

US EPA ARCHIVE DOCUMENT

CASE GS0315

LINDANE

PM PM# 04/05/84

CHEM 009001

Lindane (gamma isomer of benzene hexac

BRANCH EEB DISC 40 TOPIC 05054547

FORMULATION 90 - FORMULATION NOT IDENTIFIED

FICHE/MASTER ID 00118185

CONTENT CAT 01

Eisler, R. (19??) Acute toxicities of insecticides to marine decapod crustaceans. Crustacea 15-16:302-310. (Also In unpublished submission received Apr 27, 1976 under 201-125; submitted by Shell Chemical Co., Washington, DC; CDL:224035-C)

SUBST. CLASS = S.

DIRECT RVW TIME = 2 (MH) START-DATE 4/22/85 END DATE 4/22/85

REVIEWED BY: Ann Stavola
TITLE: Aquatic Biologist
ORG: HED EEB
LOC/TEL: cm2-101 3577560

SIGNATURE: Ann Stavola

DATE: 4/22/85

APPROVED BY:
TITLE: Section Head, EEB
ORG:
LOC/TEL:

SIGNATURE: Henry J. Craven

DATE: 6/6/85

DATA EVALUATION RECORD

1. Chemical: Lindane, DDT, Endrin, Aldrin, Heptachlor, Methoxychlor, Dieldrin, Malathion, Methylparathion, Phosdrin, Delnav, DDVP.

2. Test Material: Technical, Percents ai not given.

3. Study/Action Type: Acute Aquatic Toxicity--Estuarine Species
Grass shrimp (Palaemonetes vulgaris)
Sand shrimp (Crangon septemspinosa)
Hermit crab (Pagurus longicarpus)

4. Study ID: Eisler, R. Acute Toxicities of Insecticides to Marine Decapod Crustaceans. Crustacea 15-16: 302-310. MRID:00118185.

5. Reviewed By: Ann Stavola
Aquatic Biologist
HED/EEB

Signature: *Ann Stavola*
Date: *June 5, 1985*

6. Approved By: Harry Craven
Supervisor Biologist
HED/EEB

Signature: *Harry T. Craven*
Date: *6/6/85*

7. Conclusions:

The study is not scientifically sound and cannot be used in a risk assessment. The study does not meet our guideline requirements for acute aquatic toxicity testing with estuarine species.

8. Recommendations:

The test solutions were aerated, but the concentrations were not monitored.

9. Background:

This study was submitted in the data call-in process for the Lindane Registration Standard.

10. Materials and Methods:

- A. Test Species: Grass shrimp (Palaemonetes vulgaris)-mean length between eye and uropod = 31 mm; total body wet weight = 0.47 g, sand shrimp (Crangon septemspinosus)-26 mm and 0.25 g, hermit crab (Pagurus longicarpus)-(those housed in shells of Nassa obsoleta)- mean carapace length = 3.5 mm, total body weight = 0.28 g. Specimens were collected by seine during summer of 1964 in Sandy Hook Bay, NJ. Acclimated for 10 to 14 days before tests.
- B. Doses: Acetone solvent used. Concentrations tested or percent ai of test materials not given.
- C. Study Design: All studies were conducted at 20 °C. The test water had a salinity of 24 0/00 and a pH of 8.0. The tests were conducted in 20 liter glass aquaria containing 19 liters of solution. The solutions were aerated. Each species was tested separately. The total biomass per jar was 2.24 g for hermit crab (n = 8), 4.70 g for grass shrimp (n = 10) and 1.68 to 2.40 g for sand shrimp (n = 7 to 10).

Grass shrimp were also used to test the effects of salinity, at 12, 18, 30, and 36 0/00, on the toxicities of DDT, endrin, heptachlor, DDVP and phosdrin. The tests were run for only 48 hours.

Grass shrimp were also used to test the effects of temperature, at 10, 15, 20, 25, and 30 °C, on the toxicities of DDT, endrin, heptachlor, DDVP and malathion. The tests were run for only 48 hours.

11. Reported Results:

Table I

Acute toxicities of 12 insecticides to the sand shrimp Crangon septemspinosus at 24 0/00 salinity and 20 °C. Minimum of five test concentrations used.

Insecticide	Total Number Animals	LC ₅₀ in Micrograms/Liter Active Ingredients at Various Time Intervals		
		24 hours	48 hours	96 hours
Organochloride				
Heptachlor	42	110	28	8
Aldrin	35	30	14	8
Dieldrin	35	68	10	7
Lindane	35	14	5	5
Methoxychlor	35	9	5	4
Endrin	60	2.8	1.8	1.7
p.p' DDT	50	3.0	1.0	0.6
Organophosphorous				
Delnav [®]	50	307	285	38
Malathion	50	246	210	33
Phosdrin [®]	50	13	13	11
DDVP	50	18	12	4
Methyl parathion	60	11	3	2

Table II

Acute toxicities of 12 insecticides to the grass shrimp Palaemonetes vulgaris at 24‰ salinity and 20 °C. Minimum five test concentrations used.

Insecticide	Total Number Animals	LC ₅₀ in Micrograms/Liter Active Ingredients at Various Time Intervals		
		24 hours	48 hours	96 hours
Organochloride				
Heptachlor	60	> 6,500	3,320	440
Dieldrin	60	> 107	55	50
Methoxychlor	60	16	16	12
Lindane	60	62	10	10
Aldrin	60	> 2,000	850	9
p.p' DDT	60	12.0	5.1	2.0
Endrin	60	10.3	4.3	1.8
Organophosphorous				
Delmav®	60	300	285	285
Malathion	80	131	90	82
Phosdrin®	60	131	79	69
DDVP	140	390	300	15
Methyl parathion	60	15	10	5

Table III

Acute toxicities of 12 insecticides to the hermit crab Pagurus lonicarpus at 24 0/00 salinity and 20 °C. Minimum of five test concentrations used.

Insecticide	Total Number Animals	LC ₅₀ in Micrograms/Liter Active Ingredients at Various Time Intervals		
		24 hours	48 hours	96 hours
Organochloride				
Heptachlor	48	470	100	33
Aldrin	48	300	166	33
Dieldrin	40	70	51	18
Endrin	36	27	18	12
Methoxychlor	40	9	7	7
p,p' DDT	40	7	6	6
Lindane	40	38	11	5
Organophosphorous				
Malathion	40	118	100	83
Delnav [®]	40	300	90	82
DDVP	48	130	52	45
Phosdrin [®]	40	40	33	28
Methyl parathion	40	23	7	7

The 96-hr LC₅₀ values indicate that sand shrimp are the most sensitive species to all 12 insecticides.

Shrimp are more resistant to phosdrin and DDVP at salinities < 18 0/00 than at salinities > 24 0/00. Shrimp exposed to DDT, endrin, and heptachlor are most susceptible at salinities < 12 0/00.

Pesticide-induced mortality in shrimp was directly related to the experimental temperature.

12. Study Author's Conclusions/QA Measures:

Refer to above three tables for 96-hr LC₅₀ values.

For organochlorine pesticides these values fall within the range for various freshwater groups and for several species of marine teleosts. For most organophosphorous pesticides crustaceans are more sensitive than marine fishes.

No QA statement.

13. Reviewer's Evaluation:

A. Test Procedures:

All the procedures are basically acceptable except that the percents active ingredient are not given and the solutions were aerated during the tests.

B. Statistical Analysis:

Without the raw data the reported LC₅₀ values could not be verified.

C. Discussion/Results:

The solutions cannot be aerated unless the concentrations are monitored. Therefore, the reported results are not valid.

D. Adequacy of the Study:

1. Classification: Invalid

2. Rationale: Aeration of the test solution and failure to include percents active ingredient and raw data.

3. Repairability: None