US EPA ARCHIVE DOCUMENT

122504

DATA EVALUATION RECORD

1. CHEMICAL: Avermectin B_1

2. FORMULATION: Technical Avermectin B_1 (91.43% purity)

3. CITATION: EG&G Bionomics. 1981. Acute toxicity of L-676, 863-00V50 to the water flea (*Daphnia magna*). Report # BW-81-6-938 Submitted to Merck Sharp & Dohme, Rahway, N.J. Accession No. 246358 in 618-EUP-10.

4. REVIEWED BY: Mary L. Gessner
   Fishery Biologist
   HED/EEB

5. DATE REVIEWED: 12/18/81

6. TEST TYPE: 48-hour acute toxicity to aquatic invertebrates
   Test species: *Daphnia magna*

7. REPORTED RESULTS: The 48-hour LC_{50} (and 95% C.I.) for the water flea exposed to L-676, 863-00V50 was 0.34 (0.28-0.41) ppb.

8. REVIEWER'S CONCLUSIONS: This study is scientifically sound and is adequate to fulfill the guideline requirement for acute toxicity testing with aquatic invertebrates. With an LC_{50} of 0.34 ppb, Avermectin B_1 (technical) is very highly toxic to aquatic invertebrates.

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Materials/Methods

Test Procedure

Daphnia were obtained from Laboratory stocks cultured at the testing laboratory. Culture water was reconstituted water with the following chemical characteristics: total hardness - 165± 15 mg/l, alkalinity - 120 ± 10 mg/l, pH - 7.9 - 8.3, temperature - 21 ± 1°C, D.O. > 5.4 mg/l and specific conductance- 400-600 umhos/cm. Toxicity testing was conducted in 2 l glass jars each of which contained 500 ml of test solution. The dilution water was reconsituted water and had the same quality as the culture water mentioned above. Test material was prepared in acetone. Two control jars were maintained, one dilution water and one dilution water and acetone. Test solutions were maintained at 21 ± 1°C, with no aeration. Fifteen daphnids (<24 hours old) were randomly distributed to each test concentration. Mortalities were recorded at 24 and 48 hours. Biological observations were made and recorded at 0, 24, and 48 hours.

Statistical Analysis

The computer program utilized estimated LC_{50} values using one of three statistical methods in the following order of preference: moving average angle, probit analysis, binomial probablity. In this case, the moving average angle method was utilized.

Discussion/Results

The 48-hour LC_{50} and 95% C.I. for the Daphnia exposed to L-676, 863-00V50, were estimated by the moving average angle method to be 0.34 (0.28-0.41) ug/l. The no effect concentration was determined to be <0.31 ug/l.

Reviewer Evaluation

A. Test Procedure

Test procedure generally followed EPA-recommended protocol. Both EPA and ASTM recommend using soft water for aquatic bioassays, except when the intent is to study the effects of water quality on results of toxicity tests. The water used in this study was harder than recommended. Deviations from recommended water quality parameters can elevate LC_{50} values, which should be taken into account when risk assessments are done using this data. Reported pH was 8.1 for all concentrations at 48 hr. and D.O. was 8.4 - 8.6 mg/l.

B. Statistical Analysis

Data analysis was verified by the Stephan's program with the following results:

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CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB. (PERCENT)
2 2	15	15	100	0.003051758
1.3	15	15	100	0.003051758
0.79	15	15	100	0.003051758
0.48	15	14	93.33333	0.04882813
0.31	15	5	33.33333	15.08789

THE BINOMIAL TEST SHOWS THAT 0 AND 0.48 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 LC_{50} FOR THIS SET OF DATA IS 0.3457717

RESULTS CALCULATED USING THE MOVING AVERAGE METHOD

SPAN	G	LC_{50}	95 PERCENT CONFIDENCE LIMITS	
1	0.3047857	0.3457717	0.2783842	0.390189

RESULTS CALCULATED USING THE PROBIT METHOD

ITERATIONS	G	H	GOODNESS OF FIT PROBABILITY
7	0.3597124	1	0.999983

SLOPE = 10.19518
95 PERCENT CONFIDENCE LIMITS = 4.080514 AND 16.30984

LC50 = 0.3417328
95 PERCENT CONFIDENCE LIMITS = 0.2853172 AND 0.3914333

LC10 = 0.256518
95 PERCENT CONFIDENCE LIMITS = 0.1516263 AND 0.3006829
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C. Discussion/Results

The reported LC_{50} value is acceptable.

D. Conclusions

1. Category: Core
2. Rationale: N/A