2-6-91

DATA EVALUATION RECORD

1. CHEMICAL: OCTHILINONE

2. TEST MATERIAL: Octhilinone technical 98.5% active ingredient Lot #3192, yellow liquid

3. STUDY TYPE: 96-hour Estuarine/Marine Crustacean Flow-Through Acute Toxicity Test.

4. CITATION: Sousa, J.V. 1990. Octhilinone - Acute Toxicity to Mysid Shrimp (Mysidopsis bahia) Under Flow-Through Conditions. Study conducted by Springborn Laboratories, Inc., Wareham, MA. Report NO. 90-7-3383. Submitted by Rohm and Haas Company, Spring House, PA. Accession No. 416080-08.

5. REVIEWED BY:

Greg Susanke, Biologist
Ecological Effects Branch
Environmental Fate and Effects Division (H7507 C)

Greg Susanke 11/27/90

6. APPROVED BY:

Doug Urban, Deputy Branch Chief
Ecological Effects Branch
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2/6/91

7. CONCLUSION:

This study appears scientifically sound and fulfills the Guideline requirements (72-3) for an acute 96-hour toxicity test for an estuarine/marine crustacean. The LC50 of octhilinone to mysid shrimp is 0.071 ppm, therefore it is considered very highly toxic. The NOEL is < 0.034 ppm.

8. MATERIALS AND METHODS:

A. Test Organisms:

Species- Mysid Shrimp (Mysidopsis bahia)

Supplier- Mysids used were from cultures maintained at Springborn Laboratories, Inc., Wareham, MA.

Acclimation period- Organisms were obtained from a viable culture. The mysids were fed brine shrimp during culture and during definitive testing.

B. Test System:

Source of dilution water- Dilution water was prepared by filtering seawater collected from the Cape Canal, Bourne, MA.

Water temperature- 24-25 °C

pH- 7.9-8.0

Dissolved oxygen- 6.2-6.8 mg/L (90-99% saturation)

Salinity- 31-32 °/oo

Total organic carbon- 1.4 - 6.0 mg/L

Test aquaria- There were 14 glass aquaria (39 x 20 x 25 cm). Each aquarium contained two mysid retention chambers. Water volume fluctuated between 6.6 and 11 L. Each aquarium was in a water bath to maintain test solution temperature.

Type of dilution system- Constant flow proportional diluter was used to provide 60% dilutions between each test concentration. Test solutions were not aerated.

Flow rate- 6.5 volume replacements/day for each aquarium

Biomass loading rate- < 3 mg per liter of solution per day

Photoperiod- 16 hours light and 8 hours dark, sudden transitions were avoided, fluorescent light intensity was 70-120 footcandles

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C. Test Design:

Range finding test- Mysid shrimp were exposed to octhilinone concentrations of 0.30, 0.18, 0.11, 0.065 and 0.039 mg a.i./L. There was 100% and 70% mortality in the two highest treatment levels. All surviving shrimp at 0.18 mg a.i./L were lethargic and exhibited erratic swimming behavior. No mortality or adverse effects were observed in the lowest three treatment levels.

Definitive test

Nominal concentrations- 0.30, 0.18, 0.11, 0.065, and 0.039 mg a.i./L

Controls- water control and solvent control which contained triethylene glycol at 0.092 ml/L (highest concentration used at any treatment level)

Number of test organisms- 10 organisms per aquarium plus replicate (20 per treatment level;5 per retention chamber), 140 organisms total (5 treatment levels; 2 controls)

Biological observations- Biological and test solution observations were made at test initiation and subsequent 24 hour intervals. Live brine shrimp nauplii were fed to the mysids twice daily in each of the retention chambers.

Water parameter measurements- DO, temperature, salinity, and pH were measured daily in each replicate of each treatment level and the controls.

9. REPORTED RESULTS:

Mean measured concentrations- 0.24, 0.14,0.086, 0.055, and 0.034 mg a.i./L; mean measured concentrations taken at 0 hour and 96 hours ranged from 78-87% of nominal (81% avg.)

Recovery of chemical- There was an average octhilinone recovery of 99% from nominal fortified samples.

Mortality and observations-
"Following 96 hours of exposure, 100% mortality was observed among shrimp exposed to the two highest mean measured treatment levels tested (0.24 and 0.14 mg a.i./L, respectively). During the same period, 45%, 15% and 20% mortality was observed in the remaining lower

treatment levels (0.086, 0.055 and 0.34 mg a.i./L, respectively). At test termination, all of the surviving shrimp in the 0.086 mg a.i./L and several of the surviving shrimp in the 0.055 and 0.034 mg a.i./L treatment levels were observed to exhibit sublethal effects (e.g. lethargy, darkened pigmentation, erratic swimming)." No mortalities occurred in the solvent control but one mortality occurred in the water control within the first 24 hours

10. STUDY AUTHORS'S CONCLUSIONS / QUALITY ASSURANCE MEASURES:

"Based on these data, it was established that the effects observed during this study were clearly concentration-dependant. The 96-hour LC50 for mysid shrimp exposed to Octhilinone was calculated by moving average angle analysis to be 0.071 mg a.i./L with a 95% confidence interval 0.055 - 0.088 mg a.i./L. Based on the observations of sublethal effects at the lowest concentration tested, the No Observed Effect Concentration (NOEC) for mysid shrimp exposed to Octhilinone was determined to be < 0.034 mg a.i./L. Utilizing US EPA (1985) criteria, Octhilinone would be classified as very highly toxic to mysid shrimp (Mysidopsis bahia)."

Quality Assurance and Good Laboratory Practice Regulation Statements were included in the report, indicating that the study was conducted in accordance with the FIFRA Good Laboratory Practice Standards set forth in 40 CFR Part 160.

11. REVIEWER'S DISCUSSION AND INTERPRETATION OF STUDY RESULTS:

A. Test Procedure: The test procedures were generally in accordance with protocols recommended by the Guidelines.

B. Statistical Analysis: The LC50 was calculated using the Ecological Effects Branch toxanol computer program which used the Moving Average Method.

C. Discussion/Results: The study appears to be scientifically valid. The 96-hour LC50 value, based upon mean measured octhilinone concentrations was estimated to be .071 ppm. The 95% confidence interval is .055-.088 ppm, and the NOEL is < 0.034 ppm. Octhilinone is classified as very highly toxic to estuarine/marine crustaceans.

D. Adequacy of the Study:

1. Classification: core

2. Rationale: N/A

3. Repairability: N/A

12. COMPLETION OF ONE-LINER FOR STUDY: yes

Greg Susanke octhilinone mysid shrimp LC50

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CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB.(PERCENT)
.24	20	20	100	9.536742E-05
.14	20	20	100	9.536742E-05
.086	20	9	45	41.19014
.055	20	3	15	.1288414
.034	20	4	20	.5908966

THE BINOMIAL TEST SHOWS THAT .055 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 8.881192E-02

RESULTS CALCULATED USING THE MOVING AVERAGE METHOD

SPAN	G	LC50	95 PERCENT CONFIDENCE LIMITS	
4	.1124799	7.111501E-02	5.505006E-02	8.790201E-02

RESULTS CALCULATED USING THE PROBIT METHOD

ITERATIONS	G	H	GOODNESS OF FIT PROBABILITY
5	1.126411	3.973548	7.659793E-03

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

SLOPE = 4.359431
95 PERCENT CONFIDENCE LIMITS =-.2673426 AND 8.986203

LC50 = 7.342385E-02
95 PERCENT CONFIDENCE LIMITS = 0 AND +INFINITY

LC10 = 3.754177E-02
95 PERCENT CONFIDENCE LIMITS = 0 AND 6.575817E-02

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