Shaughnessy No.: 081301
Date Out of EAB: AUG 1 1988

To: R. Mountfort
Product Manager #23
Registration Division (TS-767C)

From: Paul Mastradone, Acting Chief
Environmental Chemistry Review Section #1
Exposure Assessment Branch/HED (TS-769C)

Through: Paul F. Schuda, Chief
Exposure Assessment Branch/HED (TS-769C)

Attached, please find the EAB review of . . .

Reg./File # : 239-1246

Chemical Name : Captan

Type Product : Fungicide

Product Name : Merpan, Orthocide, SR-406, Vancide 89

Company Name : Chevron Chemical Company

Purpose : Submission of hydrolysis and photodegradation in water studies

Date Received: 5/14/87 Action Code: 660

Date Completed: 7/21/88 EAB # (s): 70634-5

Monitoring Study Requested: _____ Total Reviewing time: 4 days

Monitoring Study Volunteered: _____

Deferrals to: _____ Ecological Effects Branch

_____ Residue Chemistry Branch

_____ Toxicology Branch

(HED PROVIDE)
CASWELL No.:

REGISTRATION DIVISION DATA REVIEW RECORD
—TO BE USED FOR REVIEW OF STUDIES PPA ONLY—

Confidential Business Information—
Does Not Contain National Security Info. (E.O. 12065)

(HED PROVIDE)
PACK No.: 16534
6/30/86

CHEMICAL NAME: Captan

(RD PROVIDE)
SHAUGHNESSY NO. 081301-4

Identifying Number	Action Code	Reference Number	Record Number	Study Guideline or Narrative Description	Reg. Std. Review Submission Criteria (SEE BELOW)	Accession Number	(HED/BUD/TSS COMPLETE) Indicate with an (X) any of the listed submissions which are not studies as defined by the study guidelines
239-1246	660	20	176155	Response to Data Call-In under Captan Standard	3	NA	
				165-3, 165-2, 165-4			
				161-3, 162-3			
				161-2, 162-4, 133-3			
				161-4, 163-1, 132-1			
				164-2, 163-2, 133-4			
				164-5, 165-1			

PRODUCT MANAGER (PM) or REVIEW MANAGER (RM) AND NUMBER: E. Jaworski 21

PM/RM TEAM MEMBER AND NUMBER: E. Eldredge 21

DATE RECEIVED (EPA): 6-12-86

RD BRANCH CHIEF INITIALS:

CHECK APPLICABLE BOX:

- [ ] Adverse 6(a)(2) Data (405,406)
- [ ] Suspect Data (415,416)
- [ ] IBT Data (485,486)
- [ ] Product Specific Data (Reregistration) (655,656)
- [X] Generic Data (Reregistration) (660,661)
- [ ] Special Review Data (870,871)

NUMBER OF INDIVIDUAL STUDIES SUBMITTED: 0

HAVE ANY OF THE ABOVE STUDIES (in whole or in part) BEEN PREVIOUSLY SUBMITTED FOR REVIEW? (circle: yes or (no)) If yes, please identify the study(ies):

RELATED ACTIONS: Registration Standard Captan

INSTRUCTIONS: & Special Rev. - Captan
Request for amendments to data requirements for RS - Captan

TO BE COMPLETED BY RSERB

DATE SENT TO HED/BUD/TSS: 06/30/86

PRIORITY NUMBER: 50

PROJECTED RETURN DATE: 08/29/86

DATE RETURNED TO RD (HED/BUD/TSS PROVIDE):

REVIEWS SENT TO:

HED: [ ] SIS [ ] TB [X] RCB [X] EAB [X] EEB RD: [ ] TSS BUD: [ ] EAB [ ] SSB

TO:	TYPE OF REVIEW	NUMBER OF ACTIONS: Reregistration	Special Review	Other
	Toxicology			
	Ecological Effects			
	Residue Chemistry			
✓	Exposure Assessment	1		
	Product Chemistry			
	Efficacy			
	Precautionary Labeling/Acute Tox.			
	Science Support			
	Economic Analysis			

FOR DATA SUBMITTED UNDER A REGISTRATION STANDARD: Review Submission Criteria

Policy Note #31

1 = data which meet 6(a)(2) or meet 3(c)(2)(B) flagging criteria

2 = data of particular concern

3 = data necessary to determine tiered testing requirements

NOTE TO TSS: Return 1 Copy To RSERB

Sent 6-26-86

INCLUDE AN ORIGINAL AND FOUR (4) COPIES OF THIS COMPLETED FORM FOR EACH BRANCH CHECKED FOR REVIEW.

(HED PROVIDE) CASWELL NO.:

REGISTRATION DIVISION DATA REVIEW RECORD
—TO BE USED FOR REVIEW OF STUDIES PPA ONLY—

Confidential Business Information—
Does Not Contain National Security Info. (E.O. 12065)

(HED PROVIDE) PACK No.: 5/14/87
36234 Hed

CHEMICAL NAME: Cygon

(RD PROVIDE) SHAUGHNESSY NO. 081301-4

(HED/BUD/TSS COMPLETE)

Identifying Number	Action Code	Reference Number	Record Number	Study Guideline or Narrative Description	Reg. Std. Review Submission Criteria (SEE BELOW)	Accession Number	Indicate with an (X) any of the listed submissions which are not studies as defined by the study guidelines
239-1246	660	30	191563	161-1 Data	1 3	401145-01	
				" Leaching water 161-2 Data		401145-02	
				" Soil 161-3 Request for waiver			
				" Air 161-4 Request for waiver			

PRODUCT MANAGER (PM) or REVIEW MANAGER (RM) AND NUMBER: Richard Mountfort E3 RM

PM/RM TEAM MEMBER AND NUMBER: E. W. Lon 10

DATE RECEIVED (EPA): 03-11-87

RD BRANCH CHIEF INITIALS: JS

CHECK APPLICABLE BOX:

- ☐ Adverse 6(a)(2) Data (405,406)
- ☐ Suspect Data (415,416)
- ☐ IBT Data (485,486)
- ☐ Product Specific Data (Reregistration) (655,656)
- ☒ Generic Data (Reregistration) (660,661)
- ☐ Special Review Data (870,871)

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NUMBER OF INDIVIDUAL STUDIES SUBMITTED:

HAVE ANY OF THE ABOVE STUDIES (in whole or in part) BEEN PREVIOUSLY SUBMITTED FOR REVIEW? (circle: yes or (no)) If yes, please identify the study(ies):

TO BE COMPLETED BY RSERB

DATE SENT TO HED/BUD/TSS: 5-14-87

PRIORITY NUMBER: 5C

RELATED ACTIONS: Other EAB Env. Fate Stud

PROJECTED RETURN DATE: 7-13-87

INSTRUCTIONS:

Please review data and the Request for a waiver of the Photodegradation Data Requirement for Cygon. The 161-3 data has been waived for water

DATE RETURNED TO RD (HED/BUD/TSS PROVIDE):

REVIEWS SENT TO:

HED: ☐ SIS ☐ TB ☐ RCB ☒ EAB ☐ EEB RD: ☐ TSS BUD: ☐ EAB ☐ SSB

TO:	TYPE OF REVIEW	NUMBER OF ACTIONS: Reregistration	Special Review	Other
	Toxicology			
	Ecological Effects			
	Residue Chemistry			
✓	Exposure Assessment	1		
	Product Chemistry			
	Efficacy			
	Precautionary Labeling/Acute Tox.			
	Science Support			
	Economic Analysis			

FOR DATA SUBMITTED UNDER A REGISTRATION STANDARD: Review Submission Criteria

Policy Note #31

1 = data which meet 6(a)(2) or meet 3(c)(2)(B) flagging criteria

(2) = data of particular concern

(3) = data necessary to determine tiered testing requirements

NOTE TO TSS: Return 1 Copy To RSERB

INCLUDE AN ORIGINAL AND FOUR (4) COPIES OF THIS COMPLETED FORM FOR EACH BRANCH CHECKED FOR REVIEW.

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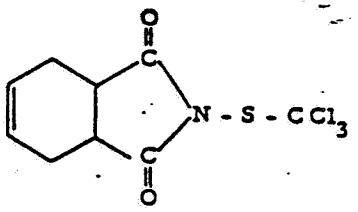
1. CHEMICAL: Common name:

Captan

Chemical name:

cis-N-((Trichloromethyl)thio)-4-cyclohexene-1,2-dicarboximide.

Structure:



2. TEST MATERIAL:

Trichloromethyl-labeled [^{14}C]captan.

3. STUDY/ACTION TYPE:

Submission of hydrolysis and photodegradation in water studies in response to data requirements listed in the Captan Registration Standard.

4. STUDY IDENTIFICATION:

Pack, D.E. 1987. [Trichloromethyl-C-14]Captan Hydrolysis Products. Laboratory Project ID MEF-0002. Unpublished study submitted by Chevron Chemical Company on behalf of the Captan Task Force. (40208101)

Pack, D.E. 1987. Photolysis of Captan in Sterile Aqueous Solution. Laboratory Project ID MEF-0001. Unpublished study submitted by Chevron Chemical Company on behalf of the Captan Task Force. (40208102)

5. REVIEWED BY:

L. Lewis
Environmental Scientist
Review Section #1
OPP/HED/EAB

Signature: Laurie C. Lewis

Date: AUG 1 1988

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6. APPROVED BY:

Paul Mastradone
Acting Chief
Review Section #1
OPP/HED/EAB

Signature: Paul J. Mastradone

Date: AUG 1 1988

7. CONCLUSIONS:

Hydrolysis:

Data were provided on the trichloromethyl portion of the captan molecule by this study. This study partially fulfills data requirements by providing information on the hydrolysis of trichloromethyl-labeled [^{14}C]captan at pH 9. Data for the pH 5 and 7 hydrolysis solutions cannot be validated because the material balance was unacceptably low.

For the pH 9 buffer solution, [^{14}C]captan hydrolyzed rapidly, with a calculated half-life of 3.6 minutes. $^{14}CO_2$ accounted for up to 86% of the applied radioactivity during the test period. Three additional products were found at >10% of the applied, but were not positively identified.

A previously reviewed study (MRID 00096974) partially fulfilled data requirements by providing information on the hydrolysis of carbonyl-labeled [^{14}C]captan at pHs ranging from 2 to 9. Data are still needed on the hydrolysis of trichloromethyl-labeled [^{14}C]captan at pH 5 and 7.

Photodegradation in water:

Data were provided on the trichloromethyl portion of the captan molecule by this study. This study is scientifically sound and provides useful information showing that trichloromethyl-labeled [^{14}C]captan is not photodegraded; the half-life for captan in sterile buffer solution (pH 5) was calculated to be approximately 10 hours in both irradiated and dark control samples. Degradates were not identified, based on the rationale that captan was degraded via hydrolysis and not photolysis. In order to fulfill the data requirement for the photodegradation of captan in water, acceptable data are needed on the hydrolysis of captan at pH 5.

8. RECOMMENDATIONS:

Data are needed on the hydrolysis of trichloromethyl-labeled [^{14}C]captan at pH 5 and 7. Acceptable data on the hydrolysis of captan at pH 5 will also satisfy the data requirement for the photodegradation of captan in water, as described in the Conclusions section of this review.

Based on acceptable data showing that the volatility of captan from soil under laboratory conditions is low, EAB recommends waiving the

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requirement for a photodegradation in air study. EAB has concurred with a request for a waiver of the field volatility study in a previous review (July 8, 1988).

9. BACKGROUND:

This study was submitted by Chevron Chemical Company on behalf of the Captan Task Force in response to the requirements for a hydrolysis and photodegradation in water study in the Captan Registration Standard. The registrant has also submitted a request for a waiver of the photodegradation in air study, based on the results of the laboratory volatility study showing that captan residues do not volatilize appreciably from soil (see EAB review dated July 8, 1988).

10. DISCUSSION OF INDIVIDUAL TESTS OR STUDIES:

See attached reviews of individual studies.

11. COMPLETION OF ONE-LINER:

See attached one-liner.

12. CBI APPENDIX:

N/A

DATA EVALUATION RECORD

CAPTAN STUDY 1

CHEM 081301 Captan

BRANCH EAB

FORMULATION--00--ACTIVE INGREDIENT

FICHE/MASTER ID 40208101 (Replaces MRID 40114502)
Pack, D.E. 1987. [Trichloromethyl-C-14]Captan Hydrolysis Products. Laboratory Project ID MEF-0002. Unpublished study submitted by Chevron Chemical Company on behalf of the Captan Task Force.

SUBST. CLASS = S

DIRECT RVW TIME = 5

REVIEWED BY: L. Lewis
Environmental Scientist
Review Section #1
OPP/HED/EAB

Laurie C. Lewis
AUG 1 1988

APPROVED BY: Paul Mastradone, Acting Chief
Review Section #1
OPP/HED/EAB

Paul J. Mastradone
AUG 1 1988

Degradation - Hydrolysis

CONCLUSIONS:

Trichloromethyl-labeled [^{14}C]captan, at 1 ppm, hydrolyzed rapidly in sterile buffer solution (pH 9) with a calculated half-life of 3.6 minutes. $^{14}CO_2$ accounted for up to 86% of the applied radioactivity during the test period. Three additional degradates were found at >10% of the applied, but were not positively identified.

This study partially fulfills EPA Data Requirements for Registering Pesticides by providing information on the hydrolysis of trichloromethyl-labeled [^{14}C]captan at pH 9. Data for the pH 5 and 7 hydrolysis solutions cannot be validated because the material balance was unacceptably low.

SUMMARY OF DATA BY REVIEWER:

The distribution of radioactivity at each sampling interval is shown in Tables 1-3. Half-lives for captan, calculated using regression analysis, were reported as 11 hours at pH 5, 2.6 hours at pH 7, and 3.6 minutes at pH 9. Total radioactivity recovered

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from the pH 5 and 7 hydrolysis solutions declined throughout the test period to <1% of the applied by day 15. Loss of $^{14}CO_2$ was believed to account for the decrease in total radioactivity in these test solutions. Total ^{14}C recovery was quantitative for the pH 9 hydrolysis solution.

CO_2 was the only product found at >10% of the applied radioactivity in the pH 5 solution. Three additional products were observed in pH 7 and 9 hydrolysis solutions; positive identification of these compounds was not possible because of their instability. The proposed hydrolysis pathway is shown in Figure 1.

MATERIALS AND METHODS:

Sterile buffer solutions (pH 5, 7, and 9) were treated with trichloromethyl-labeled [^{14}C]captan in acetonitrile (≤0.1% by volume) at 1 ppm. Treated solutions were capped and maintained at 25 C. Samples were taken for analysis immediately after treatment and at intervals up to 21 days after treatment. Two mL aliquots of the test solutions were directly injected (HPLC) for analysis.

In separate tests to trap volatilized CO_2, 5 mL of hydrolysis samples in vials were placed in closed containers with a second vial containing 5 mL of 0.5 N KOH. Radioactivity in the KOH was quantified using LSC.

DISCUSSION:

1. For the pH 5 and 7 hydrolysis solutions, the material balance is unacceptably low. Total radioactivity declined throughout the test period, to <1% of the applied by day 15. Separate tests confirmed the evolution of CO_2 from these solutions; however, the method used to trap volatiles does not appear to be quantitative (see Materials and Methods). Further tests should be performed at pH 5 and 7, using methodologies that will allow a quantitative recovery of radioactivity from these hydrolysis solutions.

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Captan Science Reviews

Page _____ is not included in this copy.

Pages __9__ through _12__ are not included in this copy.

The material not included contains the following type of information:

_____ Identity of product inert ingredients.

_____ Identity of product inert impurities.

_____ Description of the product manufacturing process.

_____ Description of product 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

__X__ 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.

DATA EVALUATION RECORD

CAPTAN STUDY 2

CHEM 081301 Captan

BRANCH EAB

FORMULATION--00--ACTIVE INGREDIENT

FICHE/MASTER ID 40208102 (Replaces MRID 40114501)
Pack, D.E. 1987. Photolysis of Captan in Sterile Aqueous Solution. Laboratory Project ID MEF-0001. Unpublished study submitted by Chevron Chemical Company on behalf of the Captan Task Force.

SUBST. CLASS = S

DIRECT RVW TIME = 5

REVIEWED BY: L. Lewis
Environmental Scientist
Review Section #1
OPP/HED/EAB

Laurie C. Lewis

AUG 1 1988

APPROVED BY: Paul Mastradone, Acting Chief
Review Section #1
OPP/HED/EAB

Paul J. Mastradone

AUG 1 1988

Degradation - Photodegradation in Water

CONCLUSIONS:

This study is scientifically sound and provides supplemental information showing that trichloromethyl-labeled [^{14}C]captan is not photodegraded; the half-life for captan in sterile buffer solution (pH 5) was calculated to be approximately 10 hours in both irradiated and dark control samples. Degradates were not identified, based on the rationale that captan was degraded via hydrolysis and not photolysis. In order to fulfill the data requirement for the photodegradation of captan in water, acceptable data are needed on the hydrolysis of captan at pH 5.

SUMMARY OF DATA BY REVIEWER:

Amounts of captan remaining at each sampling interval are shown in Table 1. Half-lives for captan were calculated to be 9.9 and 10.1 hours in the irradiated and dark control samples, respectively. By 48 hours after treatment, <4% of the applied captan remained in either solution.

MATERIALS AND METHODS:

Sterile buffer solution (pH 5) was treated with trichloromethyl-labeled [^{14}C]captan (purity $\geq$98.8%; specific activity 38 mCi/mM), at 1 ppm. The treated solution was maintained at 25 C in a photoreaction apparatus, and continuously irradiated for 48 hours. The light source (GE black light fluorescent lamp, F15T8/B1, 320-380 nm, 2 x 10^3 uW/cm^2) produced light energy in the UV region at approximately 0.5-1.5 times that of natural sunlight. An additional treated sample was maintained as a dark control. Samples were taken immediately after treatment, and at 1, 2, 3, 6, 24, and 48 hours after treatment and analyzed for captan using reverse-phase HPLC.

DISCUSSION:

1. A material balance was not provided.

2. No attempt was made to identify degradates. The investigator stated that degradate identification was considered unnecessary since the results of the study indicated that captan was degraded via hydrolysis and not photolysis. Provided that acceptable data for captan hydrolysis at pH 5 are submitted, this study can be used to fulfill data requirements for captan photodegradation in water.

TABLE 1

PHOTOLYSIS DATA

INTERVAL HOURS	HPLC COUNTS	% OF ZERO TIME	RATE CONSTANT k	HALF LIFE hours	STANDARD ERROR OF k	CORR COEF r
	IRRADIATED					
0	33362	100.0				
1	30947	92.8				
2	28110	84.3	0.07006	9.9	0.001609	-0.99895
3	25669	76.9				
6	20318	60.9				
24	6103	18.3				
48	680	2.0				
	DARK CONTROL					
0	41703	100.0				
1	35685	85.6				
2	34338	82.3	0.06878	10.1	0.001556	-0.99898
3	32179	77.2				
6	26462	63.5				
24	7646	18.3				
48	1560	3.7				

$$\text{Student's "t"} = \frac{0.07006 - 0.06878}{((0.001609)^2 + (0.001556)^2)^{1/2}} = 0.57$$

EXPOSURE ASSESSMENT BRANCH
PESTICIDE ENVIRONMENTAL FATE ONE-LINER

CAPTAN

File No.: 081301 CAS No.: 133-06-2
Type Pesticide: Fungicide
Chemical Name: N-(trichloromethylthio)-4-cyclohexene-1,2-dicarboximide

Empirical Form.: C9H8Cl3NO2S

Uses: Variety of fruit, vegetable, nut, and ornamental crops; seed treatment; postharvest dip; nonfood uses; incorporated into plastics, paints/pastes, textiles, paper, and cosmetics.

Form.Type: WP, SP, D, Seed treatment

Mole Wt.	Sol.@20C (ppm)	Vap.Pres (torr)	Log KOW
300.61	Practically insoluble in water	$<10^{-6}$ mm Hg @25C	

Hydrolysis (161-1)
pH 5:
pH 7: 0.25 days#
pH 9: 3.6 minutes#

Photolysis (161-2, -3, -4)
Air:
Soil:
Water:

Mobility Studies (163-1)

Soil Partition (Kd)	Rf Factors
1	0.08-0.14#
2	
3	
4	
5	

Soil Metabolism Studies - Terrestrial

Aerobic (162-1)	Anaerobic (162-2)
1 14-21 days (volcanic ash)#	<7 days (loamy sand)#
2 1-2 days	
3 2-3 days (loam)#	
4 99% degraded within 7 days (sandy loam)#	
5	
6	
7	

Soil Metabolism Studies - Aquatic

Aerobic (162-4)	Anaerobic (162-3)
1	
2	
3	
4	

Field Dissipation Studies
Terrestrial (164-1)

1
2
3
4
5
6

Aquatic (164-2)

Field Dissipation Studies
Forest (164-3)

1
2

Other (164-5)

Ground Water Findings
1
2
3

Rotational Crop Restrictions (165-1, -2)
1
2

Fish Accumulation Studies (165-4)
1
2

Degradation Products
1 delta^4-Tetrahydrophthalimide
2 delta^4-Tetrahydrophthalmic acid
3 N-(trichloromethylthio)-4,5-epoxyhexahydrophthalimide
4 4,5-epoxyhexahydrophthalimide
5 3-Hydroxy-delta^4-tetrahydrophthalimide
6 5-Hydroxy-delta^4-tetrahydrophthalimide
7 delta^4-Tetrahydrophthalic acid
8 4,5-Dihydroxyhexahydrophthalimide
9 Phthalimide
10 3-Hydroxy-delta^4-tetrahydrophthalamic acid

Notes

References: EAB Files
Writer: L. Lewis

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