

US EPA ARCHIVE DOCUMENT

Study ValidationReviewer: R. BalcombDate: 11/19/80

1. Chemical: Permethrin
2. Purity: 94.8% C14. Permethrin
3. Test type: 21-Day Flow-through Daphnia Reproduction study
4. Organism: Daphnia magna
5. Test Lab: Analytical Bio Chemistry Laboratories Inc.  
Columbia, MO
6. Registrant: ICI and FMC
7. Report Date: September 9, 1980 (#23647)      Accepted for publication 12/10/80
8. Validation Category: Core (Dose)
9. Abstract:

A dynamic 21 day life cycle toxicity study of  $^{14}\text{C}$ -permethrin to Daphnia magna was conducted to determine Maximum Acceptable Toxicant Concentration (MATC) limits. A one-liter proportional diluter system was used to maintain constant test concentrations. Exposure concentrations of  $^{14}\text{C}$ -Permethrin were measured radiometrically on days 0, 3, 10, 14 and 21. The mean measured levels of  $^{14}\text{C}$ -Permethrin were 29 ng/l, 60 ng/l, 118 ng/l, 271 ng/l and 608 ng/l. These values were not corrected for recovery.\*

Survival of adult daphnids after 21 days exposure to  $^{14}\text{C}$ -permethrin at 271 ng/l and 608 ng/l ( $P=0.05$ ) was significantly reduced. Complete mortality was observed in the high concentration of 608 ng/l. Production of offspring from adults was significantly reduced ( $P=0.05$ ) at the concentration of 271 ng/l on day 14 and at the concentrations of 271 estimated to be between 60 ng/l and 118 ng/l.

\* Recovery from spiked samples averaged 70% of nominal values. See note for Mayfly study (ABC Report No. 23648).

Reviewer comments

- (1) test methodology acceptable
- (2) Statistical conclusions validated (attached)

" 47039 "  
Dose

DEPENDENT VARIABLE: RESPONSE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE
MODEL	6	25.24960000	4.20826667	26.23
ERROR	14	2.24640000	0.16045714	0.0001
CORRECTED TOTAL	20	27.49600000		

R-SQUARE	C V	STD DEV	RESPONSE MEAN
0.918301	19.6358	0.40057102	2.04000000

SOURCE	DF	TYPE I SS	F VALUE	PR > F
VARIABLE	6	25.24960000	26.23	0.0001

SOURCE	DF	TYPE IV SS	F VALUE	PR > F
VARIABLE	6	25.24960000	26.23	0.0001

STATISTICAL ANALYSIS SYSTEM  
7:34 THURSDAY, NOVEMBER 20,

GENERAL LINEAR MODELS PROCEDURE

DUNCAN'S MULTIPLE RANGE TEST FOR VARIABLE RESPONSE

MEANS WITH THE SAME LETTER ARE NOT SIGNIFICANTLY DIFFERENT

ALPHA LEVEL=.05      DF=14      MS=0.160457

GROUPING	MEAN *	N	VARIABLE
A	3.033333	3	C 29 ppt
A	2.833333	3	A Control
A	2.733333	3	B Solvent Control
A	2.533333	3	D 60 ppt
A	2.433333	3	E 118 ppt
B	0.713333	3	F 271 ppt
C	0.000000	3	X 608 ppt

COMMAND ?

\* = Day 14. Average number of offspring per adult.

DEPENDENT VARIABLE: RESPONSE →

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE
MODEL	6	46.13904762	7.68984127	62
ERROR	14	1.72046667	0.12289048	PR
CORRECTED TOTAL	20	47.85951429		0.000

R-SQUARE	C.V	STD DEV	RESPONSE MEAN
0.964052	12.9153	0.35055738	2.71428571

SOURCE	DF	TYPE I SS	F VALUE	PR > F
VARIABLE	6	46.13904762	62.57	0.0001

SOURCE	DF	TYPE IV SS	F VALUE	PR > F
VARIABLE	6	46.13904762	62.57	0.0001

STATISTICAL ANALYSIS SYSTEM  
13:57 WEDNESDAY, NOVEMBER 19, 1

GENERAL LINEAR MODELS PROCEDURE

DUNCAN'S MULTIPLE RANGE TEST FOR VARIABLE RESPONSE

MEANS WITH THE SAME LETTER ARE NOT SIGNIFICANTLY DIFFERENT.

ALPHA LEVEL=.05      DF=14      MS=0.12289

GROUPING	MEAN*	N	VARIABLE	Conc.
A	4.000000	3	C	29 pp
A	3.833333	3	B	solvent con
A	3.666667	3	A	control
A	3.633333	3	D	60
B	2.966667	3	E	118
C	0.900000	3	F	271
D	0.000000	3	G	608

\* = Dose