Shaughnessy No.: 084301

Date Out EAB: 13 DEC 1984

TO: R. Taylor
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Registration Division
TS-767

FROM: Samuel M. Creeger, Chief
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Attached please find the environmental fate review of:

Reg./File No.: 1471-55

Chemical: Benefin

Type Product: Herbicide

Product Name: BALAN

Company Name: Elanco

Submission Purpose: Review data - no specific use

Action Code: 405

Date In: 12/3/84

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TAIS (Level II)	Days
62	2

Deferrals To:

_____ Ecological Effects Branch

_____ Residue Chemistry Branch

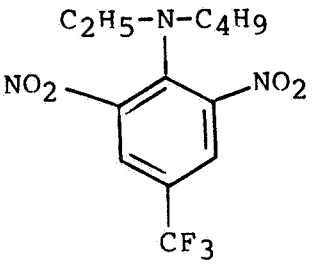
_____ Toxicology Branch

1.0 INTRODUCTION

Elanco has submitted data on benefin (Balan®), a herbicide, as a part of the registration file. Prior to this review, no environmental fate data have been submitted on this chemical.

1.2 Chemical

- o Common name: benefin
- o Product name: Balan
- o Chemical name: N-butyl-N-ethyl-α,α,α-trifluoro-2,6-dinitro-p-toluidine
- o Structural formula:



2.0 DIRECTIONS FOR USE

EAB review of 5/17/67 provides the following information:

Broadcast -- 2 qt Balan Liquid Concentrate/A (0.75 lb ai/A) on sandy and sandy loam soils, 3 qt/A (1.125 lg ai/A)on loam soils, and 4 qt/A (1.5 ai/A) on silt and clay soils for the preemergence control of annual grasses and broadleaf weeds. Apply any time within 3 weeks of planting. Do not apply after planting.

3.0 DISCUSSION OF DATA

3.1 Determination of Benefin in Agricultural Crops and Soil. O. D. Decker and R. D. Griggs, Lilly Research Laboratories, 5/9/80, AM-AA-CA-R027-AA-755, EPA Acc. No. 255775.

This report deals with laboratory procedures/methods for the determination of benefin in plant tissues and soil, and does not deal with the results obtained from any experimental data. The following is the summary of the procedures.

Extraction of Crops

A sample (25 g, finely ground) is blended in methanol (100 ml) using a gyratory platform shaker (15 min, 300 rpm). After the

solids are settled, a 10 ml aliquot of the clear supernatant is transferred to a separatory funnel containing 20 ml of 5 % NaCl aqueous solution. The solution is extracted with CH_2Cl_2 (20 ml x 2), and the extracts are dried over Na_2SO_4 and combined in a 125 ml boiling flask, to which 0.1 ml of decane is added. All of the CH_2Cl_2 is evaporated using a Rinco evaporator and a 40-45°C water bath. The 0.1 ml of decane will remain in the flask.

A standard recovery sample of 0.04 ppm and a control sample are assayed with each set of experimental samples. The standard recovery sample is prepared by adding 1.0 ug of benefin standard to 25 g of control tissue.

Extraction of Soils

A soil sample (50 g) is blended in CH_3CN/H_2O (99:1, 100 ml) (15 minutes, 300 rpm). After the solids are settled, a 10 ml aliquot of the clear supernatant was transferred into a 125 ml boiling flask, to which 30 ml of CH_3CN is added. After evaporation of the CH_3CN/H_2O solution to a volume of 3-5 ml on a Rinco evaporator and a 40-45°C water bath, 25 ml of 1 % decane in CH_2Cl_2 is added to the extracts. The solution is evaporated until all organic solvent is gone. About 0.1 ml of decane will remain in the flask.

A standard recovery sample of 0.1 ppm (5 ug/50 g soil) may be run with soil samples which have control material available. System recoveries (all reagent without soil) which simulate the 0.1 ppm recovery are used when control soil is unavailable.

Purification and Quantitation

The crop extract or the soil extract is purified using a Florisil column and hexane as an eluent. To the hexane eluent, 0.1 ml of decane is added, and then the hexane was evaporated by rotary evaporation. The residue is redissolved in toluene and the toluene solution (0.9 ml for crop samples, 5.0 ml for soil samples) is used for GC analysis (Hewlett-Packard Model 5713 A, 5 % Carbowax 20 M, 5 % XE-60, 5% W-98 or Ultra-Bond 100/120 mesh).

Discussion

It was reported that the procedure usually gives recovery in excess of 85 % at the specified levels for crops and soil in their laboratory and that the assay sensitivity is 0.01 ppm for crops and 0.02 ppm for soil.

Decane is added prior to each complete evaporation to insure safety from volatility losses. Since benefin is extremely volatile, immediate removal of the sample from vacuum just at dryness is critical when decane is not used. Use of current of air must be avoided for evaporation.

Benefin is photosensitive and exposure to light, especially to sunlight, should be minimized.

Comments

The procedures for the determination of benefin in agricultural crops and soil appear to be scientifically valid. The reviewer has the following questions:

- Is benefin photosensitive under the ordinary laboratory lighting?
- What portion of the unrecovered benefin (about 15 %) is due to photolysis and due to volatility?

3.2 Octanol/Water Partition Coefficient of Benefin. E. W. Day, Jr., D. G. Sanders, and A. Loh, September, 1983, Lilly Research Laboratories, I-EWD-83-29, EPA Acc. No. 255776.

Experimental

Water (25 ml) saturated with n-octanol was placed in each of four specially constructed tubular separatory funnels which could be centrifuged. One milliliter of 0.5 % benefin solution (5 mg/ml) was added to two of the funnels, and 1.0 ml of 0.05 % benefin solution (0.5 mg/ml) was added to the other two funnels. The tubes were then shaken for 90 minutes, and then allowed to stand overnight. The tubes were then centrifuged (30 minutes, 1700 rpm). Aliquots of the aqueous layers were transferred into separatory funnels, and 20 ml of aqueous NaCl solution was added. The resulting solutions were extracted with CH_2Cl_2. After drying over Na_2SO_4, the extracts were evaporated to dryness, residues dissolved in benzene and quantitated for benefin using GC.

Results

The analytical results are presented in the following table:

C_{oct} (ug/ml)	C_{aq} (ug/ml)	K_{ow} (x 10^5)	Log K_{ow}
5000	0.024	2.08	5.32
5000	0.030	1.67	5.22
500	0.00215	2.33	5.37
500	0.0029	1.72	5.24
Average		1.95	5.29

Comments

- o What was the method sensitivity of the GC analysis?
- o Were there any losses from the evaporation of the extracts to dryness? The report in section 3.1 of this review says benefin is extremely volatile.
- o What was the concentration of the NaCl solution added to the aqueous phase after centrifugation?

Conclusion

The n-octanol/water partition coefficient (K_{OW}) of benefin was determined to be 195,000.

4.0 CONCLUSION

The data included in this submission are not required environmental fate data and therefore do not satisfy any environmental fate data requirement.

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December 12, 1984
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