CIBL
S12-02

5/19/1997

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

068002

1. **CHEMICAL:** Zinc Omadine PC Code No.: 001258

2. **TEST MATERIAL:** Zinc bis-1-oxide-2(1H)-pryidenethionate, off-white powder, CAS No.13463-41-7 Purity: 97.8%

3. **CITATION**

Authors:	R. L. Boeri, J. P. Magazu, and T. J. Ward
Title:	Acute toxicity of Zinc Omadine to the Mysid, *Mysidopsis bahia*.
Study Completion Date:	11 July 1993
Laboratory:	T. R. Wilbury Laboratories, Inc., Marblehead, MA
Sponsor:	Olin Corp., New Haven, CT
Laboratory Report ID:	23-OL
MRID No.:	438646-07
DP Barcode:	D228348

4. **REVIEWED BY:** Regina Hirsch, Wildlife Biologist, EEB, EFED

Signature: [signature] Date: 1/8/97

5. **APPROVED BY:** Les Touart, Head of Section (1), EEB, EFED

Signature: [signature] Date: 5/19/97

6. **STUDY PARAMETERS**

Scientific Name of Test Organism:	*Mysidopsis bahia*
Age or Size of Test Organism:	1.5 mg
Definitive Test Duration:	96 hours
Study Method:	Flow-through
Type of Concentrations:	Mean measured

7. **CONCLUSIONS:**

Results Synopsis

LC_{50}: 4.7 µg/L ai 95% C.I.: 4.04 - 5.53 µg/L ai

NOEL: 1.6 µg/L ai

8. **ADEQUACY OF THE STUDY**

   A. **Classification:** Core.

   B. **Rationale:** N/A

   C. **Repairability:** N/A

9. **BACKGROUND**

10. **GUIDELINE DEVIATIONS**

   1. Dilution water contained dechlorinated tap water.

   2. Total organic carbon was not reported.

11. **SUBMISSION PURPOSE:** Registration

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.*	*Mysidopsis bahia*
Age Juvenile, mysids should be ≤ 24 hours old	< 24 hours old
Supplier	Aquatic Indicators, St. Augustine, FL
All shrimp are from same source?	Yes
All shrimp are from the same year class?	Yes

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B. Source/Acclimation

Guideline Criteria	Reported Information
Acclimation Period minimum 10 days	14 days
Wild caught organisms were quarantined for 7 days?	N/A
Were there signs of disease or injury?	No
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.	Mysids were fed live *Artmia salina* daily during acclimation and testing.
Pretest Mortality <3% mortality 48 hours prior to testing	<3% mortality prior to testing.

C. Test System

Guideline Criteria	Reported Information
Source of dilution water Soft reconstituted water or water from a natural source, not dechlorinated tap water	dilution as natural filtered seawater adjusted with dechlorinated tapwater to the correct salinity.
Does water support test animals without observable signs of stress?	Yes
Salinity 30-34 for marine (stenohaline) shrimp and 10-17 for estuarine (euryhaline) shrimp, weekly range < 6	11 to 19 ppt

Guideline Criteria	Reported Information
Water Temperature Approx. 22 ± 1 °C	21.3 to 22.9°C
pH 8.0-8.3 for marine (stenohaline) shrimp, 7.7-8.0 for estuarine (euryhaline) shrimp, monthly range < 0.8	7.1 to 8.0
Dissolved Oxygen Static: ≥ 60% during 1st 48 hrs and ≥ 40% during 2nd 48 hrs, Flow-through: ≥ 60%	7.9 mg/L at 24 hour
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.	glass 20 L 15 L
Type of Dilution System Must provide reproducible supply of toxicant	Intermittent flow proportional diluter. The diluter was constructed at T. R. Wilbury Laboratories, allowed test media to contact only glass, stainless steel, or Teflon surfaces.
Flow Rate Consistent flow rate of 5-10 vol/24 hours, meter systems calibrated before study and checked twice daily during test period	5.3 vol/24 hours

Guideline Criteria	Reported Information
Biomass Loading Rate Static: ≤ 0.8 g/L at ≤ 17°C, ≤ 0.5 g/L at > 17°C; flow-through: ≤ 1 g/L/day	0.001 g/L (0.002 g/L/day)
Photoperiod 16 hours light, 8 hours dark	16 h light, 8 h dark.
Solvents Not to exceed 0.5 ml/L for static tests or 0.1 ml/L for flow-through tests	None

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.	A screening test was not performed and historic data were used to determine the range of concnetrations for the definitive test.
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.	Control, 2.4, 4.0, 6.4, 9.6, 16 µg ai/L.
Number of Test Organisms Minimum 20/level, may be divided among containers	20/Level (2 replicates with 10 organisms per replicate)
Test organisms randomly or impartially assigned to test vessels?	Yes
Biological observations made every 24 hours?	Yes

Guideline Criteria	Reported Information
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 in one test vessel was recorded continuously during the test. DO, pH, and temperature were measured and recorded daily in each test chamber that contained live shrimp.
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	Analytical determineation of test material concnetration from the test was performed on pooled samples collected midway between the top, bottom, and sides of the 2 replicates of each concentration at the beginning and end of the test.

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	67-106 % of Nominal
Control Mortality Not more than 10% of control organisms may die or show abnormal behavior.	0.05%
Raw data included?	No
Signs of toxicity (if any) were described?	Yes

Mortality

Concentration (ppm)		Number of Shrimp	Cumulative Number Dead			
			Hour of Study			
Nominal	Mean Measured		24	48	72	96
Control	0.0	20	0	0	1	1
2.4	1.6	20	0	0	1	1
4.0	3.2	20	1	1	4	8
6.4	5.9	20	0	0	5	8
9.6	9.4	20	3	3	20	20
16.0	17.0	20	12	20	20	20

Other Significant Results:
No sublethal effects were observed.

B. Statistical Results

Method: Binomial/nonlinear interpolation

96-hr LC_{50}: 6.3 µg/L ai 95% C.I.: 1.6 to 9.4 µg/L ai

Probit Slope: Could not be calculated NOEC: 1.6 µg/L ai

14. VERIFICATION OF STATISTICAL RESULTS

Parameter	Result
Binomial Test LC_{50} (C.I.)	6.35 (1.6-9.39) µg/L ai
Moving Average Angle LC_{50} (95% C.I.)	4.70 (4.04-5.53) µg/L ai
Probit LC_{50} (95% C.I.)	Probability less than 0.05 Probit should not be used.
NOEC	1.6 µg/L ai

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NOTE: BECAUSE THERE WAS CONTROL MORTALITY, AND NONE
OF THE LOWER CONCENTRATIONS PRODUCED ZERO MORTALITY,
THE DATA HAS BEEN SUBJECTED TO ABBOTT'S CORRECTION.

Regina Hirsch Zinc Omadine Acute Toxicity to Mysid Shrimp

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CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB. (PERCENT)
17	19	19	100	1.907348E-04
9.399999		19	19	100
1.907348E-04				
5.9	19	7	36.8421	17.96417
3.2	19	7	36.8421	17.96417
1.6	19	0	0	1.907348E-04

THE BINOMIAL TEST SHOWS THAT 1.6 AND 9.399999 CAN BE
USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT
CONFIDENCE LIMITS, BECAUSE THE ACTUAL CONFIDENCE LEVEL
ASSOCIATED WITH THESE LIMITS IS GREATER THAN 95 PERCENT.

AN APPROXIMATE LC50 FOR THIS SET OF DATA IS 6.351465

RESULTS CALCULATED USING THE MOVING AVERAGE METHOD

SPAN	G	LC50	95 PERCENT CONFIDENCE LIMITS	
3	5.359227E-02	4.705913	4.042063	5.531044

RESULTS CALCULATED USING THE PROBIT METHOD

ITERATIONS	G	H	GOODNESS OF FIT PROBABILITY
4	1.198996	3.96021	7.803023E-03

SINCE THE PROBABILITY IS LESS THAN 0.05, RESULTS CALCULATED
USING THE PROBIT METHOD PROBABLY SHOULD NOT BE USED.

SLOPE = 4.443864
95 PERCENT CONFIDENCE LIMITS =-.4221077 AND 9.309834

LC50 = 4.856263
95 PERCENT CONFIDENCE LIMITS = 0 AND +INFINITY

LC10 = 2.514866
95 PERCENT CONFIDENCE LIMITS = 0 AND 4.610631

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Regina Hirsch Zinc Omadine Acute Toxicity to Mysids

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CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB. (PERCENT)
17	19	19	100	1.907348E-04
9.399999		19	19	100

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Table B.1. Results of analyses of test media containing Zinc Omadine®.

Nominal Concentration of Test Substance (µg/L)	Measured Concentration (µg/L)			Percent of Nominal
	0 hour	96 hour	Mean	
Test Media				
0.0 (control)	ND	ND	ND	--
2.4	1.3	1.8	1.6	67
4.0	2.0	4.4	3.2	80
6.4	5.6	6.1	5.9	92
9.6	7.7	11	9.4	98
16	15	18	17	106
Laboratory Standard				
10	9.2 9.8 10	9.8 10 10	9.8	98
Matrix Spike				
6.4	2.9 5.4	8.0 8.3	6.2	97
Laboratory Control Spike				
6.4	7.1	6.8	7.0	109
Blank				
0.0	ND	ND	ND	--

Notes: 1. ND = none detected (detection limit = 0.80 µg/L).