

Fenvalerate - Esfenvalerate Information

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[Note: I gathered this information from a variety of sources:

- 8/22/00 telephone conversation with George LaRocca, EPA's Project Manager for second-generation synthetic pyrethroids.
- PDP Technical-QA meeting, April 2002, Manassas, VA.
- Dr Angela Klemens, DuPont

This document does NOT constitute official policy of the Florida Dept of Agriculture. It is a working document to assist staff chemists in understanding the issues pertaining to identification, measurement, tolerance interpretation, and reporting of Fenvalerate / Esfenvalerate.]

There is some confusion among pesticide residue regulators about the difference between Fenvalerate and Esfenvalerate.

EPA tolerances are listed in separate sections of 40 CFR 180.

40 CFR 180.379 - Fenvalerate - trade name Pydrin

Chemical name: Cyano(3-phenoxyphenyl)methyl-4-chloro-alpha-(1-methylethyl)benzeneacetate

40 CFR 180.533 - trade name Asana

Chemical name: (S)-cyano(3-phenoxyphenyl)methyl-(S)-4-chloro-alpha-(1-methylethyl)benzeneacetate

The chemical name is the same for both Fenvalerate and Esfenvalerate (except, of course, for the "S"). That's because both products are mixtures of four optical isomers: SS, RS, SR and RR. Fenvalerate was on the market first. The SS isomer is the one that has insecticidal activity. Dupont invented a manufacturing process that greatly enhanced the percentage of the active SS stereoisomer in the mix. They named their resulting product Esfenvalerate. According to Dupont, only Esfenvalerate has been used in the US since 1992. There are still some uses of Fenvalerate in other countries, but the trend is for foreign growers to also switch over to Esfenvalerate.

Because the application rate for Esfenvalerate is much less than for Fenvalerate (about 1/4th the amount achieves the same insecticidal control) EPA assigned DIFFERENT 40 CFR 180 designations to these two pesticide products. Since Fenvalerate is the earlier product, there are many more tolerances listed for it than for Esfenvalerate. As Dupont conducts new field residue studies (using Esfenvalerate only) in order to add new commodities to their Esfenvalerate label, EPA lists those new tolerances under 180.533. But because field residue studies are so expensive, Dupont has asked EPA to simply transfer the 180.379 commodities to 180.533 (and reduce by about 1/4th). This would save Dupont from having to repeat field residue studies that were previously conducted using Fenvalerate.

EPA doesn't want to eliminate Fenvalerate tolerances until they are sure Fenvalerate is no longer used overseas. When the worldwide usage switches completely to Esfenvalerate (and

factoring in a lag-time to account for any pesticide persistence) EPA intends to revoke 180.379 (Fenvalerate) and only list 180.533 (Esfenvalerate). At that time EPA will move the commodities currently listed under 180.379 to 180.533 and apply a tolerance reduction. But until then, EPA intends that state regulators apply Fenvalerate tolerances to Esfenvalerate findings.

Therefore unless there is a lower tolerance listed under 180.533, we can apply 180.379 tolerances whenever we find Esfenvalerate.

In 40 CFR 180.379 following the table listing the Fenvalerate tolerances, there is a paragraph that reads:

(2) A food additive tolerance of 0.05 parts per million is established for residues of the insecticide cyano(3-phenoxyphenyl)methyl-4-chloro-alpha-(1-methylethyl)benzeneacetate and an isomer, (S)-cyano(3-phenoxyphenyl)methyl-(S)-4-chloro-alpha-(1-methylethyl)-benzeneacetate, as follows: (i) In or on all food item (other than those already covered by a higher tolerance as a result of use on growing crops) in food-handling establishments where food products are held, processed, or prepared.....

This food additive tolerance covers both Fenvalerate and Esfenvalerate, and may be used whenever a commodity is not specifically listed.

It is important to remember that both Fenvalerate and Esfenvalerate contain the same 4 isomers. The only difference is the percentage of each in the mix.

On the non-optical GC columns that we use (DB-5, DB-35), the 4 isomers elute as 2 peaks. The SR and RS isomers coelute first, followed by a peak containing both SS and RR. According to Dupont, in an analytical grade standard of technical Fenvalerate, the second peak is roughly 46% of the total peak area, and in an analytical grade standard of technical Esfenvalerate; the second peak is roughly 85% of the total peak area. [We don't see those exact proportions in our samples or standards.]

Prior to the April 2002 PDP QA-Tech meeting, the Florida Dept of Agriculture would report Fenvalerate whenever the abundance of the two peaks were roughly equal, and we would report Esfenvalerate whenever the second peak was much larger than the first. However, we found the relative percentages of the two peaks would vary from sample to sample. And relative percentages of the two peaks would vary in different analytical grade standards that we purchased. Our reporting policy was therefore problematic.

At the April 2002 PDP QA-Tech meeting, PDP discussed the need to standardize the way PDP labs measured and reported these pesticides. PDP asked that we only report one value as "Esfenvalerate + Fenvalerate total" for our findings and PDP assigned pestcode = ADE (in absence of an FDA pesticide code).

Dr Angela S. Klemens from Dupont was present at the April 2002 PDP meeting and gave a talk. Her PowerPoint presentation is available at <http://www.flworkshop.com/sscs/Esfen-FenPresentation.ppt>

Dr Klemens said Dupont will provide standards of the individual optical isomers to state and federal regulatory labs - by submitting a standard request form available at <http://www.flworkshop.com/sscs/StandardRequest-DuPont.doc>