OCT 21 1980

To. Chief, Ecological Effects Branch
Hazard Evaluation Division

Thru: Chief, Review Section No. 1 Samuel M. Creeger (Acting Chief)
Environmental Fate Branch, HED

From: Review Section No. 1
Environmental Fate Branch, HED

Attached find environmental fate information and/or EEC(s) requested for:

Chemical: Oftanol (1-methylethyl-2 (ethoxy(methylethylamino)phosphinothioyl)oxy) benzoate)

Product Name: Amaze Reg. 3125

Use Pattern for EEC Calculations: turf, field crop (corn)

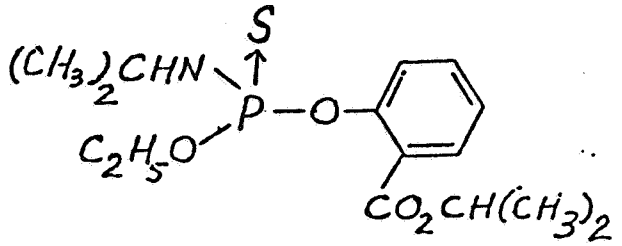
Date in: 10/9/80

Date out: OCT 21 1980

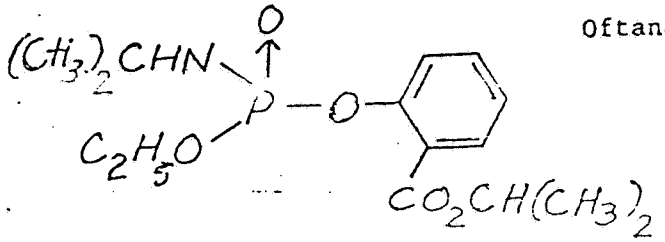
EEC/EFF#: 34

I Environmental Fate Profile

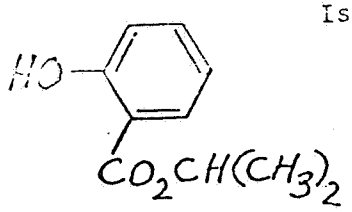
Structure



Oftanol



Oftanol-oxygen analog



Isopropyl salicylate

Physical/Chemical Properties

Oftanol has a water solubility of 23.2 ppm, a vapor pressure of 4×10^{-6} millibar (20 °C), and a specific gravity of 1.135 (20 °C).

Hydrolysis

Oftanol hydrolyzes fairly slowly with the following half-lives (average of measurements at 1 ppm and 10 ppm): 54.5 days (pH 3,37 °C), 12 days (pH 3, 50 °C), 24.5 days (pH 6,50 °C), 60 days (pH 9,37 °C) 6 days (pH 9,50 °C). Degradates include deaminated oftanol/oftanol oxygen analog, oftanol oxygen analog, salicylic acid, isopropyl salicylate, decthylated oftanol oxygen analog, and N-isopropyl salicylamide.

Photodegradation

Oftanol photolyzes in water with a half-life of 51 days (artificial sunlight, pH 7). There were 13-16 products formed, but the only major product was 3,3-dimethylisoindolin-1-one. In soil exposed to artificial sun light, oftanol degraded with a half-life of 2.6 days. The major identified photo product was the oxygen analog of oftanol (31-38% of material at day 3 of the study).

Soil Metabolism/Field Dissipation

There are no valid data on the field dissipation of oftanol. In the green house, oftanol degraded in aerobic soil with a half-life of 59 days (silt loam) or 127 days (sandy loam). Over a 360 day period in the sandy loam, about 60% of the material was lost (volatilized parent and degradates). The oxygen analog was the only degradate identified. After a 90 day incubation in anaerobic silt loam, 72 % of the material was oftanol, 3% was oftanol oxygen analog, 13% was soil-bound, and 12% was lost.

Aquatic Metabolism: The half-life of oftanol in hydrosoil/pond water was 13 days . After 70 days, 89% of the material was lost. The degradates in the last 5 weeks of the study included cyclic oftanol oxygen analog, cyclic oftanol, and isopropyl salicylate.

Microbial Metabolism. Oftanol did not degrade in sterile soil (aerobic or anaerobic), but did under non-sterile conditions (vide supra).

Growth of Pseudomonas sp. was somewhat inhibited by oftanol. Bacteria tested were not inhibited at concentration up to 1000 ppm. Results with fungi were inconclusive. Oftanol did not inhibit nitrogen fixation, nitrification, or denitrification.

Animal Metabolism.

a) Rats: Excretion rapid with 88% via urine and 4% via feces within 72 hours (ring ^{14}C label). Matabolites included glucuronide conjugate of isopropyl salicylate, O-hydroxy-hippuric acid, isopropyl salicylate and several trace materials.

b) Lactating cow: Excretion rapid with 90% lost in urine, 5% in feces within 80 hours metabolite were hydroxy hippuric acid, isopropyl salicylate, salicylic acid, deaminated oftanol oxygen analog.

c) Chickens: Excretion was rapid, with 78% excreted within 96 hours of treatment. No excreted material were characterized.

Forest Ecosystem: No data are available.

Mobility: Oftanol residues aged with a sandy day loam (% OM unknown)for 30 days leached in a column study. Over 9% eluted from a 30 cm column treated with 540 inches of water over a 45 day period. This is an excessive amount but may indicate some tendency of degradates to leach. Aged soils analyzed by soil TLC also showed a tendency to leach; especially in silty clay and silt loam; although not to the exaggerated degree seen in the column study. Non-aged oftanol was classified as having a low potential for leaching when analyzed by soil TLC (R_f = 0.19; average of 6 soils).

In a silt loam soil (1.8% OM), an adsorption coefficient (Ka) of 5.6 was obtained. In sandy clay loam (2.9% OM), Ka was 11.3. Oftanol is moderately tightly bound to soil.

No water dispersal data are available.

Accumulation

Oftanol did not accumulate in rotational crops when applied to the soil surface. No data are available for soil-incorporated oftanol.

Channel catfish exposed to oftanol in a flow-through system accumulated residues only to a relatively low degree. A maximum whole fish accumulation factor of 75 was reached at 7 days of exposure; and at 21 and 28 days, accumulation of 50 and 40 fold were obtained. Upon withdrawal to clean water, residues declined from 400 ppb to ca. 30 ppb at 28 days of depuration. Only oftanol was found in the tissues.

The n-octanol/water partition coefficient of oftanol is 4230.

II. Estimated Environmental concentrations

A. Terrestrial ECC

No foliar residues are expected from the use of granular or emulsifiable formulations of oftanol on corn, because direct application on corn plants is not made. The rate of application of emulsifiable Amaze is 2 lb ai/acre, once per year.

The following maximum residue are expected on the following plant items following a 2 lb a.i./acre application directly to the plant (1); short range grass - 480 ppm

long grass - 220 ppm
grass and seeds - 20 ppm

When used as per label directions, the above values pertain only to turf treated with the emulsifiable formulation.

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The following soil residues are anticipated from all applications (one per year, 2 lb a.i./acre) assuming direct soil application or that rainfall quantitatively washes the chemical from vegetation to the soil. If 1 lb/acre gives a uniform distribution in the upper 3 inches equal to 1 ppm, a 2 lb/acre treatment will give 2 ppm in the 0.0 to 3.0 soil layer. If, instead, the pesticide is distributed only in the (surface) 0.0-0.1 layer, a concentration of 60 ppm will result. It is possible that for corn varieties other than sweet corn, two applications or more may be made.

For the worst case, assume a pre- plant treatment and two post-plant treatments, and no degradation. In that case, the above estimated soil concentration would be tripled.

B. Aquatic

The lentic situation we shall consider is [illegible] acre pond, 0.5 feet deep, in a drainage basin containing 100 acres of treated vegetation and a small (< 1 acre) margin around the pond edge left untreated. Under the proposed use patterns, typical sites would be farm ponds and ponds on golf courses. Applications are made with ground equipment, thereby eliminating drift as a major [illegible] soil [illegible] run-off events.

Immediately after a 2 lb oftanol/acre treatment, a rainfall creates a severe run-off event. Two percent of the applied chemical runs off into the pond as a result of a 0.1 inch rainfall run-off.

Therefore: 2 lb/acre x 100 acre x (0.02)

= 4 lb oftanol enters the pond.

After the rainfall the amount of water in the pond increases to 3.63×10^6 lb. There is a 2" active hydrosoil layer. Assuming an instantaneous equilibrium in partition ($K_d = 5.6$)

$$EEC_{Water} = 0.48 \text{ ppm}$$

$$EEC_{hydrosoil} = 2.7 \text{ ppm}$$

These are reasonable worst-case estimates for the stated conditions (2).

Lotic Situation.

Consider instead that the runoff enters a small stream. The stream is 5 m wide, 0.75 m deep, and has a flow of 10 CFS. For the purpose of this calculation, the chemical load to the stream is reduced to 2.72 lb. The K_d value is 5.6 and no chemical or biological degradation occurs. The runoff from the rainfall event described above for the pond situation enters the stream over a 20 m length of stream bank.

The [illegible] for small stream equilibrium (Bowers 1989) predicts a maximum concentration of 0.25 ppm in the stream water and 1.4 ppm in the stream sediments. Within 12 hours of the initial event, over 99.9% of the chemical burden in water was dissipated, and 9% of the sediment load. In roughly 5 days, the stream and sediment residues were completely dissipated (2).

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Section #1, EFB/HED

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1. Hoerger F.D. and Kenaga, E.E., J. Environ. Qual. 1: 9 (1972).

2. J. C. Reinert, "Estimating the Maximum Concentration of Pesticides in the Environment as a Consequence of Specific Events" September 15, 1980, EFB/HED USEPA.