9-7-89

105501

Shaughnessy No.: ~~009001~~

Date Out of EFGWB: 9/7/89

TO: Robert Taylor
Product Manager # 25
Registration Division (H7505C)

FROM: Paul Mastradone, Chief
Environmental Chemistry Review Section #1
Environmental Fate and Groundwater Branch

THRU: Henry Jacoby, Acting Chief
Environmental Fate and Groundwater Branch
Environmental Fate and Effects Division (H7507C)

Attached please find the EFGWB review of:

Reg./File # : 1471-101

Chemical Name : Tebuthiuron 105501

Product Type : Herbicide

Product Name : N/A

Company Name : ELANCO

Purpose : Review data submitted in response to Registration Standard

Date Received : 5/2/89 Action Code: 660

Date Completed : 8/23/89 EFGWB No. : 90557

Total Reviewing Time (decimal days): 5.0

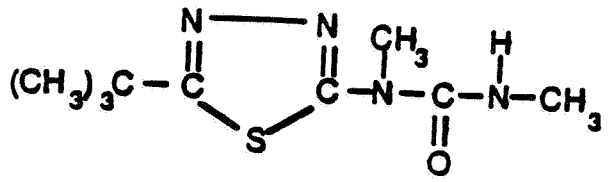
Deferrals to EFED :
_____ Ecological Effects Branch, EFED
_____ Science integration & Policy Staff,
_____ Non-Dietary Exposure Branch, HED
_____ Dietary Exposure Branch, HED
_____ Toxicology Branch, HED

1.0 CHEMICAL:

Common Name: Tebuthiuron

Chemical Name: N-[5-(1,1-dimethylethyl)-1,3,4-thiadiazol-2-yl]-N,N'dimethylurea

Chemical Structure:



Chemical/physical properties:

molecular weight: 228.3
melting point: 161.5-164 oC
solubility: 2.5.g/l
vapor pressure: 0.27 mPa

2.0 TEST MATERIAL: ^{14}C-Tebuthiuron

3.0 STUDY/ACTION TYPE:

Review soil photolysis study submitted in response to Registration Standard.

4.0 STUDY IDENTIFICATION:

Saxena, Adesh M. 1989. Artificial Sunlight Photodegradation of ^{14}C-Tebuthiuron on Soil. Hazelton Laboratories America, Inc. MRID Number 410502-01.

5.0 REVIEWED BY:

Richard J. Mahler
Hydrologist, Review
Section 1, EFGWB, EFED

Signature: Richard J. Mahler

Date: 8/31/89

6.0 APPROVED BY:

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

Signature: Paul J Mastradone

Date: SEP -7

7.0 CONCLUSION:

1. EFGWB concludes that this study is scientifically valid and satisfies the data requirement for soil photolysis.

2

2. Based on the results of the study, EFGWB concludes that tebuthiuron photolyzes on soil with a half-life of 39.7 days.

3. The major products of photodegradation were soil bound residues and five minor products (each less than 7% of applied radioactivity). Three of the minor products were identified as T-104, T-105, and T-106 (See Figure 1 in DER for structures and names of designated compounds), while two of the products were not identifiable. If there is any concern about any degradates, in the future, a photolysis degradation study on soil may be required for those degrades of interest.

8.0 RECOMMENDATIONS:

The data requirement is satisfied and no further work is recommended for the photolysis on soil study at this time. However, if there is a concern in the future about any degradates of tebuthiuron, then further soil photolyses studies may be required on the degradates of interest.

9.0 BACKGROUND:

Registration Division has requested EFGWB review of the soil photolysis study of tebuthiuron which Elanco has submitted in response to the Registration Standard for tebuthiuron.

Tebuthiuron is on the GWDCI list and has been found in shallow Texas ground water. This chemical is on the list of analytes to be monitored in the National Pesticides in Ground Water Monitoring Survey. The Ground Water Team has recommended a small-scale retrospective study.

10.0 DISCUSSION OF INDIVIDUAL STUDIES:

See attached DER.

11.0 COMPLETION OF ONE-LINER:

One-liner updated.

12.0 CBI APPENDIX:

Elanco makes no claim of confidentiality for the submitted studies.

DATA EVALUATION RECORD

STUDY IDENTIFICATION:

Saxena, Adesh M. 1989. Artificial Sunlight Photodegradation of ^{14}C-Tebuthiuron on Soil. Hazelton Laboratories America, Inc. MRID Number 410502-01.

REVIEWED BY:

Richard J. Mahler, Hydrologist
Review Section I, EFGWB

Signature: Richard J. Mahler

Date: 8/31/89

APPROVED BY:

Paul J. Mastradone, Chief
Review Section I, EFGWB

Signature: Paul J Mastradone

Date: SEP -7 19[illegible]

TYPE OF STUDY: Soil Photolysis

CONCLUSIONS:

1. EFGWB concludes that this study is scientifically valid and satisfies the data requirement for soil photolysis.

2. Based on the results of the study, EFGWB concludes that tebuthiuron photolyzes on soil with a half-life of 39.7 days.

3. The major products of photodegradation were soil bound residues and five minor products (each less than 7% of applied radioactivity). Three of the minor products were identified as T-104, T-105, and T-106 (See Figure 1 for names and structures of designated compounds), while two of the products were not identifiable. If there is any concern about any degradates, in the future, a photolysis degradation study on soil may be required for those degrades of interest.

MATERIALS AND METHODS:

A sieved (2mm) sandy loam soil (60% sand, 22 % silt, 12 % clay, 1.4% organic matter, 11.86% field moisture capacity at 0.33 bar, 5.7 pH, 4.9 meq/100g CEC and 1.28 g/ml bulk density) was used in this study. Thin layers of soil in petri dishes were fortified with 28.0 ppm of thiadiazol ring-labeled ^{14}C-tebuthiuron (specific activity, 17.1 uCi/mg and 97.2% radiopurity) and nonradiolabeled tebuthiuron at a rate of 588.5 ppm. The exaggerated rate of nonradiolabeled tebuthiuron was justified as necessary to provide sufficient metabolites to analyze with HPLC.

Two samples were used as Day 0 samples. Twelve samples were placed in a xenon lamp chamber and irradiated continuously for 22

days at a temperature ranging between 24.5° to 29.0° C. Twelve dark control samples were placed in an enclosed glass chamber that was maintained in a dark, temperature-controlled room maintained at 25° to 26° C. Traps to collect volatile components were connected to the irradiation and dark control chambers.

Duplicate samples were removed from the irradiation chamber after 5, 9, 14, 19, and 22 days of continuous irradiation and from the dark control chamber at the same times. Samples were extracted with methanol:water (80:20) $MeOH:H_2O$. The radioactivity in the $MeOH:H_2O$ extracts was quantitated by LSC and the distribution of radioactivity was analyzed by HPLC. The radioactivity in the HPLC fractions, extracted soil (oxidized by combustion), and trapping media was quantitated by LSC.

Identification of parent tebuthiuron and degradation products in the extracts was determined by comparing chromatograms of mixed nonradiolabeled tebuthiuron and other standards (Figure 1) using a UV-detector at 254 nm and 0.2 AUFS.

REPORTED RESULTS:

The author reported that the intensity of spectral distribution of the xenon lamp from 290 to 750 nm measured through a pyrex glass plate at a distance equivalent to the soil to lamp distance was comparable to natural sunlight (Table C-1 and Figure C-1).; and that the artificial light intensity was approximately 72.0% of the natural sunlight intensity during equinox at 40° N latitude.

The author reported that tebuthiuron degraded on soil when irradiated with artificial sunlight, but not under dark control conditions (Table 8). Radiolabeled tebuthiuron decreased from a mean of 99.3% of the applied radioactivity at Day 0 to 53.0% at Day 22. The decrease in tebuthiuron was accompanied by an increase in the amount of radioactive residues bound to the soil (1.1% at Day 0 to 13.7% at Day 22). The author reported that soil bound tebuthiuron constituted no more than 3.5% of the applied radioactivity.

For dark control samples, the amount of radioactivity extracted with $MeOH:H_2O$ ranged from 97.2 to 103.2%; the major component of the extract was tebuthiuron (93.3 to 96.2%). Less than 2% of the applied radioactivity was detected as soil bound residues.

The author reported that one lamp day was equivalent to 1.44 days of natural sunlight days. The photodegradation half-life (Table 4, Figure 12) was calculated to be 27.6 lamp days or 39.7 days of natural sunlight (12 hours/day).

The overall material balance of the study ranged from a mean of 90.5% to 104.3% for the irradiated samples and 98.5% to 104.3% for the dark control samples. No radioactivity was detected in the traps for volatile products, therefore the author concluded that any volatile products formed from irradiating the samples were not trapped in the trapping media. The major products of photodegradation were soil-bound residues and five minor products (each less than 7% of the applied radioactivity). Three of the products were identified as T-104, T-105 and T-106 (Figure 1) by comparison of retention times with nonradiolabeled standards of T-104, T-105, and T-106. The other two products were unknown compounds making up no more than 3.5% of applied radioactivity.

DISCUSSION:

1. EFGWB concludes that this study is scientifically valid and satisfies the data requirement for soil photolysis.

2. Based on the results of the study, EFGWB concludes that tebuthiuron photolyzes on soil with a half-life of 39.7 days.

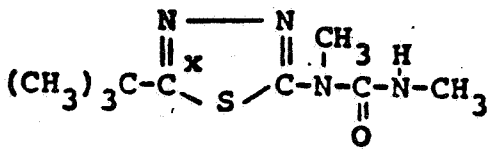
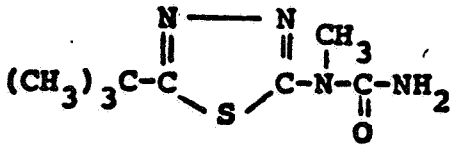
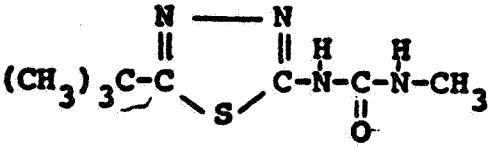
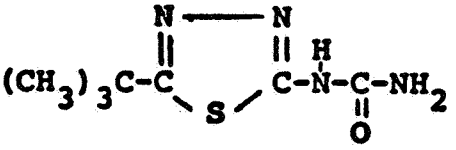
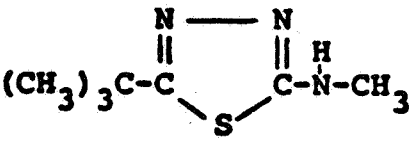
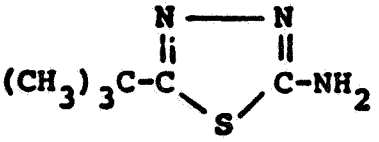
3. The major products of photodegradation were soil bound residues and five minor products (each less than 7% of applied radioactivity). Three of the minor products were identified as T-104, T-105, and T-106, while two of the products were not identifiable. In the future, if there is any concern about any degradates, a photolysis degradation study on soil may be required for those degrades of interest.

4. Although it has no negative impact on the results of the study, the author calculated the pounds of tebuthiuron/acre incorrectly. The general consensus in the scientific community when dealing with a pesticide application on soil is that parts per million times two equals pounds per acre. Therefore the correct rate of tebuthiuron applied to the soil is 1233 lb/a (616.5 ppm X 2 = 1233 lb/a).

5. The author should be informed that future reports should contain the structures and IUPAC nomenclature of products listed in the reports instead of using company alphanumeric designations.

Figure 1.

Compound Designations, Structures, and Chemical Names of Reference Compounds

Compound Designation	Structure	Chemical Name
Tebuthiuron	 x - ^{14}C label	N-[5-(1,1-Dimethylethyl) 1,3,4-thiadiazol-2-yl]-N,N'-dimethylurea
104		N-[5-(1,1-Dimethylethyl) 1,3,4-thiadiazol-2-yl]-N-methylurea
105		N-[5-(1,1-Dimethylethyl) 1,3,4-thiadiazol-2-yl]-N'-methylurea
106		N-[5-(1,1-Dimethylethyl) 1,3,4-thiadiazol-2-yl]-urea
107		2-Dimethylethyl-5-methyl amino-1,3,4-thiadiazol
108		2-Dimethylethyl-5-amino-1,3,4-thiadiazole

Tebuthiuron

Page_____ is not included in this copy.

Pages 8 through 13 are not included.

The material not included contains the following type of information:

____ Identity of product inert ingredients.

____ Identity of product impurities.

____ Description of the product manufacturing process.

____ Description of quality control procedures.

____ Identity of the source of product ingredients.

____ Sales or other commercial/financial information.

____ A draft product label.

____ The product confidential statement of formula.

____ Information about a pending registration action.

✓ FIFRA registration data.

____ The document is a duplicate of page(s) _____.

____ The document is not responsive to the request.

The information not included is generally considered confidential by product registrants. If you have any questions, please contact the individual who prepared the response to your request.