

DATA EVALUATION RECORD
S 72-2 -- ACUTE LC₅₀ TEST WITH A FRESHWATER INVERTEBRATE

1. CHEMICAL: Lamda-Cyhalothrin PC Code No.: 128867

2. TEST MATERIAL: 25 CS Formulation (#WF2289); white liquid
Purity: 23.7%

3. CITATION

Authors: S.J. Kent, S.A. Sankey, J.E. Caunter and P.A. Johnson
Title: Lambda-Cyhalothrin: Acute Toxicity to *Daphnia magna* Of a

25 CS Formulation

Study Completion Date: 1995

Laboratory: Brixham Environmental Laboratory, Brixham, Devon, UK

Sponsor: Zeneca Ag Products

Laboratory Report ID: AA1091/B

MRID No.: 43908811

DP Barcode: D223935

4. REVIEWED BY: Joanne S. Edwards, Entomologist, EEB, EFED

Signature:

Joanne S. Edwards

Date:

5/13/96

5. APPROVED BY: Leslie Touart, Head of Section 1, EEB, EFED

Signature:

L. Touart

Date:

6-11-96

6. STUDY PARAMETERS

Scientific Name of Test Organism:	<i>Daphnia magna</i>
Age of Test Organism:	<24 hrs
Definitive Test Duration:	48 hours
Study Method:	Static
Type of Concentrations:	Final measured

7. CONCLUSIONS:

Results Synopsis (Stefan's moving angle method)

technical lambda cyhalothrin:

48-hr EC50: 0.18 ppb 95% C.I.: 0.14 -0.23 ppb

25 CS Formulation:

48-hr EC50: 0.76 ppb 95% C.I.: 0.61 -0.98 ppb

8. ADEQUACY OF THE STUDY

A. Classification: Core

B. Rationale: N/A

C. Repairability: N/A

9. Guideline Deviations

See under item #14, Reviewer's Comments

10. SUBMISSION PURPOSE:

11. MATERIALS AND METHODS

A. Test Organisms

Guideline Criteria	Reported Information
<u>Species</u> Preferred species is <i>Daphnia magna</i>	<i>Daphnia magna</i>
All organisms are approximately the same size and weight?	Yes
<u>Life Stage</u> Daphnids: 1 st instar (<24 h). Amphipods, stoneflies, and mayflies: 2 nd instar. Midges: 2 nd & 3 th instar.	1st instar; less than 24 hrs old
<u>Supplier</u>	In house lab cultures
All organisms from the same source?	Yes

B. Source/Acclimation

Guideline Criteria	Reported Information
<u>Acclimation Period</u> Minimum 7 days	Parental stock were 18 ± 1 day old
Wild caught organisms were quarantined for 7 days?	N/A
Were there signs of disease or injury?	No evidence of disease
If treated for disease, was there no sign of the disease remaining during the 48 hours prior to testing?	N/A

Guideline Criteria	Reported Information
Feeding No feeding during the study.	Daphnids were not fed during the study
Pretest Mortality No more than 3% mortality 48 hours prior to testing.	Not reported

C. Test System:

Guideline Criteria	Reported Information
Source of dilution water Soft reconstituted water or water from a natural source, not dechlorinated tap water.	Reconstituted water
Does water support test animals without observable signs of stress?	Yes
Water Temperature Daphnia: 20°C Amphipods and mayflies: 17°C Midges and mayflies: 22°C Stoneflies: 12°C	20 ± 1°C
pH Prefer 7.2 to 7.6.	8.06 to 8.14
Dissolved Oxygen Static: ≥ 60% during 1 st 48 h and ≥ 40% during 2 nd 48 h, flow-through: ≥ 60%.	8.6 to 9.0 mg/l
Total Hardness Prefer 40 to 48 mg/L as CaCO ₃ .	238 mg/L as CaCO ₃
Test Aquaria 1. <u>Material</u> : Glass or stainless steel. 2. <u>Size</u> : 250 ml (daphnids and midges) or 3.9 L (1 gal). 3. <u>Fill volume</u> : 200 ml (daphnids and midges) or 2-3 L.	Borosilicate glass beakers 250 ml capacity; each vessel contained 200 ml test solution
Type of Dilution System Must provide reproducible supply of toxicant.	Static; no aeration during study

Guideline Criteria	Reported Information
<u>Flow Rate</u> Consistent flow rate of 5-10 vol/24 hours, meter systems calibrated before study and checked twice daily during test period.	N/A
<u>Biomass Loading Rate</u> Static: ≤ 0.8 g/L at $\leq 17^{\circ}\text{C}$, ≤ 0.5 g/L at $> 17^{\circ}\text{C}$; flow-through: ≤ 1 g/L/day.	Not reported
<u>Photoperiod</u> 16 hours light, 8 hours dark.	16 hours light; 8 hours dark
<u>Solvents</u> Not to exceed 0.5 ml/L for static tests or 0.1 ml/L for flow-through tests.	None employed

D. Test Design:

Guideline Criteria	Reported Information
<u>Range Finding Test</u> If $\text{LC}_{50} > 100$ mg/L, then no definitive test is required.	Not reported
<u>Nominal Concentrations of Definitive Test</u> Control & 5 treatment levels; a geometric series with each concentration being at least 60% of the next higher one.	0.32, 0.56, 1.0, 1.8, 3.2, 5.6, 10, and 18 ppb formulation concentrations
<u>Number of Test Organisms</u> Minimum 20/level, may be divided among containers.	20/level; four replicates per level (5 daphnids in each)
Test organisms randomly or impartially assigned to test vessels?	Yes

<p>Water Parameter Measurements</p> <p>1. <u>Temperature</u> Measured continuously or, if water baths are used, every 6 h, may not vary > 1°C.</p> <p>2. <u>DO and pH</u> Measured at beginning of test and ever 48 h in the high, medium, and low doses and in the control.</p>	All criteria met
<p>Chemical Analysis Needed if solutions were aerated, if chemical was volatile, insoluble, or known to absorb, if precipitate formed, if containers were not steel or glass, or if flow-through system was used</p>	Chemical analyses were performed

12. REPORTED RESULTS:

Guideline Criteria	Reported Information
Quality assurance and GLP compliance statements were included in the report?	Yes
<p><u>Control Mortality</u> Static: ≤10% Flow-through: ≤5%</p>	0%
<u>Percent Recovery of Chemical</u>	51 to 63% of nominal; low recovery due to adsorption of material onto surfaces the material came in contact with
Raw data included?	Excerpted

Mortality

Concentration (ppb)	Number of Organisms	% Immobilized
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Nominal conc. of Formulation	Final Measured Technical/ Formulation		
			48 hrs
Control		20	0
0.32	0.017/ 0.072	20	0
0.56	0.029/ 0.122	20	0
1	0.058/ 0.245	20	15
1.8	0.097/ 0.409	20	25
3.2	0.18/ 0.759	20	30
5.6	0.30/ 1.27	20	70
10	0.87/ 3.67	20	90
18	0.84/ 3.54	20	100

Other Significant Results:

B. Statistical Results

Method: Stefan's Method - Moving-angle
(mean measured concentrations)

technical lambda cyhalothrin:

48-hr EC₅₀: 0.44 ppb 95% C.I.: 0.35 -0.56 ppb

NOEC: 0.075 ppb based on immobility

25. CS Formulation:

48-hr EC₅₀: 1.8 ppb 95% C.I.: 1.5 -2.3 ppb

NOEC: 0.32 ppb based on immobility

13. VERIFICATION OF STATISTICAL RESULTS

Technical Lambda-Cyhalothrin

Parameter	Result (ppb)
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Binomial Test EC ₅₀ (C.I.)	0.23 (0.097-0.84)
Moving Average Angle EC ₅₀ (95% C.I.)	0.18 (0.14-0.23)
Probit EC ₅₀ (95% C.I.)	0.2 (0.16- 0.26)
Probit Slope	2.5
NOEC	0.56 (nominal level)

25 CS Formulation

Parameter	Result (ppb)
Binomial Test EC ₅₀ (C.I.)	0.98 (0.41- 3.54)
Moving Average Angle EC ₅₀ (95% C.I.)	0.76 (0.61 -0.98)
Probit EC ₅₀ (95% C.I.)	0.86 (0.67 -1.11)
Probit Slope	2.5
NOEC	0.56 (nominal level)

Because of the low recovery of the material, we based the results on the final measured concentrations at 48 hours. Slightly more conservative results were obtained.

14. REVIEWER'S COMMENTS:

The following deviations were noted. The deviations were not found to affect the overall quality of the study.

- o Pretest mortality was not reported.
 - o The total hardness (238 mg/L as CaCO₃) was higher than the recommended (40 to 48 mg/L as CaCO₃).
 - o Biomass loading was not reported.
0. Recovery was only 51-63% of the nominal. As adsorption of the material to surfaces is expected with this type of material (i.e. a pyrethroid), the low recovery does not invalidate this study. We believe a more accurate EC50 is based on the final measured concentrations, thus our findings are more conservative than that of the study authors (0.76 ppb vs 1.8 ppb for the 25 CS formulation).

This study is scientifically sound and satisfies the guideline requirement (72-2b) for testing with a formulated product. The 48-hr EC50 for daphnids exposed to a 25 CS

formulation containing lambda-cyhalothrin is 0.76 ppb based on final measured concentrations.