

US EPA ARCHIVE DOCUMENT

(10-13-98)

MRID No.: 445234-12

DATA EVALUATION RECORD
§ 72-1(A) -- ACUTE LC₅₀ TEST WITH A WARMWATER FISH

1. CHEMICAL: MITC (methyl isothiocyanate) PC Code No.: 068103
2. TEST MATERIAL: MITC technical Purity: 94.9%
3. CITATION:

Authors: J.K. Schupner and B.J. Stachura
Title: W149 MITC: The Acute Toxicity of MITC Technical to Bluegill Sunfish, *Lepomis macrochirus*, in a Flow Through System
Study Completion Date: September 4, 1991
Laboratory: NOR-AM Chemical Company, Pikeville, NC
Sponsor: AgrEvo USA Company, Wilmington, DE
Laboratory Report ID: 501AF
MRID No.: 445234-12
DP Barcode: D248126

4. REVIEWED BY: Max Feken, M.S., Environmental Toxicologist, Golder Associates Inc.

Signature:  Date: 10/5/98

- APPROVED BY: Pim Kosalwat, Ph.D., Senior Scientist, Golder Associates Inc.

Signature: P. Kosalwat Date: 10/5/98

5. APPROVED BY:

Signature: Thomas M Steyer Date: 10/13/98

6. STUDY PARAMETERS:

Age or Size of Test Organism: Average of 29 mm
Definitive Test Duration: 96 hours
Study Method: Flow-Through
Type of Concentrations: Mean Measured

7. CONCLUSIONS: This study is scientifically sound and fulfills the guideline requirements for an acute toxicity test using bluegill sunfish. An LC₅₀ value of 142 ppb classifies MITC technical as highly toxic to bluegill sunfish. The NOEC was determined to be 88 ppb.



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Results Synopsis

LC₅₀: 142 ppb

95% C.I.: 88 - 251 ppb

NOEC: 88 ppb

Probit Slope: N/A

8. ADEQUACY OF THE STUDY:

A. Classification: Core

B. Rationale: N/A

C. Repairability: N/A

9. GUIDELINE DEVIATIONS:

1. The range for fish length was not reported.
2. The pH of the test solutions (6.3 - 7.1) were lower than recommended (7.2 - 7.6)
3. The test chambers (12 L) were smaller than recommended (19 L).

10. SUBMISSION PURPOSE:

11. MATERIALS AND METHODS:

A. Test Organisms

Guideline Criteria	Reported Information
<u>Species</u> Preferred species is the bluegill sunfish (<i>Lepomis macrochirus</i>)	<i>Lepomis macrochirus</i>
<u>Mean Weight</u> 0.5-5 g	0.608 g
<u>Mean Standard Length</u> Longest not > 2x shortest	Mean (for control): 29 mm Range: not reported
<u>Supplier</u>	Aquatic Research Organisms, Hampton, NH

Guideline Criteria	Reported Information
All fish from same source?	Yes
All fish from the same year class?	Yes

B. Source/Acclimation

Guideline Criteria	Reported Information
<u>Acclimation Period</u> Minimum 14 days	5 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
<u>Feeding</u> No feeding during the study	No feeding 75 hours prior to testing or during test period.
<u>Pretest Mortality</u> No more than 3% mortality 48 hours prior to testing	No mortality five days prior to testing.

C. Test System

Guideline Criteria	Reported Information
<u>Source of dilution water</u> Soft reconstituted water or water from a natural source, not dechlorinated tap water	Well water mixed with deionized water to a hardness of 42 mg/L as CaCO ₃ .
Does water support test animals without observable signs of stress?	Yes

Guideline Criteria	Reported Information
<u>Water Temperature</u> 17°C or 22°C	21.1 - 22.9°C
<u>pH</u> Prefer 7.2 to 7.6	6.3 - 7.1
<u>Dissolved Oxygen</u> Static: ≥ 60% during 1 st 48 hrs and ≥ 40% during 2 nd 48 hrs, flow-through: ≥ 60%	≥83% throughout test
<u>Total Hardness</u> Prefer 40 to 48 mg/L as CaCO ₃	42 mg/L as CaCO ₃
<u>Test Aquaria</u> 1. <u>Material</u> : Glass or stainless steel 2. <u>Size</u> : Volume of 19 L (5 gal) or 30 x 60 x 30 cm 3. <u>Fill volume</u> : 15-30 L of solution	Glass 12 L 10 liters
<u>Type of Dilution System</u> Must provide reproducible supply of toxicant	Intermittent flow proportional diluter
<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	8.6 volume additions/24 hours
<u>Biomass Loading Rate</u> Static: ≤ 0.8 g/L at ≤ 17°C; ≤ 0.5 g/L at > 17°C; flow- through: ≤ 1 g/L/day	0.608 g/L
<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	Solvent: Acetone Maximum conc.: 0.1 mL/L

D. Test Design

Guideline Criteria	Reported Information
<p><u>Range Finding Test</u> If $LC_{50} > 100$ mg/L with 30 fish, then no definitive test is required.</p>	<p>Range finding test was performed at 0, 32, 90, and 250 μg/L. 0% mortality was observed at the 32 and 90 μg/L concentrations after 72 hours. 100% mortality was observed at 250 μg/L.</p>
<p><u>Nominal Concentrations of Definitive Test</u> Control & 5 treatment levels; dosage should be 60% of the next highest concentration; concentrations should be in a geometric series</p>	<p>Control, solvent control and five treatment concentrations: 64.8, 108, 180, 300, and 500 μg/L.</p>
<p><u>Number of Test Organisms</u> Minimum 10/level, may be divided among containers</p>	<p>20 fish per level, 10 per replicate</p>
<p>Test organisms randomly or impartially assigned to test vessels?</p>	<p>Yes</p>
<p>Biological observations made every 24 hours?</p>	<p>Yes</p>
<p><u>Water Parameter Measurements</u></p> <ol style="list-style-type: none"> 1. <u>Temperature</u> Measured constantly or, if water baths are used, every 6 hrs, may not vary $> 1^{\circ}C$. 2. <u>DO and pH</u> Measured at beginning of test and every 48 h in the high, medium, and low doses and in the control 	<p>Temperature was measured daily in all aquaria and continuously in the water bath. DO and pH were measured every 24 hours in each test chamber.</p>

Guideline Criteria	Reported Information
<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>	Yes, solutions collected and analyzed at test initiation and test termination (96 hours).

12. **REPORTED RESULTS:**A. **General Results**

Guideline Criteria	Reported Information
Quality assurance and GLP compliance statements were included in the report?	Yes
Recovery of Chemical	74-87%
<p>Control Mortality Not more than 10% control organisms may die or show abnormal behavior.</p>	0%
Raw data included?	Yes
Signs of toxicity (if any) were described?	Yes

Mortality

Concentration ($\mu\text{g/L}$)		Number of Fish	Cumulative Number Dead			
Nominal	Mean Measured		Hour of Study			
			24	48	72	96
Control	<10	20	0	0	0	0
Solvent Control	<10	20	0	0	0	0
54.8	48	20	0	0	0	0
108	88	20	0	0	0	0

Concentration ($\mu\text{g/L}$)		Number of Fish	Cumulative Number Dead			
Nominal	Mean Measured		Hour of Study			
			24	48	72	96
180	157	20	0	0	1	13
300	251	20	0	20	20	20
500	398	20	19	20	20	20

Other Significant Results: Signs of toxicity including, sounding, dark pigmentation, and lethargy were observed in fish at the 180 $\mu\text{g/L}$ nominal concentration. No signs of toxicity were observed at concentrations less than 180 $\mu\text{g/L}$.

B. Statistical Results

Method: Least squares linear regression versus \log_{10} dose.

96-hr LC_{50} : 142 $\mu\text{g/L}$ 95% C.I.: 88 - 250 $\mu\text{g/L}$

Probit Slope: 2.2 NOEC: 88 $\mu\text{g/L}$

13. VERIFICATION OF STATISTICAL RESULTS:

Method: Binomial method

96-hr LC_{50} : 142 ppb 95% C.I.: 88 - 251 ppb

Probit Slope: N/A NOEC: 88 ppb

14. REVIEWER'S COMMENTS: This study is scientifically sound and fulfills the guideline requirements for an acute toxicity test using bluegill sunfish. An LC_{50} value of 142 ppb would classify MITC technical as highly toxic to bluegill sunfish. The NOEC was determined to be 88 ppb. This study is classified as Core.

CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB. (PERCENT)
251	20	20	100	9.536742E-05
157	20	13	65	13.1588
88	20	0	0	9.536742E-05

THE BINOMIAL TEST SHOWS THAT 88 AND 251 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 141.7256

WHEN THERE ARE LESS THAN TWO CONCENTRATIONS AT WHICH THE PERCENT DEAD IS BETWEEN 0 AND 100, NEITHER THE MOVING AVERAGE NOR THE PROBIT METHOD CAN GIVE ANY STATISTICALLY SOUND RESULTS.
