types of Formulations:** Pressurized liquids, mosquito coils, dusts, emulsifiable concentrates, soluble concentrate liquids, and ready-to-use liquids. Almost always formulated with a synergist and one or more additional active ingredients.

**Predominant uses and**

**Methods of Application:**

Primarily indoor and outdoor use around the home as foggers, plant, carpet and general purpose aerosols, and mosquito coils to control common pests including, but not limited to, ants, bedbugs, carpet beetles, cockroaches, fleas, ticks, moths, wasps and bees. Applied to crops foliarly by aerial or ground equipment. Postharvest applications made as an emulsive dip.

### 3. SCIENCE FINDINGS

#### Summary Science Statement

The Agency has very little acceptable toxicity data for the allethrin stereoisomers. There are no data available to assess the environmental fate characteristics of these compounds, including their potential to contaminate ground water. There are ecological effects data which show that the stereoisomers are highly toxic to fish and aquatic invertebrates, and essentially non-toxic to avian species. There are no acceptable residue data available to assess the adequacy of the current tolerances for allethrin.

#### Chemical Characteristics of the Technical Material

Physical State: Viscous oil; liquid, clear oil

Color: Pale yellow, yellow-orange, slightly brownish

Odor: Mild to slightly aromatic

Molecular weight and empirical formula: 302 -  $C_{19}H_{26}O_3$

Solubility: Insoluble in water; miscible with petroleum oils,  
and soluble in paraffinic and aromatic hydrocarbons

#### Toxicology Characteristics

Acute toxicity: The acute oral toxicity of bioallethrin and s-bioallethrin is low to moderate. Adequate data to discern other acute effects of these compounds are not available.

Subchronic toxicity: In a 90-day feeding study on bioallethrin, rats were administered 0, 500, 1500, 5000, and 10,000 ppm bioallethrin in the diet. A no-observed-effect-level (NOEL) was established at 1500 ppm based upon a decrease in body weight gain and increased levels of serum liver enzymes in females and increased liver weights in both sexes. This study, however, is presently classified as only supplementary, but may be upgraded upon submission of additional information.

Chronic toxicity: In a 6-month oral feeding study using beagle dogs, the animals were administered 0, 200, 1000, and 5000 ppm bioallethrin in the diet. The NOEL was determined to be 200 ppm based on effects on the liver.

One rodent chronic feeding/oncogenicity study is available for d-cis/trans allethrin. In this study, rats were fed 0, 125, 500, and 2000 ppm of the test substance in the diet for 2 years. No oncogenic effects were observed. For systemic toxicity, the NOEL was determined to be 125 ppm based on decreased body weight gain and the presence of liver effects.

Teratogenicity: One teratology study conducted with bioallethrin is available. In this study, rats were dosed with 50, 125, and 195 mg/kg/day bioallethrin in the diet. The test compound did not induce developmental effects at the dose levels tested.

Mutagenicity: Two mutagenicity studies (DNA damage and reverse mutation) conducted with bioallethrin are negative for genetic damage.

#### Environmental Fate Characteristics

No data on the allethrin stereoisomers are available to assess the environmental fate and transport, and the potential exposure of humans and nontarget organisms. The potential of these compounds to contaminate ground water is unknown. Because the allethrins are thought to degrade rapidly in the environment, environmental fate data are being required on a "tiered" basis. This approach will permit the Agency to make a preliminary assessment of the persistence of these compounds. The requirement for additional testing will be deferred until evaluation of all data submitted under Tier I.

#### Ecological Characteristics

##### Avian Acute Oral Toxicity:

<u>Species</u>	<u>Stereoisomer</u>	<u>LD50 or LC50</u>
Mallard Duck	Technical allethrin	>2000 mg/kg
Mallard Duck	D-cis/trans allethrin	5620 ppm
Bobwhite Quail	Bioallethrin	2030 ppm
Bobwhite Quail	D-cis/trans allethrin	5620 ppm

These data show that the allethrins are practically nontoxic to birds on both an acute and subacute exposure basis.

Freshwater Fish Acute Toxicity: Twenty-seven toxicity tests conducted with coldwater and warmwater fish species indicate that the allethrins are highly toxic to fish. The LC50 values ranged from 2.6 ppb (coho salmon — bioallethrin) to 80 ppb (fathead minnow — S-bioallethrin).

Toxicity to Aquatic Invertebrates: Data show that allethrin is highly toxic to aquatic invertebrates with LC<sub>50</sub> values of 5.6 ppb for stoneflies and 56 ppb for blackflies.

Toxicity to Non-target Insects: Although technical allethrin is moderately toxic to honey bees, the outdoor application rates are so low that even a direct application to bees is not likely to result in significant mortality.

#### Tolerance Assessment

The available data reviewed are insufficient to evaluate the adequacy of the established tolerances (covering postharvest use) for residues of allethrin in or on food/feed items (40 CFR 180.113). Allethrin is the only stereoisomer with established tolerances.

Because of insufficient residue chemistry and toxicity data for all of the allethrin stereoisomers, the Agency is unable to calculate an acceptable daily intake under the Tolerance Assessment System.

There are no Canadian or Mexican tolerances or Codex Maximum Residue Limits for residues of the allethrins in or on any plant commodity. Therefore, no compatibility questions exist.

#### 4. REQUIRED UNIQUE LABELING

The Registration Standard for the allethrins contains no unique labeling requirements. It requires only updated environmental precautionary and disposal statements and a statement for outdoor use products that the product is highly toxic to fish.

#### 5. SUMMARY OF REGULATORY POSITIONS AND RATIONALES

°The Agency is not starting a special review the allethrins.

°Since EPA believes that the allethrins may degrade rapidly in the environment, the Agency is requiring environmental fate data on a tiered basis. Additional data may be required upon evaluation of the tier I studies.

°The Agency is permitting registrants to use the technical product Esbiothrin as a representative test material for chronic studies on Bioallethrin and S-bioallethrin since it is a mixture of the two compounds, and they are of similar toxicity. Separate chronic studies are being required for Allethrin and D-cis/trans allethrin.

°The Agency is not requiring any endangered species restrictions since there is no evidence that the allethrins pose a hazard to endangered species from domestic indoor/outdoor uses.

\*The Agency is not requiring any ground water advisory labeling, or reentry, spray drift, or protective clothing restrictions at this time.

\*The Agency is not imposing restricted use classification on the allethrins.

\*While the required data are under development all currently registered products containing the allethrins may be sold, distributed, formulated and used, provided that they are in compliance with all other terms specified in the Registration Standard.

## 6. SUMMARY OF MAJOR DATA GAPS

### Toxicology

#### Acute Toxicity:

Acute oral LD<sub>50</sub> toxicity (Allethrin, Pynamin-forte)  
 Acute dermal LD<sub>50</sub> toxicity (Allethrin, Pynamin-forte,  
 S-bioallethrin, Bioallethrin)  
 Acute inhalation LC<sub>50</sub> Toxicity (all allethrins)  
 Eye irritation (all allethrins except Esbiothrin)  
 Dermal irritation (all allethrins except Esbiothrin)  
 Dermal sensitization (all allethrins)

#### Subchronic Toxicity

90-day feeding  
     Rodent (all allethrins except Pynamin-forte)  
     Nonrodent (all allethrins except Bioallethrin)  
 21-day dermal (all allethrins)  
 90-day inhalation (reserved for all allethrins)

#### Chronic Toxicity

Rodent feeding (all allethrins except Pynamin-forte)  
 Nonrodent feeding (all allethrins except Bioallethrin)  
 Rat oncogenicity (all allethrins except Pynamin-forte)  
 Mouse oncogenicity (all allethrins)  
 Rat teratogenicity (all allethrins except Bioallethrin)  
 Rabbit teratogenicity (all allethrins)  
 Reproduction (all allethrins)

#### Mutagenicity

Gene mutation (Allethrin, Pynamin-forte, S-bioallethrin)  
 Chromosomal aberration (all allethrins)  
 Other mechanisms of mutagenicity (all allethrins except  
 Bioallethrin)

#### Special Testing

Metabolism (all allethrins)

## Ecological Effects

Avian reproduction  
 Field testing - mammals and birds (reserved pending reproduction data)  
 Freshwater fish LC50 (typical EP)  
 Freshwater aquatic invertebrate LC50 (typical EP)  
 Acute estuarine and marine LC50 (fish, shrimp, oyster)  
 Fish early life stage and invertebrate life cycle (freshwater, estuarine)  
 Fish life cycle  
 Field testing (aquatic organisms)

## Environmental Fate

### TIER I

DEGRADATION STUDIES - LAB  
 Hydrolysis  
 Photodegradation - water, soil, and air  
  
 METABOLISM STUDIES - LAB  
 Aerobic metabolism (soil and aquatic)  
 Anaerobic metabolism in soil  
  
 MOBILITY STUDIES  
 Leaching/aged leaching  
 Volatility (lab)

### TIER II

Anaerobic aquatic metabolism	- Reserved
Volatility (field)	- Reserved
Field dissipation (soil)	- Reserved
Field dissipation (aquatic, sediment)	- Reserved
Field dissipation (soil, long-term)	- Reserved
Accumulation studies on rotational crops (confined)	- Reserved
Accumulation studies on rotational crops (field)	- Reserved
Accumulation studies on irrigated crops	- Reserved
Accumulation studies in fish	- Reserved
Accumulation studies in aquatic nontarget organisms	- Reserved
Reentry	- Reserved
Spray drift	- Reserved
Exposure	- Reserved

Product Chemistry

Product Identity and Composition  
 Analysis and Certification of Product Ingredients  
 Physical and Chemical Characteristics

Residue Chemistry

Nature of the Residue (Metabolism) in Plant and  
 Livestock  
 Residue Analytical Methods (may be required if  
 additional metabolites of toxicological concern are  
 identified)  
 Stability Data  
 Magnitude of Residue  
   Crop field trials  
   Postharvest treatment of fruits and vegetables  
   Stored commodities  
   Processing studies  
   Meat/milk/poultry/eggs  
   Food handling

7. CONTACT PERSON AT EPA

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