12/19/83

MRID 00084749

Data Evaluation Record

1. Chemical: Molinate

2. Formulation: Technical (99% active)

3. Citation: Sleight, B. and K. Macek. July 1970. Acute toxicity of Ordram to bluegill, rainbow trout and fathead minnow. Prepared by Bionomics, Inc. Wareham, Mass. Submitted to Stauffer Chemical Co. EPA Accession No. 246020. Reference No. 3.

4. Reviewed by: Elizabeth E. Zucker
Wildlife Biologist
EEB/HED

5. Date Reviewed: December 19, 1983

6. Test Type: Fish acute toxicity studies
A. Test Species: Bluegill (Lepomis macrochirus)
Rainbow trout (Salmo gairdneri)
Fathead minnow (Pimephales promelas)

7. Reported Results:

Species	TL50 (95% CL) mg/l	No effect level (mg/l)
Bluegill	18.8 (16.7 - 21.1)	14.0
Trout	6.97 (5.21 - 9.34)	3.7
Fathead Minnow	26.0 (20.5 - 32.9)	21.0

8. Reviewer's Conclusions

These studies are scientifically sound, but may not be used to fulfill guideline requirements. This is because test water characteristics and monitoring procedures were not adequately reported. Also the number of fish utilized per dosage level was not indicated.

Material/Methods

Test Procedures

Fish were obtained from commercial hatcheries and acclimated to the test system at 24 hours prior to testing. Test specifics of note include:

Ave. fish size: Bluegill - 1.5 g and length 43 mm
Trout - 1.5 g and length 49 mm
Minnows - 0.8 g and length 42 mm
Vessels - 5 gallon glass
Diluent - 35 ppm as $CaCO_3$
pH 7.1
D.O ranged from 8.4 mg/l initially to 4.9 mg/l at the study's termination.

Statistical Analysis

The method of analysis was not reported.

Discussion/Results

Dosage (mg/l)	% Mortality of Bluegill Hour 24	96
0	0	0
37	30	100
28	20	100
24	0	100
21	0	70
18	0	20
14	0	0

Temperature averaged 18°C + 0.5.
Positive control (DDT) - 0.008 mg/l 96-hr LC_{50}

Dosage (mg/l)	Hours	% Mortality of Trout 24	96
Control		0	0
28.0		10	100
18.0		6	100
14.0		0	100
7.5		0	30
5.6		0	30
3.7		0	0

Temperature averaged 13°C (+ 0.5)
Positive Control (DDT) - 0.006 mg/l 96 hr. LC_{50}

Dosage (mg/l)	Hours	% Mortality of Minnows 24	96
0		0	0
42.0		40	100
37.0		20	100
32.0		10	100
38.0		10	60
21.0		0	0
16.0		0	0
10.0		0	0

Temperature averaged 18°C.
Positive control (DDT) - 96 hour LC_5 0.019 mg/l

In all studies, affected fish had bloated abdomens, became dark and lethargic, lost equilibrium and died.

Reviewer's Evaluation

A. Test Procedures

These studies were performed under conditions that generally complied with current guidelines with the following notable exceptions:

1. Diluent characteristcs and monitoring methods were not adequately described.

2. The number of fish tested per dosage level was not reported.

3. The statistical analysis method used to determine LC_{50}'s was not reported.

4. Recommended test temperature for trout is 12°C and 22°C for fathead minnow.

B. Statistical Analysis

Results were verified through utilization of Stephan's computer program. It was assumed that there were 10 animals per test level. Results of the probit method are acceptable.

C. Result/Discussion

96 hour LC_{50}'s

Trout - 7.62 ppm (95% C.L. 6.4 to 9.5 ppm)

Bluegill - 19.67 ppm (95% C.L. 18.22 to 20.94 ppm)

Minnow - 27.00 ppm (95% C.L. 21 to 32 ppm)

Positive control (DDT) LC_{50} values were comparable to those found in Johnson and Finely (1980).

D. Conclusions

1. Category: Supplemental (all 3 studies)

2. Rationale: Test water characteristics and monitoring procedures of D.O and pH were not adequately reported. Also the number of fish per dosage level was not indicated

3. Repairability: If the above information is provided and found acceptable, then these studies may be upgraded.

ZUCKER MOLINATE 96 HOUR LC50 TROUT

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CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB.(PERCENT)
28	10	10	100	.0976563
18	10	10	100	.0976563
14	10	10	100	.0976563
7.5	10	3	30	17.1875
5.6	10	3	30	17.1875
3.7	10	0	0	.0976563

THE BINOMIAL TEST SHOWS THAT 3.7 AND 14 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 8.64847

RESULTS CALCULATED USING THE MOVING AVERAGE METHOD

SPAN	G	LC50	95 PERCENT CONFIDENCE LIMITS	
4	.0767217	7.78744	6.54461	9.17038

RESULTS CALCULATED USING THE PROBIT METHOD

ITERATIONS	G	H	GOODNESS OF FIT PROBABILITY
6	.246295	1	.551493

SLOPE = 7.2659

95 PERCENT CONFIDENCE LIMITS = 3.65997 AND 10.8718

LC50 = 7.6201

95 PERCENT CONFIDENCE LIMITS = 6.37363 AND 9.50522

LC10 = 5.09532

95 PERCENT CONFIDENCE LIMITS = 3.39468 AND 6.133[illegible]

ZUCKER MOLINATE 96 HOUR LC50 BLUEGILL

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CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB.(PERCENT)
37	10	10	100	.0976563
28	10	10	100	.0976563
24	10	10	100	.0976563
21	10	7	70	17.1875
18	10	2	20	5.46875
14	10	0	0	.0976563

THE BINOMIAL TEST SHOWS THAT 14 AND 24 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 19.7694

RESULTS CALCULATED USING THE MOVING AVERAGE METHOD

SPAN	G	LC50	95 PERCENT CONFIDENCE LIMITS	
3	.12368	19.3774	18.0338	20.7752

RESULTS CALCULATED USING THE PROBIT METHOD

ITERATIONS	G	H	GOODNESS OF FIT PROBABILITY
11	.327002	1	.983925

SLOPE = 24.1122
95 PERCENT CONFIDENCE LIMITS = 10.3239 AND 37.9005

LC50 = 19.6741
95 PERCENT CONFIDENCE LIMITS = 18.225 AND 20.9392

LC10 = 17.4271
95 PERCENT CONFIDENCE LIMITS = 14.2657 AND 18.6556

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ZUCKER MOLINATE 96 HOUR LC50 FATHEAD MINNOW

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CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB.(PERCENT)
42	10	10	100	.0976563
37	10	10	100	.0976563
32	10	10	100	.0976563
28	10	6	60	37.6953
21	10	0	0	.0976563
16	10	0	0	.0976563
10	10	0	0	.0976563

THE BINOMIAL TEST SHOWS THAT 21 AND 32 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 26.997

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.

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