

US EPA ARCHIVE DOCUMENT

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5/19/1997

**DATA EVALUATION RECORD**  
**ACUTE LC<sub>50</sub> TEST WITH AN ESTUARINE/MARINE SHRIMP**  
**§ 72-3(C)**

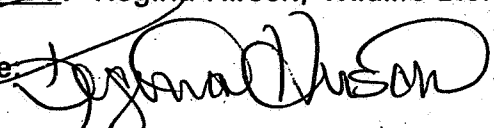
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7

- 1. **CHEMICAL:** Zinc Omadine PC Code No.: 001258
- 2. **TEST MATERIAL:** Zinc bis-1-oxide-2(1H)-pyridenethionate, off-white powder,  
CAS No.13463-41-7 Purity: 97.8%

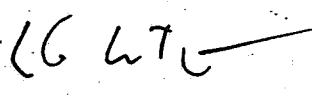
3. **CITATION**

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:  Date: 1/8/97

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

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<sub>50</sub>: 4.7 µg/L ai                      95% C.I.: 4.04 - 5.53 µg/L ai  
 NOEL: 1.6 µg/L ai

1

DP Barcode: D228348

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**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
<b>Species</b> Preferred species are <i>Mysidopsis bahia</i> , <i>Penaeus setiferus</i> , <i>P. duorarun</i> , <i>P.</i> <i>aztecus</i> and <i>Palaemonetes sp.</i>	<i>Mysidopsis bahia</i>
<b>Age</b> Juvenile, mysids should be ≤ 24 hours old	< 24 hours old
<b>Supplier</b>	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
<b>Acclimation Period</b> minimum 10 days	14 days
<b>Wild caught organisms were quarantined for 7 days?</b>	N/A
<b>Were there signs of disease or injury?</b>	No
<b>If treated for disease, was there no sign of the disease remaining during the 48 hours prior to testing?</b>	N/A
<b>Feeding</b> 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 <i>Artemia salina</i> daily during acclimation and testing.
<b>Pretest Mortality</b> <3% mortality 48 hours prior to testing	<3% mortality prior to testing.

**C. Test System**

Guideline Criteria	Reported Information
<b>Source of dilution water</b> 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.
<b>Does water support test animals without observable signs of stress?</b>	Yes
<b>Salinity</b> 30-34 for marine (stenohaline) shrimp and 10-17 for estuarine (euryhaline) shrimp, weekly range < 6	11 to 19 ppt

Guideline Criteria	Reported Information
<u>Water Temperature</u> Approx. $22 \pm 1$ °C	21.3 to 22.9°C
<u>pH</u> 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
<u>Dissolved Oxygen</u> Static: $\geq 60\%$ during 1 <sup>st</sup> 48 hrs and $\geq 40\%$ during 2 <sup>nd</sup> 48 hrs, Flow-through: $\geq 60\%$	7.9 mg/L at 24 hour.
<u>Total Organic Carbon</u>	Not reported
<u>Test Aquaria</u> 1. <u>Material:</u> Glass or stainless steel 2. <u>Size:</u> 19.6 L is acceptable for organisms $\geq 0.5$ 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. <u>Fill volume:</u> 15 L is acceptable for organisms $\geq 0.5$ g, 2-3 L is acceptable for smaller organisms.	glass  20 L     15 L
<u>Type of Dilution System</u> 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.
<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	5.3 vol/24 hours

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Guideline Criteria	Reported Information
<b>Biomass Loading Rate</b> Static: $\leq 0.8$ g/L at $\leq 17^\circ\text{C}$ , $\leq 0.5$ g/L at $> 17^\circ\text{C}$ ; flow-through: $\leq 1$ g/L/day	0.001 g/L (0.002 g/L/day)
<b>Photoperiod</b> 16 hours light, 8 hours dark	16 h light, 8 h dark.
<b>Solvents</b> 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
<b>Range Finding Test</b> 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 concentrations for the definitive test.
<b>Nominal Concentrations of Definitive Test</b> 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 $\mu\text{g ai/L}$ .
<b>Number of Test Organisms</b> Minimum 20/level, may be divided among containers	20/Level (2 replicates with 10 organisms per replicate)
<b>Test organisms randomly or impartially assigned to test vessels?</b>	Yes
<b>Biological observations made every 24 hours?</b>	Yes

Guideline Criteria	Reported Information
<p><b><u>Water Parameter Measurements</u></b>  <b>1. Temperature</b>                      Measured constantly or, if water baths are used, every 6 hrs, may not vary &gt; 1°C  <b>2. DO and pH</b>                      Measured at beginning of test and ever 48 h in the high, medium, and low doses and in the control</p>	<p>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.</p>
<p><b><u>Chemical Analysis</u></b>                      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>	<p>Analytical determination of test material concentration 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.</p>

**13. REPORTED RESULTS**

**A. General Results**

Guideline Criteria	Reported Information
<p><b>Quality assurance and GLP compliance statements were included in the report?</b></p>	<p>Yes</p>
<p><b><u>Recovery of Chemical</u></b></p>	<p>67-106 % of Nominal</p>
<p><b><u>Control Mortality</u></b>                      Not more than 10% of control organisms may die or show abnormal behavior.</p>	<p>0.05%</p>
<p><b>Raw data included?</b></p>	<p>No</p>
<p><b>Signs of toxicity (if any) were described?</b></p>	<p>Yes</p>

6

**Mortality**

Concentration (ppm)		Number of Shrimp	Cumulative Number Dead			
Nominal	Mean Measured		Hour of Study			
			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<sub>50</sub>: 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 <sub>50</sub> (C.I.)	6.35 (1.6-9.39) µg/L ai
Moving Average Angle LC <sub>50</sub> (95% C.I.)	4.70 (4.04-5.53) µg/L ai
Probit LC <sub>50</sub> (95% C.I.)	Probability less than 0.05 Probit should not be used.
NOEC	1.6 µg/L ai



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
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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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 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

8

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	
<b>Test Media</b>				
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
<b>Laboratory Standard</b>				
10	9.2 9.8 10	9.8 10 10	9.8	98
<b>Matrix Spike</b>				
6.4	2.9 5.4	8.0 8.3	6.2	97
<b>Laboratory Control Spike</b>				
6.4	7.1	6.8	7.0	109
<b>Blank</b>				
0.0	ND	ND	ND	--

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

9