DATA EVALUATION RECORD
ACUTE LC_{50} TEST WITH AN ESTUARINE/MARINE SHRIMP
§ 72-3(C)

1. **CHEMICAL:** spinosed PC Code No.: 110003

2. **TEST MATERIAL:** XDE-105, AGR 293707 Purity: 87.9%

3. **CITATION**

Authors:	J. Yurk
Title:	Acute Toxicity of XDE-105 Insecticide to the Grass Shrimp (Palaemonetes pugio)
Study Completion Date:	1993
Laboratory:	Environmental Science & Engineering, Inc.
Sponsor:	Dow Chemical Company
Laboratory Report ID:	392302106003140
MRID No.:	43414539
DP Barcode:	D209720

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

Signature: Joanne S Edwards **Date:** 3/14/95

5. **APPROVED BY:** Leslie W. Touart, Section Head, EEB, EFED

Signature: L. W. T. **Date:** 3/24/95

6. **STUDY PARAMETERS**

Scientific Name of Test Organism:	
Age or Size of Test Organism:	0.12 - 0.21 g wet wt
Definitive Test Duration:	96 hours
Study Method:	Static-Renewal
Type of Concentrations:	Mean measured

7. **CONCLUSIONS:**

Results Synopsis
LC_{50}: >9.76 ppm ai (moderately toxic)

8. **ADEQUACY OF THE STUDY**

A. Classification: Supplemental

B. Rationale: Organisms were fed during the study.

C. Repairability: No; registrant does not have to repeat study since another estuarine species, the oyster, was found to be more sensitive in acute testing and results from that study will be will be used for risk assessment purposes.

9. **BACKGROUND** New chemical; no previous EEB file.

10. **GUIDELINE DEVIATIONS**

See Under Reviewer's Comments.

11. **SUBMISSION PURPOSE:** New chemical EUP.

12. **MATERIALS AND METHODS**

A. Test Organisms

Guideline Criteria	Reported Information
Species Preferred species are *Mysidopsis bahia*, *Penaeus setiferus*, *P. duorarun*, *P. aztecus* and *Palaemonetes sp.*	Palaemonetes pugio
Age Juvenile, mysids should be ≤ 24 hours old	at end of test organisms were juveniles between 20 and 25 mm in length and 0.12 and 0.21 g wt weight
Supplier	Aquatic Indicators, St. Augustine, FL
All shrimp are from same source?	yes
All shrimp are from the same year class?	yes

B. Source/Acclimation

Guideline Criteria	Reported Information
Acclimation Period minimum 10 days	10 days
Wild caught organisms were quarantined for 7 days?	N/A
Were there signs of disease or injury?	not reported

Guideline Criteria	Reported Information
If treated for disease, was there no sign of the disease remaining during the 48 hours prior to testing?	N/A
Feeding No feeding during the study and no feeding for 24 hour before the beginning of the test if organisms are over 0.5 g each.	test organisms were fed brine shrimp (A salina) nauplii throughout the test
Pretest Mortality <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	filtered Atlantic Ocean water obtained near the Whitney Lab, Marineland, FL and diluted to a salinity of 20 ppt using water from a well located near the lab
Does water support test animals without observable signs of stress?	yes (based on 0% mortality in the control during the study)
Salinity 30-34 ‰ for marine (stenohaline) shrimp and 10-17 ‰ for estuarine (euryhaline) shrimp, weekly range < 6 ‰	no range provided; study author stated it remained constant at 21 ppt in dilution water during the test
Water Temperature 22 ± 1 °C	20.6 to 22.0 °C during the test
pH 8.0-8.3 for marine (stenohaline) shrimp, 7.7-8.0 for estuarine (euryhaline) shrimp, monthly range < 0.8	8.2 to 8.4 during the test

Guideline Criteria	Reported Information
Dissolved Oxygen Static: ≥ 60% during 1st 48 hrs and ≥ 40% during 2nd 48 hrs, Flow-through: ≥ 60%	6.2 - 7.2 mg/L during the test
Total Organic Carbon	not reported
Test Aquaria 1. Material: Glass or stainless steel 2. Size: 19.6 L is acceptable for organisms ≥ 0.5 g (e.g. pink shrimp, white shrimp, and brown shrimp), 3.9 L is acceptable for smaller organisms (e.g. mysids and grass shrimp). 3. Fill volume: 15 L is acceptable for organisms ≥ 0.5 g, 2-3 L is acceptable for smaller organisms.	24 L glass chambers measuring 44 cm (l) x 24.5 cm (w) x 22.5 cm (ht); each were filled to 10 L and kept covered during the test
Type of Dilution System Must provide reproducible supply of toxicant	24 hr static renewal (approx. 80% renewal)
Flow Rate Consistent flow rate of 5-10 vol/24 hours, meter systems calibrated before study and checked twice daily during test period	N/A
Biomass Loading Rate Static: ≤ 0.8 g/L at ≤ 17°C, ≤ 0.5 g/L at > 17°C; flow-through: ≤ 1 g/L/day	not reported
Photoperiod 16 hours light, 8 hours dark	16 h light, 8 h dark including 15 minute dawn/dusk transition periods
Solvents Not to exceed 0.5 ml/L for static tests or 0.1 ml/L for flow-through tests	none employed

Comment: According to the study author, the test material was poorly soluble in water (measured solubility in 20 ppt filtered seawater of 2 mg/L). To enhance solubility, the pH was altered. As noted on page 11 of the report, a stock containing a nominal concentration of 100 mg/L XDE-105 (corrected for purity) was prepared in 35 L of deionized water adjusted to a pH near 5 with 1 N HCl and mixed vigorously. This technique yielded a solubility of XDE-105 in the test system of approximately 12 mg/L.

D. Test Design

Guideline Criteria	Reported Information
Range Finding Test If LC_{50} >100 mg/L with 30 shrimp, then no definitive test is required.	yes; in range-finding tests it was determined that the LC_{50} was near 10 mg ai/L
Nominal Concentrations of Definitive Test Control & 5 treatment levels; a geometric series in which each concentration is at least 60% of the next higher one.	1.6, 2.6, 4.3, 7.2 and 12 mg ai/L.
Number of Test Organisms Minimum 20/level, may be divided among containers	20 per test concentration; 2 replicates
Test organisms randomly or impartially assigned to test vessels?	yes; indiscriminate distribution
Biological observations made every 24 hours?	observations were made daily for mortality and behavioral changes
Water Parameter Measurements 1. Temperature Measured constantly or, if water baths are used, every 6 hrs, may not vary > 1°C 2. DO and pH Measured at beginning of test and ever 48 h in the high, medium, and low doses and in the control	temperature, pH, salinity, and DO were measured daily in each chamber; temperature was continuously monitored in the water bath

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Guideline Criteria	Reported Information
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	in each exposure chamber at 0, 24 (prior to renewal) and 96 hours

13. REPORTED RESULTS

A. General Results

Guideline Criteria	Reported Information
Quality assurance and GLP compliance statements were included in the report?	yes
Recovery of Chemical	81 - 104% (Table 1, attached); stock solution was 85% of the nominal at test initiation
Control Mortality Not more than 10% of control organisms may die or show abnormal behavior.	0%
Raw data included?	no
Signs of toxicity (if any) were described?	only mortality was described

Mortality

Concentration (ppm)		Number of Shrimp	Cumulative Number Dead			
			Hour of Study			
Nominal	Mean Measured		24	48	72	96
Control		20	0	0	0	0
1.6	1.66	20	0	0	0	0
2.6	2.71	20	2	2	2	2
4.3	4	20	3	5	6	7

Concentration (ppm)		Number of Shrimp	Cumulative Number Dead			
			Hour of Study			
Nominal	Mean Measured		24	48	72	96
7.2	6.19	20	1	5	5	5
12	9.76	20	3	5	6	7

Other Significant Results:

B. Statistical Results

The LC_{50} was based upon visual observation of the data. The LC_{50} was reported to be >9.76 mg/L. The NOEC was reported to be 1.66 mg/L (based on mortality).

14. VERIFICATION OF STATISTICAL RESULTS

A LC_{50} cannot be calculated, since at the highest test concentration mortality was only 7 individuals. Based upon visual observation of the data the LC_{50} is >9.76 mg/L. Depending upon where the actual LC50 value falls, this would characterize spinosed as moderately toxic to estuarine invertebrates.

15. REVIEWER'S COMMENTS:

The following study deviations were noted:

- Biological observations should include both behavioral and physical observations. Observations, other than mortality, were not reported.
- An acceptable acute toxicity test should provide an LC_{50}.
- The % mortality prior to the test was not reported.
- The biomass loading rate was not included.
- Salinity measurements were not provided.
- The age of the grass shrimp was not reported.
- The organisms were fed Aretemia salina nauplii throughout the study, which constitutes a major study deviation.

- The temperature range (20.6 - 22.0 ° C) was outside the range of that recommended by the SEP (21 - 23 ° C).
- The pH (8.2 - 8.4) and the salinity (21 ppt) was higher than that recommended for estuarine shrimp species (7.7 - 8.0) and (10 - 17 ppt), respectively.

DER dated 3/24/95 (MRID 43414539)

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