

US EPA ARCHIVE DOCUMENT

DATA EVALUATION RECORD

- 1. **CHEMICAL:** Octhilinone.
Shaughnessey No. 099901.
- 2. **TEST MATERIAL:** Octhilinone; Lot No. 3192; 98.5% active ingredient; a yellow liquid.
- 3. **STUDY TYPE:** Freshwater Invertebrate Life-Cycle Test.
Species Tested: *Daphnia magna*
- 4. **CITATION:** McNamara, P.C. 1991. Octhilinone - The Chronic Toxicity to *Daphnia magna* Under Flow-Through Conditions. Report No. 90-09-3473. Study conducted by Springborn Laboratories, Inc., Wareham, MA. Submitted by Rohm and Haas Company, Spring House, Pennsylvania. EPA MRID No. 419094-01.

5. **REVIEWED BY:**

Rosemary Graham Mora, M.S.
Associate Scientist
KBN Engineering and
Applied Sciences, Inc.

Signature:

Rosemary Graham Mora

Date:

12/11/91 *Arthur J. Reed*
EEB/EFED
2/13/92

6. **APPROVED BY:**

Pim Kosalwat, Ph.D.
Senior Scientist
KBN Engineering and
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Signature:

P. Kosalwat

Date:

12/11/91

Henry T. Craven, M.S.
Supervisor, EEB/EFED
USEPA

Signature:

Arthur J. Reed
2/14/92

Date:

7. **CONCLUSIONS:** This study is scientifically sound, but does not fulfill the guideline requirements for a daphnid life-cycle test. An MATC could not be determined from this chronic study. In addition, raw data for reproduction and water quality parameters were not submitted with the report. The NOEC was determined to be 74 µg a.i./l mean measured concentration, the highest test level.

8. **RECOMMENDATIONS:** N/A.

9. **BACKGROUND:**

10. **DISCUSSION OF INDIVIDUAL TESTS:** N/A.



11. MATERIALS AND METHODS:

- A. Test Animals:** *Daphnia magna* (≤ 24 hours old) were obtained from populations cultured at the testing facility. The cultures were maintained in a waterbath at $20 \pm 2^\circ\text{C}$. The culture water was fortified well water filtered through a resin column. The daphnids were fed a combination of green alga (*Ankistrodesmus falcatus*) and a trout food suspension daily.
- B. Test System:** The flow-through test system was an intermittent flow proportional diluter with a 50% dilution factor. The diluter delivered test solutions to each vessel at an average rate of approximately 6 volume replacements per day. The 90% replacement time was approximately 9 hours. The diluter was allowed to equilibrate for 7 days before test initiation.

Test vessels were 1.6-l glass battery jars. Each jar drained through two 2-cm holes which were covered with a Nitex[®] 40-mesh screen and located on the upper portion of the test vessel. The volume of test solutions was maintained at 1.4 l.

Sixteen hours of light at an intensity of 80-160 footcandles were provided each day. Test temperature was maintained at approximately $20 \pm 2^\circ\text{C}$ by an air-temperature controlled room.

The dilution water was prepared with a fortified well water which was filtered through a resin column and a carbon filter to remove potential organic contaminants. Total hardness and alkalinity ranges of the dilution water were 160-180 and 110-130 mg/l as CaCO_3 , respectively. The pH ranged from 7.9 to 8.3 and the specific conductivity ranged from 400 to 600 $\mu\text{mhos/cm}$.

A diluter stock solution (6.0 mg a.i./ml) was prepared by dissolving 0.152 g (0.150 g as active ingredient) of test material with triethylene glycol to a volume of 25 ml. This solution was inverted several times prior to use. The diluter system delivered 0.0066 ml of this stock solution and 395 ml of dilution water to the diluter mixing chamber. This mixture provided the highest treatment level (100 μg a.i./l) and subsequent 50% dilutions of this concentration provided the remaining test levels (6.3-50 μg a.i./l).

- C. **Dosage:** Twenty-one-day, life-cycle, flow-through test. Nominal test concentrations selected based on results of a preliminary study were 6.3, 13, 25, 50, and 100 μg a.i./l. In addition, a solvent control (0.017 ml triethylene glycol/l) and a dilution water control were included.
- D. **Design:** Ten daphnids were impartially selected and distributed to each of four replicate exposure vessels (i.e., 40 daphnids/concentration) of the Octhiline concentrations and the controls.

The daphnids were fed 2.0 ml of trout food (5 mg/ml), 3.0 ml of algal suspension (*Ankistrodesmus falcatus*; 4×10^7 cells/ml), and 0.5 ml of Selco® (a commercial mixture of proteins and fatty acids, 0.6 mg/ml) three times daily on weekdays and twice daily on weekends and holidays. Test vessels were brushed to remove algal growth and the solutions filtered through a fine-mesh net at least twice a week.

Adult survival was determined on days 1, 2, 4, 7, 14, and 21. Offspring production was noted on days 1, 2, 4, and three times per week from day 7 through 21. The offspring were discarded after counting. At test termination, body length (from helmet to base of the spine) and dry weight of all surviving adults were recorded.

Dissolved oxygen (DO) concentration was measured every weekday in one replicate vessel of each test concentration and the controls. Temperature was measured daily in one replicate vessel of each treatment and the controls and continuously throughout the test period in one replicate vessel of the 6.3 μg a.i./l nominal concentration. Total hardness and alkalinity as CaCO_3 , specific conductivity, and pH were measured weekly in one replicate vessel of each treatment and the controls. The DO concentration, pH, and temperature were also measured once a week in all replicate vessels of each treatment group and the controls.

Water samples were collected from the midpoint of two of the four replicate vessels of all groups on test days 0, 7, 14, and 21, and analyzed for Octhiline using high performance liquid chromatographic (HPLC) procedure.

E. **Statistics:** The responses of the dilution water control and solvent control animals for each endpoint were compared using a one-way analysis of variance (ANOVA). If no significant difference was demonstrated, the treatment responses were compared to those of the pooled control (solvent and dilution water control data). If a significant difference did exist, the responses of the treatment groups were compared to those of the solvent control.

The survival, reproduction, and growth data were normally distributed with homogeneous variance (Chi Square Goodness of Fit and Bartlett's tests); therefore, ANOVA followed by Williams' or Dunnett's test was used to assess exposure-level effects of these parameters. Analyses were performed using the mean organism response in each replicate vessel. Survival data were arcsine square-root transformed before the analysis.

EC₅₀ values were determined using the computer program by Stephan (1977, 1982) or empirically.

12. **REPORTED RESULTS:** "No undissolved test material was observed in the diluter system or exposure solution vessels during the chronic study."

The mean measured concentrations established in the test solutions were 3.2, 7.9, 17, 40, and 74 $\mu\text{g a.i./l}$, with a coefficient of variation averaging 13% (Table 2, attached).

A summary of the biological results are presented in Tables 4, 6, 8, and 9 (attached). The survival and reproductive rates for control groups exceeded the minimum EPA guideline requirements of 70% survival and 40 offspring/female. Survival in all test concentrations was statistically similar when compared to that of the pooled control.

The cumulative number of offspring produced per female in the four highest test solutions (7.9-74 $\mu\text{g a.i./l}$ mean measured concentrations) was statistically similar to that of the solvent control. The number of young produced per female in the lowest test concentration (3.2 $\mu\text{g a.i./l}$ mean measured concentration) was significantly less than that of the solvent control. Mean total body length at test termination of the four highest test concentrations were similar to that of the pooled control. The mean length of daphnids exposed to the lowest concentration (3.2 $\mu\text{g a.i./l}$ mean measured concentration) was significantly less than

that of the pooled control. Since daphnids exposed to higher concentrations demonstrated no effects, effects demonstrated by the lowest test concentration were not considered to be adverse effects caused by the toxicity of Octhilinone. Mean dry weight of daphnids at all concentrations were statistically similar to that of the solvent control. The 21-day EC₅₀ value for immobilization was >74 µg a.i./l.

During the study, pH was 8.0-8.4; mean total hardness and alkalinity were 170 and 110 mg/l as CaCO₃, respectively. Specific conductivity was 500 µmhos/cm; the mean DO concentration was 7.8-7.9 mg/l. The average daily temperature was 20 ±0.6°C and the mean continuous temperature was 17-22°C.

13. STUDY AUTHOR'S CONCLUSIONS/QUALITY ASSURANCE MEASURES:

"Based on the absence of a biological effect on any of the endpoints evaluated during this chronic exposure (survival, reproduction, length and weight), the No-Observed Effect Concentration (NOEC) for this study was determined to be 74 µg a.i./l, the highest mean measured concentration tested. Exposure to higher concentrations (i.e., 1000-120 µg a.i./l) of Octhilinone (SLI Report #90-6-3350, Appendix VI) adversely affected daphnid survival within 48 hours. During this acute test, *D. magna* were exposed, under flow-through conditions, to five concentrations of Octhilinone, a dilution water control and a solvent control...Following 48-hours, daphnid survival was significantly affected (p=0.05) by exposure to 340 µg a.i./l Octhilinone (Williams' Test). Based on the adverse effect on organism survival, 340 µg a.i./l was established as the LOEC for Octhilinone and daphnids. Analyses of these data determined the Maximum Acceptable Toxicant Concentration of Octhilinone to *D. magna* to be <340 µg a.i./l and >74 µg a.i./l (Geometric MATC=160 µg a.i./l)...Utilizing these data, Octhilinone is not considered chronically toxic to daphnids at concentrations significantly lower than the acute effect levels."

A GLP Compliance Statement was included in the report indicating that the data and report prepared for this study were produced and compiled in accordance with all pertinent EPA Good Laboratory Practice Regulations except in the case of stability, characterization and verification of test substance identity. This statement was signed by the Study Director and representatives of the test sponsor.

A Quality Assurance Statement was included and signed by a representative of the Quality Assurance Unit of the performing laboratory.

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

- A. Test Procedure:** An SEP for *Daphnia* chronic flow-through studies is not available at this time, thus ASTM recommended procedures were used in this data validation process. The test procedure was in accordance with ASTM, except for the following deviations:

Raw data for reproduction and water quality parameters were not presented in the report. Data for reproduction were presented as number of offspring per female at each observation interval. Therefore, the reviewer could not analyze the reproduction data as number of young produced per female reproduction day.

Some measured concentrations of test material in test chambers at all test levels were less than 30% lower than nominal concentrations.

The values presented in Tables 8 and 9 (attached) for the dilution water control and the solvent control are presented in the raw data as the values for the solvent control and dilution water control (raw data, attached), respectively. This is a discrepancy in the report.

The author did not indicate the selection criteria (i.e., brood number) for organisms used in the test.

A 15- to 30-minute dawn and dusk simulation period was not employed in this study.

Test chambers were 1.6 l beakers containing 1.4 l of test solutions; 2-l beakers containing 1.5 l of test solution are recommended.

- B. Statistical Analysis:** The survival data (arcsine square-root transformed) were analyzed using a one-way ANOVA and Dunnett's comparison test. Survival was statistically similar at all test levels and the dilution water control when compared to that of the solvent control (printout, attached).

A two-way ANOVA with Bonferroni's comparison test was performed on each growth endpoint. Analysis of weight

data demonstrated that all test concentrations were statistically similar to that of the solvent control. The weight data for the solvent control was significantly reduced when compared with that of the dilution water control. The length of daphnids exposed to the lowest concentration (3.2 $\mu\text{g a.i./l}$) was significantly less than that of the solvent control. Analysis of length data demonstrated that the solvent control was significantly less than that of the dilution water control which is different from the results presented by the author. This difference may be explained by the difference in experimental units used in the analyses. The author reported the length and weight data as being individually measured; however, the data from these parameters were statistically analyzed using the mean value of each replicate. When mean values are used, the variation that exists within each replicate is ignored.

The author evaluated the effects of the test material on reproduction using average number of young produced per female. Since reproduction was observed every 2-3 days (not daily), the appropriate endpoint should have been number of young per female reproduction day, rather than number of young per female. Since raw data were not submitted with the report, the reviewer could not perform statistical analysis on this parameter.

- C. Discussion/Results: The purpose of a life-cycle test is to determine the chronic effects of the test material on the exposed organisms. Accurate LOEC and NOEC values were not determined by this chronic study. The author used survival results of a 48-hour acute supplemental study and those of this chronic study to determine the LOEC and NOEC, respectively, of Othilinine for *Daphnia magna*.

Raw data for reproduction and water quality parameters were not submitted by the registrant. All raw data for each biological endpoint and for physical and chemical parameters measured during the test must always be submitted.

This study is scientifically sound, but does not fulfill the guideline requirements for a daphnid life-cycle test. The NOEC was 74 $\mu\text{g a.i./l}$ mean measured concentration, the highest test level. The MATC of Othilinine for *Daphnia magna* could not be determined from this test.

D. Adequacy of the Study:

(1) **Classification:** Supplemental.

(2) **Rationale:** 1) An MATC could not be determined from this chronic study. 2) Raw data for reproduction and water quality were not submitted with the report. 3) Statistical analysis of reproduction could not be verified due to the lack of raw data.

(3) **Repairability:** No.

15. **COMPLETION OF ONE-LINER:** Yes, December 9, 1991.

KATHON

SH # 099901

Page ___ is not included in this copy.

Pages 9 through 15 are not included.

The material not included contains the following type of information:

- Identity of product inert ingredients.
 - Identity of product impurities.
 - Description of the product manufacturing process.
 - Description of quality control procedures.
 - Identity of the source of product ingredients.
 - Sales or other commercial/financial information.
 - A draft product label.
 - The product confidential statement of formula.
 - Information about a pending registration action.
 - FIFRA registration data.
 - The document is a duplicate of page(s) _____.
 - The document is not responsive to the request.
-

The information not included is generally considered confidential by product registrants. If you have any questions, please contact the individual who prepared the response to your request.

TITLE: Octhilinone: Survival of Exposed Daphnids

FILE: b:41909401.sur

TRANSFORM: ARC SINE(SQUARE ROOT(Y))

NUMBER OF GROUPS: 7

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	Solvent Control	1	1.0000	1.4120
1	Solvent Control	2	1.0000	1.4120
1	Solvent Control	3	0.8000	1.1071
1	Solvent Control	4	1.0000	1.4120
2	Control	1	1.0000	1.4120
2	Control	2	0.8000	1.1071
2	Control	3	0.9000	1.2490
2	Control	4	0.8000	1.1071
3	3.2 ug a.i./l	1	0.9000	1.2490
3	3.2 ug a.i./l	2	0.9000	1.2490
3	3.2 ug a.i./l	3	0.9000	1.2490
3	3.2 ug a.i./l	4	0.8000	1.1071
4	7.9 ug a.i./l	1	1.0000	1.4120
4	7.9 ug a.i./l	2	0.7000	0.9912
4	7.9 ug a.i./l	3	0.9000	1.2490
4	7.9 ug a.i./l	4	0.9000	1.2490
5	17 ug a.i./l	1	0.8000	1.1071
5	17 ug a.i./l	2	0.8000	1.1071
5	17 ug a.i./l	3	0.9000	1.2490
5	17 ug a.i./l	4	1.0000	1.4120
6	40 ug a.i./l	1	0.9000	1.2490
6	40 ug a.i./l	2	1.0000	1.4120
6	40 ug a.i./l	3	1.0000	1.4120
6	40 ug a.i./l	4	0.9000	1.2490
7	74 ug a.i./l	1	0.9000	1.2490
7	74 ug a.i./l	2	1.0000	1.4120
7	74 ug a.i./l	3	1.0000	1.4120
7	74 ug a.i./l	4	0.9000	1.2490

OCTHILINONE: SURVIVAL OF EXPOSED DAPHNIDS

Analysis of Variance

File; S419094

Date: 12-05-1991

FILTER: None

N's, means and standard deviations based on dependent variable: SURVIVAL

* Indicates statistics are collapsed over this factor

DATA ARE
ARCSINE SQRT
TRANSFORMED

Factors:	<u>LEVEL</u>	<u>CONCENTRATION</u>	N	Mean	S.D.
	*		28	1.2676	0.1281
	1	SOLVENT CONTROL	4	1.3358	0.1524
	2	CONTROL	4	1.2188	0.1451
	3	3.2 µg a.i./l	4	1.2135	0.0709
	4	7.9 µg a.i./l	4	1.2253	0.1740
	5	17 µg a.i./l	4	1.2188	0.1451
	6	40 µg a.i./l	4	1.3305	0.0941
	7	74 µg a.i./l	4	1.3305	0.0941

Fmax for testing homogeneity of between subjects variances: 6.01
Number of variances= 7 df per variance= 3.

Source	df	SS (H)	MSS	F	P
Between Subjects	27	0.4433			
C (CONC)	6	0.0881	0.0147	0.869	0.5384
Subj w Groups	21	0.3551	0.0169		

Post-hoc tests for factor C (CONC)

Level	Mean	Level	Mean
1	1.336	6	1.331
2	1.219	7	1.331
3	1.214		
4	1.225		
5	1.219		

Comparison	Bon- ferroni	Dunnett
1 > 2		
1 > 3		
1 > 4		
1 > 5		
1 > 6		
1 > 7		
2 > 3		N.A.
2 < 4		N.A.
2 < 5		N.A.
2 < 6		N.A.
2 < 7		N.A.
3 < 4		N.A.
3 < 5		N.A.
3 < 6		N.A.
3 < 7		N.A.
4 > 5		N.A.
4 < 6		N.A.
4 < 7		N.A.
5 < 6		N.A.
5 < 7		N.A.
6 = 7		N.A.

For Dunnett's test only the P-values .05 and .01 are possible and only for comparisons with the control mean (level 1).

OCTHILINONE: GROWTH DATA OF EXPOSED DAPHNIDS

Data listing

File: g419094

Date: 12-06-1991

Obs.	CONC	REP	LENGTH	WEIGHT	<u>LEVEL</u>
1	1	1	5.1	1.60	SOLVENT CONTROL
2	1	1	5.3	1.44	
3	1	1	5.3	1.50	
4	1	1	5.0	0.93	
5	1	1	4.9	1.14	
6	1	1	5.0	1.22	
7	1	1	5.1	1.11	
8	1	1	5.2	1.42	
9	1	1	4.9	1.01	
10	1	1	5.1	1.51	
11	1	2	5.0	1.42	
12	1	2	5.0	1.23	
13	1	2	5.1	1.41	
14	1	2	5.1	1.41	
15	1	2	4.8	1.43	
16	1	2	5.0	1.25	
17	1	2	5.1	1.24	
18	1	2	5.2	1.39	
19	1	2	4.7	0.90	
20	1	2	4.9	1.46	
21	1	3	4.9	1.30	
22	1	3	5.0	1.07	
23	1	3	5.1	1.34	
24	1	3	5.1	1.44	
25	1	3	5.4	1.43	
26	1	3	4.9	1.24	
27	1	3	4.9	0.97	
28	1	3	4.7	1.46	
29	1	4	5.0	1.17	
30	1	4	4.8	1.49	
31	1	4	5.1	1.29	
32	1	4	5.0	1.54	
33	1	4	5.2	1.76	
34	1	4	5.1	1.23	
35	1	4	4.9	1.24	
36	1	4	5.1	1.22	
37	1	4	5.0	1.36	
38	1	4	5.1	1.15	
39	2	1	5.3	1.70	CONTROL
40	2	1	5.5	1.66	
41	2	1	5.3	1.34	
42	2	1	5.2	1.66	
43	2	1	5.4	1.68	
44	2	1	5.1	1.65	
45	2	1	5.3	1.77	
46	2	1	5.3	1.25	
47	2	1	5.2	1.67	
48	2	1	5.2	1.42	
49	2	2	5.5	1.79	
50	2	2	5.0	1.54	
51	2	2	5.2	1.76	
52	2	2	5.0	1.17	
53	2	2	5.0	1.56	
54	2	2	5.3	1.71	
55	2	2	5.1	1.59	

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Data listing

File: g419094

Date: 12-06-1991

Obs.	CONC	REP	LENGTH	WEIGHT
56	2	2	5.2	1.60
57	2	3	5.3	1.50
58	2	3	5.0	1.38
59	2	3	4.9	1.53
60	2	3	5.0	1.50
61	2	3	5.1	1.42
62	2	3	5.2	1.77
63	2	3	5.1	1.54
64	2	3	5.1	1.10
65	2	3	4.7	0.85
66	2	4	5.2	1.34
67	2	4	5.2	1.04
68	2	4	5.1	1.51
69	2	4	5.1	1.30
70	2	4	5.2	1.74
71	2	4	5.4	1.61
72	2	4	5.0	1.43
73	2	4	4.8	1.32
74	3	1	4.8	1.53
75	3	1	5.1	1.61
76	3	1	5.0	1.43
77	3	1	5.0	1.57
78	3	1	5.0	1.11
79	3	1	5.0	1.59
80	3	1	5.1	1.45
81	3	1	5.1	1.31
82	3	1	5.1	1.61
83	3	2	5.0	1.44
84	3	2	5.1	1.46
85	3	2	4.6	1.13
86	3	2	4.9	1.29
87	3	2	5.0	1.48
88	3	2	4.8	1.44
89	3	2	4.5	0.84
90	3	2	4.9	1.55
91	3	2	5.0	1.54
92	3	3	4.8	1.05
93	3	3	4.9	1.12
94	3	3	4.7	1.24
95	3	3	4.5	1.02
96	3	3	4.9	1.32
97	3	3	4.6	1.39
98	3	3	4.8	1.42
99	3	3	5.0	1.29
100	3	3	4.8	1.34
101	3	4	4.6	1.21
102	3	4	4.5	1.29
103	3	4	4.4	1.04
104	3	4	4.5	1.14
105	3	4	4.6	1.13
106	3	4	4.3	1.11
107	3	4	4.6	1.17
108	3	4	4.6	1.14
109	4	1	5.0	1.40
110	4	1	5.1	1.47

LEVEL
CONTROL

3.2 µg a.i./l

7.9 µg a.i./l

Data listing

File: g419094

Date: 12-06-1991

Obs.	CONC	REP	LENGTH	WEIGHT
111	4	1	4.9	0.84
112	4	1	5.0	1.47
113	4	1	5.1	1.50
114	4	1	5.1	1.34
115	4	1	5.1	1.37
116	4	1	5.2	1.37
117	4	1	4.8	1.66
118	4	1	5.1	1.36
119	4	2	4.8	1.24
120	4	2	5.0	1.25
121	4	2	5.0	1.59
122	4	2	5.1	1.47
123	4	2	5.2	1.57
124	4	2	5.1	1.30
125	4	2	5.4	1.67
126	4	3	5.0	1.50
127	4	3	5.0	1.50
128	4	3	5.2	1.54
129	4	3	4.9	1.35
130	4	3	5.0	1.25
131	4	3	5.3	1.64
132	4	3	5.2	1.65
133	4	3	5.3	1.65
134	4	3	4.6	1.42
135	4	4	4.9	1.25
136	4	4	5.3	1.33
137	4	4	5.1	1.36
138	4	4	4.9	1.39
139	4	4	5.2	1.51
140	4	4	5.1	1.41
141	4	4	5.0	1.37
142	4	4	5.1	1.41
143	4	4	5.1	1.51
144	5	1	5.0	1.39
145	5	1	5.0	1.44
146	5	1	5.1	1.57
147	5	1	5.2	1.45
148	5	1	5.1	1.33
149	5	1	5.1	1.51
150	5	1	5.1	1.31
151	5	1	5.1	1.40
152	5	2	5.2	1.41
153	5	2	5.2	1.30
154	5	2	5.2	1.20
155	5	2	5.1	0.57
156	5	2	4.9	1.39
157	5	2	5.0	1.00
158	5	2	5.1	1.19
159	5	2	5.2	1.30
160	5	3	5.0	1.08
161	5	3	4.7	1.44
162	5	3	4.8	1.28
163	5	3	5.0	1.39
164	5	3	5.1	1.36
165	5	3	5.3	1.62

LEVEL
7.9 µg a.i./l

17 µg a.i./l

Data listing

File: g419094

Date: 12-06-1991

Obs.	CONC	REP	LENGTH	WEIGHT
166	5	3	4.7	1.48
167	5	3	4.7	0.96
168	5	3	5.1	1.12
169	5	4	5.2	1.46
170	5	4	4.9	1.19
171	5	4	5.0	1.54
172	5	4	5.0	1.53
173	5	4	4.9	1.54
174	5	4	4.9	1.37
175	5	4	5.1	1.62
176	5	4	4.8	1.44
177	5	4	5.2	1.41
178	5	4	4.9	1.52
179	6	1	5.2	1.24
180	6	1	5.2	1.63
181	6	1	5.0	1.45
182	6	1	5.0	1.46
183	6	1	5.1	1.59
184	6	1	4.8	1.42
185	6	1	5.2	1.63
186	6	1	5.0	1.57
187	6	1	4.8	1.51
188	6	2	4.9	1.47
189	6	2	5.1	1.48
190	6	2	5.1	1.60
191	6	2	5.0	1.46
192	6	2	5.0	1.13
193	6	2	5.0	1.56
194	6	2	5.1	1.66
195	6	2	5.1	1.43
196	6	2	5.0	1.44
197	6	2	4.7	1.37
198	6	3	4.9	1.50
199	6	3	4.9	1.59
200	6	3	5.1	1.43
201	6	3	5.0	1.41
202	6	3	5.0	1.54
203	6	3	4.7	1.22
204	6	3	5.1	1.42
205	6	3	5.0	1.60
206	6	3	5.0	1.34
207	6	3	4.9	1.28
208	6	4	4.9	1.33
209	6	4	4.9	1.42
210	6	4	4.9	1.37
211	6	4	5.2	1.45
212	6	4	5.0	1.34
213	6	4	4.8	1.41
214	6	4	4.8	1.38
215	6	4	4.7	1.35
216	6	4	5.0	1.38
217	7	1	5.3	1.53
218	7	1	4.9	1.22
219	7	1	5.2	1.41
220	7	1	5.4	1.58

LEVEL
17 µg a.i./l

40 µg a.i./l

74 µg a.i./l

Data listing

File: g419094

Date: 12-06-1991

Obs.	CONC	REP	LENGTH	WEIGHT
221	7	1	5.0	1.20
222	7	1	5.0	1.37
223	7	1	4.9	1.40
224	7	1	5.0	1.33
225	7	1	5.3	1.34
226	7	2	5.2	1.44
227	7	2	5.2	1.51
228	7	2	4.9	1.35
229	7	2	5.1	1.37
230	7	2	5.0	1.02
231	7	2	5.2	1.55
232	7	2	5.2	1.52
233	7	2	5.0	1.56
234	7	2	5.2	1.45
235	7	2	5.0	1.42
236	7	3	5.1	1.28
237	7	3	4.9	0.97
238	7	3	5.1	1.43
239	7	3	5.1	1.27
240	7	3	5.0	1.66
241	7	3	5.1	1.45
242	7	3	5.1	1.44
243	7	3	5.0	1.82
244	7	3	5.1	1.22
245	7	3	4.8	1.31
246	7	4	5.4	1.37
247	7	4	5.2	1.39
248	7	4	5.2	1.31
249	7	4	5.1	1.51
250	7	4	5.2	1.27
251	7	4	5.0	1.47
252	7	4	5.2	1.51
253	7	4	5.0	1.37
254	7	4	5.1	1.56

LEVEL
74 µg a.i./l

22

OCTHILINONE: GROWTH OF EXPOSED DAPHNIDS

Analysis of Variance

File: G419094

Date: 12-06-1991

N's, means and standard deviations based on dependent variable: LENGTH

* Indicates statistics are collapsed over this factor

Factors:	LEVEL		N	Mean	S.D.
	C	R			
	*	*	254	5.0220	0.1948
	1	*	38	5.0289	0.1541
	2	*	35	5.1571	0.1770
	3	*	35	4.8029	0.2320
	4	*	35	5.0629	0.1610
	5	*	35	5.0257	0.1578
	6	*	38	4.9763	0.1384
	7	*	38	5.0974	0.1385
	*	1	65	5.0969	0.1520
	*	2	62	5.0403	0.1732
	*	3	64	4.9719	0.1890
	*	4	63	4.9778	0.2331
	1	1	10	5.0900	0.1449
	1	2	10	4.9900	0.1524
	1	3	8	5.0000	0.2070
	1	4	10	5.0300	0.1160
	2	1	10	5.2800	0.1135
	2	2	8	5.1625	0.1768
	2	3	9	5.0444	0.1740
	2	4	8	5.1250	0.1753
	3	1	9	5.0222	0.0972
	3	2	9	4.8667	0.2000
	3	3	9	4.7778	0.1563
	3	4	8	4.5125	0.1126
	4	1	10	5.0400	0.1174
	4	2	7	5.0857	0.1864
	4	3	9	5.0556	0.2242
	4	4	9	5.0778	0.1302
	5	1	8	5.0875	0.0641
	5	2	8	5.1125	0.1126
	5	3	9	4.9333	0.2179
	5	4	10	4.9900	0.1370
	6	1	9	5.0333	0.1581
	6	2	10	5.0000	0.1247
	6	3	10	4.9600	0.1174
	6	4	9	4.9111	0.1453
	7	1	9	5.1111	0.1900
	7	2	10	5.1000	0.1155
	7	3	10	5.0300	0.1059
	7	4	9	5.1556	0.1236

Fmax for testing homogeneity of between subjects variances: 12.24
 Number of variances= 28 df per variance= 8.

Source	df	SS (H)	MSS	F	P
Between Subjects	253	9.5965			
C (CONC)	6	2.6760	0.4460	19.792	0.0000
R (REP)	3	0.6625	0.2208	9.800	0.0000
CR	18	1.1654	0.0647	2.873	0.0001
Subj w Groups	226	5.0927	0.0225		

Post-hoc tests for factor C (CONC)

LENGTH

Level	Mean	Level	Mean
1	5.029	6	4.976
2	5.157	7	5.097
3	4.803		
4	5.063		
5	5.026		

Comparison	Bon- ferroni
1 < 2	0.0073
1 > 3	0.0000
1 < 4	
1 > 5	
1 > 6	
1 < 7	
2 > 3	0.0000
2 > 4	
2 > 5	0.0068
2 > 6	0.0000
2 > 7	
3 < 4	0.0000
3 < 5	0.0000
3 < 6	0.0000
3 < 7	0.0000
4 > 5	
4 > 6	
4 < 7	
5 > 6	
5 < 7	
6 < 7	0.0115

Post-hoc tests for factor R (REP)

Level	Mean
1	5.097
2	5.040
3	4.972
4	4.978

Comparison	Bon- ferroni
1 > 2	
1 > 3	0.0000
1 > 4	0.0000
2 > 3	
2 > 4	
3 < 4	

N's, means and standard deviations based on dependent variable: WEIGHT

* Indicates statistics are collapsed over this factor

Factors:	<u>LEVEL</u>	<u>CONCENTRATION</u>	N	Mean	S.D.
* *			254	1.3897	0.1931
1 *	SOLVENT CONTROL		38	1.3084	0.1908
2 *	CONTROL		35	1.4971	0.2258
3 *	3.2 µg a.i./l		35	1.3086	0.1988
4 *	7.9 µg a.i./l		35	1.4260	0.1615
5 *	17 µg a.i./l		35	1.3460	0.2118
6 *	40 µg a.i./l		38	1.4437	0.1208
7 *	74 µg a.i./l		38	1.3995	0.1598
* 1			65	1.4300	0.1872
* 2			62	1.3915	0.2195
* 3			64	1.3662	0.2033
* 4			63	1.3702	0.1547
1 1			10	1.2880	0.2347
1 2			10	1.3140	0.1694
1 3			8	1.2813	0.1798
1 4			10	1.3450	0.1952
2 1			10	1.5800	0.1759
2 2			8	1.5900	0.1939
2 3			9	1.3989	0.2708
2 4			8	1.4113	0.2142
3 1			9	1.4678	0.1675
3 2			9	1.3522	0.2327
3 3			9	1.2433	0.1469
3 4			8	1.1538	0.0735
4 1			10	1.3780	0.2116
4 2			7	1.4414	0.1774
4 3			9	1.5000	0.1404
4 4			9	1.3933	0.0822
5 1			8	1.4250	0.0872
5 2			8	1.1700	0.2752
5 3			9	1.3033	0.2130
5 4			10	1.4620	0.1205
6 1			9	1.5000	0.1250
6 2			10	1.4600	0.1447
6 3			10	1.4330	0.1276
6 4			9	1.3811	0.0395
7 1			9	1.3756	0.1254
7 2			10	1.4190	0.1575
7 3			10	1.3850	0.2365
7 4			9	1.4178	0.0992

Fmax for testing homogeneity of between subjects variances: 48.50
 Number of variances= 28 df per variance= 8.

Dependent variable: WEIGHT

Source	df	SS (H)	MSS	F	P
Between Subjects	253	9.4346			
C (CONC)	6	1.1128	0.1855	6.052	0.0000
R (REP)	3	0.1594	0.0531	1.734	0.1594
CR	18	1.2371	0.0687	2.243	0.0034
Subj w Groups	226	6.9252	0.0306		

WEIGHT

Post-hoc tests for factor C (CONC)

Level	Mean	Level	Mean
1	1.308	6	1.444
2	1.497	7	1.399
3	1.309		
4	1.426		
5	1.346		

Comparison	Bon- ferroni
1 < 2	0.0000
1 < 3	
1 < 4	
1 < 5	
1 < 6	0.0190
1 < 7	
2 > 3	0.0000
2 > 4	
2 > 5	0.0082
2 > 6	
2 > 7	
3 < 4	
3 < 5	
3 < 6	0.0244
3 < 7	
4 > 5	
4 < 6	
4 > 7	
5 < 6	
5 < 7	
6 > 7	

Post-hoc tests for factor R (REP)

Level	Mean
1	1.430
2	1.391
3	1.366
4	1.370

Comparison	Bon- ferroni
1 > 2	
1 > 3	
1 > 4	
2 > 3	
2 > 4	
3 < 4	