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TO: Kathy Davis
Product Manager 52
Reregistration Division (H7508W)

FROM:

Paul Mastradone, Section Chief
Environmental Chemistry Review Section #1
Environmental Fate and Ground Water Branch

THRU:

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Environmental Fate and Ground Water Division (H7507C)

Attached please find the EFGWB review of:

Reg./File # : 108401-000239

Chemical Name: Thiobencarb

Product Type : Herbicide

Product Name : BOLERO 10G and 8 EC

Company Name : Valent U.S.A. Corporation

Purpose : Review aerobic aquatic metabolism study

Action Code: 606 EFGWB #(s): 92-0023 Reviewer time:3.0days

EFGWB Guideline	MRID #(s)	Status of data requirement[1]
162-4	420153-01	Y

1/ Y = Acceptable (Study satisfied the Guideline)/Concur
P = Partial (Study partially satisfied the Guideline, but additional information is still needed)
S = Supplemental (Study provided useful information, but Guideline was not satisfied)
N = Unacceptable (Study was rejected)/Non-Concur

/

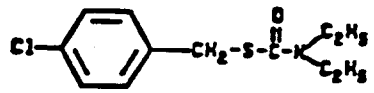
1.0 CHEMICAL:

Common name: Thiobencarb

Chemical name: S-[4-chlorophenylmethyl]diethylcarbamothioate

Trade Name: BOLERO 10 G and 8 EC

Chemical Structure:



2.0 TEST MATERIAL: [Phenyl-UL-^{14}C]thiobencarb

3.0 STUDY/ACTION TYPE: Review aerobic aquatic soil metabolism study

4.0 STUDY IDENTIFICATION:

Mulkey, N.S. 1991. The Aerobic Aquatic Metabolism of [Ring-^{14}C] Thiobencarb. Analytical Development Corporation, Colorado Springs, Colorado, for Valent U.S.A. Corporation. MRID No. 420153-01

5.0 REVIEWED BY:

George Tompkins
Entomologist, Review Section 1
EFGWB/EFED

Signature: George Tompkins
Date: 7/2/91

6.0 APPROVED BY:

Paul Mastradone
Section Chief, Review Section 1
EFGWB/EFED

Signature: Paul J. Mastradone
Date: 7/2/91

7.0 CONCLUSIONS:

1. The aerobic aquatic soil metabolism study on thiobencarb is scientifically valid and satisfies this data requirement.

2. Based on the results of the study, EFGWB concludes that thiobencarb is stable in an aerobic aquatic environment. Dissipation appeared to be primarily due to adsorption of residues to the soil sediment.

3. No meaningful half-life could be determined since the study results indicated no observed consistent decline of thiobencarb during the 30 day study period.

4. ENVIRONMENTAL FATE SUMMARY

The limited information currently available does not allow for a complete environmental fate analysis. However, a satisfactory soil photolysis study indicates that photolysis is not a primary route of degradation, with a reported half-life of 168 days on a sandy loam soil exposed to natural sunlight. Supplemental hydrolysis studies indicate that thiobencarb is stable at pH 5, 7, and 9. A supplemental aerobic soil metabolism study indicated an aerobic soil half-life from 15-28 days in clay and silty clay loam soils; and a supplemental anaerobic soil metabolism study indicated a half-life greater than 5 months with no single metabolite present in greater than 5% of the initial dose. Supplemental leaching studies indicate that thiobencarb has K_{ds} ranging from 5.4-20. Thiobencarb thus appears to be moderately mobile and persistent.

8.0 RECOMMENDATIONS:

The data required for an aerobic aquatic metabolism study that was submitted is acceptable and this data requirement is satisfied.

9.0 BACKGROUND:

Thiobencarb is a herbicide marketed primarily for weed control in rice and is applied preemergent or postemergent to moist or flooded soil at a maximum of 4 lbs ai/A.

10.0 DISCUSSION OF INDIVIDUAL STUDIES:

See attached DER.

11.0 COMPLETION OF ONE-LINER:

Updated

12.0 CBI APPENDIX:

VALENT U.S.A. Corporation makes no claim of confidentality for the submitted study.

DATA EVALUATION RECORD

STUDY IDENTIFICATION:

Mulky, N.S. 1991. The Aerobic Aquatic Metabolism of [Ring-^{14}C] Thiobencarb. Study performed by Analytical Development Corporation, Colorado Springs, Colorado, for VALENT U.S.A. Corporation. MRID No. 420153-01.

TYPE OF STUDY: Aerobic Aquatic Metabolism (162-4)

REVIEWED BY:

George Tompkins, Entomologist
Review Section 1, EFGWB, EFED

Signature: George Tompkins
Date: JUN 11 1992

APPROVED BY:

Paul J. Mastradone, Section Chief
Review Section 1, EFGWB, EFED

Signature: Paul J Mastradone
Date: JUN 11 1992

CONCLUSIONS:

EFGWB concludes that the submitted study satisfies the environmental fate data requirements for an aerobic aquatic soil metabolism study.

The results of the study indicate that thiobencarb is stable in an aerobic aquatic environment. The primary dissipation route appears to be adsorption of residues to the soil sediment.

The results of the study indicate no observed consistent decline of thiobencarb during the 30 day study period. A meaningful half-life could not be determined.

MATERIALS AND METHODS:

Radiolabeled [Phenyl-UL-^{14}C]thiobencarb (S-[4-chlorophenylmethyl]diethylcarbamothioate (See Fig. 1 for position of radiolabel) with a specific activity of 41.7 mCi/mmol (359,092 dpm/ug) and 99.4% radiochemically pure active ingredient was used in this study. Biometer flasks (250 ml) containing aliquots (10 g-dry weight) of soil (clay soil with 25.1% sand, 25.2% silt, 49.7% clay, 2.8% organic matter, pH 5.8, 40 meq/100 g cec, and 36% moisture holding capacity[1/3 bar]) from a rice growing area near Chico, CA. were used in this study. An aliquot of river water from the Sacramento River, CA., the source for irrigation rice water, pH 9.2, was poured onto the soil in each flask. A 10% NaOH in water solution was added to the sidearm of each flask to trap any CO_2 generated in the flasks. Sixty microliters of the ^{14}C-thiobencarb in ethanol treatment solution was added to the water (6.71 ppm ^{14}C-thiobencarb at 203,305 dpm/ug, based on the dry weight of the soil) in each flask and the contents of the

flask was swirled. Samples were incubated at 25°C under aerobic conditions. Duplicate samples were removed on Day 0, 1, 3, 7, 14, 21, and 30 after treatment. After each sampling period the sodium hydroxide solution in all the biometer flasks yet to be sampled was replaced.

Each plug was extracted with ethyl acetate. The radioactivity in the trapping solutions was determined by LSC. Each water sample was acidified to pH 2 and extracted with ethyl acetate. Aliquots of the aqueous fraction were analyzed by LSC. The samples were assayed by HPLC and TLC. TLC analysis was carried out under saturated conditions in two solvent systems: Merck silica gel 60 F_{254} plates in benzene (saturated with formic acid):ethyl acetate (3:1) and Whatman Reversed Phase $KC_{18}F$ plates in acetonitrile:water:glacial acetic acid (67:32:1). Appropriate amounts of unlabeled standards, mixed standards solution , and extract were applied to duplicate plates in superimposed aliquots. After plate development the plates were scraped to determine the amount and distribution of radioactivity.

The soil fraction was acidified to pH 2 and each sample extracted with ethyl acetate 5x, extracts combined and then evaporated. The remaining soil was additionally extracted with ethyl acetate 3x with a Waring blender. Residual radioactivity was determined by LSC. The samples were assayed by TLC as described above. Aliquots of each sample were qualitatively assayed by HPLC. The extracted soil residue was air dried, ground to a powder, and radioassayed after oxidative combustion to determine the bound residue.

REPORTED RESULTS:

1. The authors report that there was no observed consistent decline of thiobencarb during the 30 day incubation period and a meaningful half-life could not be determined.

2. Recovery of the applied radioactivity ranged from 96.8-106% (Table VIII).

3. The water fractions had decreasing amounts of radioactivity over the period of study (from 53.2% of the dpm at Day 0 to 0.81% at Day 30). The aqueous fractions contained from 0.04-0.22% of the applied radioactivity (Table V). The radioactivity contained in the water fractions was reported to be 100% thiobencarb.

4. The total amount of radioactivity extracted from the soil ranged from 33.4% (Day 0) to 92.2% (Day 14; Table VI).

5. Only one Day 30 sample of NaOH trapping solution contained more than 0.1% of the Day 0 radioactivity.

6. The plugs trapped a minimal amount of volatile components. A maximum of 0.05 ppm of thiobencarb was found in the extracts from the plugs from the test vessels (Day 14, Table II).

DISCUSSION:

1. EFGWB concludes that the study is scientifically valid and satisfies the data requirement for an aerobic soil metabolism study.

2. The results of the study indicate that thiobencarb will be stable in an aerobic aquatic environment. The primary dissipation route appears to be adsorption of residues to the soil sediment.