652B

Date Out EFB: 1/30/80

To: Product Manager 17
TS-767

Through: Dr. Gunter Zweig, Chief
Environmental Fate Branch

From: Review Section No. 1
Environmental Fate Branch

Attached please find the environmental fate review of:

Reg./File No.: 279-3013, 10182-17

Chemical Permethrin Tech. and Pounce Tech.

Type Product: Insecticide

Product Name: Pounce Technical Insecticide and Permethrin Technical

Company Name: FMC Corp. and I.C.I. Americas, Inc.

Submission Purpose: Data submission to remove some conditions of conditional registration

EFB #328

ZBB Code: 3(c)(7)

Date in: 11-29-79

Date Completed: _____

Deferrals To:

_____ Ecological Effects Branch

_____ Residue Chemistry Branch

_____ Toxicology Branch

I. Introduction

In a joint submission, FMC Corp. and ICI Americas, Inc. are requesting the conditional registration of Pounce[R] Technical and Permethrin Technical insecticides. The submission includes only a report on the $^{14}$C-permethrin (acid and alcohol label) activated sludge metabolism study performed by Biospherics, Inc. The active ingredient is a mixture of the cis and trans isomers of the chemical (3-phenoxyphenyl)methyl(±) cis-trans,3-(2,2-dichloroethyenyl)-2,2-dimethylcyclopropane-carboxylate.
For the registration of a technical product, the hydrolysis and activated sludge metabolism studies are the only environmental chemistry data required. The hydrolysis of permethrin (the active ingredient) was previously submitted and reviewed under submission symbol EPA file no. 10182-RI dated 7-31-78.
The product's label is not included in this submission.

II. Directions for Use

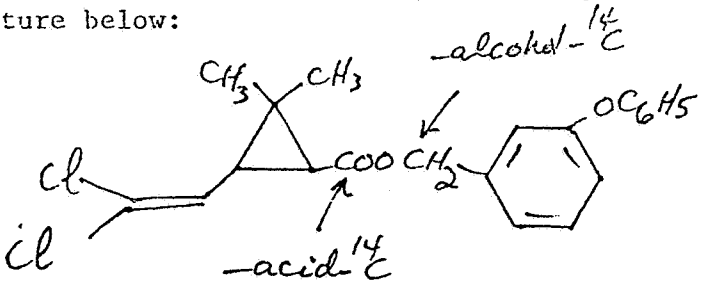
In absence of the label, it is assumed that the technical material is for manufacturing use only .

III. Data Discussion

3.1 Activated Sludge Metabolism
$^{14}$C-Permethrin (acid and alcohol label)
Activated Sludge Metabolism" report by Biospherics, Inc., March 17, 1979 Jason A. Caplan & Jenefir Isbister, Ph.D.

Procedure

Two radiolabeled compounds were studied for this experiment: $^{14}$C-acid labeled and $^{14}$C-alcohol labeled; the $^{14}$C positions is shown in the structure below:



The acid-$^{14}C$ and alcohol $^{14}C$ each was composed of cis and trans isomers.
The activated sludge used in the study was obtained from Back River Sewage Treatment Plant in Dundalk, Md., (85% domestic and 15% industrial wastes).
The sludge was acclimated for 23 hrs prior to initiation of the study and its ss were adjusted to 1.2 g/l.
In the operational procedure, activated sludge was mixed with synthetic sewage and spiked with $^{14}C$-acid solution of permethrin in test chambers(flasks) 1 and 2, and with $^{14}C$-alcohol solution of permethrin in test chambers 3 and 4; control mix (unspiked) was kept in chambers 11 and 12.
The permethrin nominal concentration in chambers 1,2,3 and 4 measured 0.1, 0.5, 1.0, 5.0, 10.0, 20.0, 40.0, 60.0, 80.0, and 100.00 ppm in each chamber over consecutive 10, 23-hr. aeration cycles; with additional 7 cycles tested at 100.00 ppm permethrin conc.
At the end of each cycle and prior to discontinuing aeration, the system suspension was sampled in every chamber for suspended solids, % settled solids, plate counts and radioassay. Thirty (30) min. after discontinuation of aeration, the system supernatent was sampled for DO, pH and temp. measurements.
Microbial examination included the test for bacteria, actinomycetes, yeasts and protozoa.
Sludge solids were combusted and then radioassayed while filtrates and $CO_2$ traps were directly assayed.
Filtrate from cycle 10 was partitioned with DCM, evaporated to dryness and then spotted on TLC plates along with unlabeled permethrin and developed in two solvent systems prior to x-ray radiogram exposure and quantification of radioactive spots by LSC.

Results

1. Temp. in all flasks averaged 21±2°C.
2. Dissolved oxygen(DO) fluctuated in the range of 6.0-6.8 ppm during study.
3. Suspended solids (ss) in test units was up to 2100mg/l from 1400mg/l and only to up 1600 mg/l in the central units. This increase is presumed due to the adsorption of permethrin to solids.
4. The % settled solids peaked to 32% level at 100.0ppm conc. decreasing to 14% level by end of study for the alcohol label and control systems.
5. pH measured gradual decrease by the end of study in all flasks.
6. Plate counts for total bacteria and actinomycetes were not affected by the pesticide presence in the AS system, while the protozoa found stressed and absent at 100ppm conc. only appear normal at subsequent cycles.
7. Daily radiocarbon analysis reported indicates that 80% of radioactivity remained in solids thru cycle 10, with the remainder accounted for in the supernate. And only small amounts ( 0.1%) of $^{14}C$-$CO_2$ and volatiles were observed in the treated systems.

8. TLC and auto radiographic analysis of solid extracts show cis permethrin (36% of dose in both acid and alcohol label) and trans permetrhin (53% of dose acid labels, 57% alcohol label) as the major components. Characterization of filtrate extract yielded the major component present of cis permethrin (17-17.5%) and trans permethrin (24-27.8%) and identifying the presence of polar material at origon (47-49.7%).

Conclusion

1. The reported results of this study indicates that permethrin (cis, trans isomers) does not affect the physical or biological parameters of the activated sludge process.
2. And the activated sludge process removes 80% of permethrin or its degradates from wastewater (for adsorption to solids). About 10% or less is passed thru the system in the supernate.
3. Permethrin is not biodegradable.

Recommendation

1. The environmental fate of the active ingredient permethrin for the technical products is known. It suggests that any permethrin should not be discharged to activated sludge treatment system since up to 10% will pass thru the system undegraded and about 80% will be present in the sludge.
2. We (EFB) concur with the proposed conditional registration.

M. Nawar M. Nawar
Review Section #1
EFB
1/30/80