

48-HR Acute Toxicity to Daphnia, *Daphnia magna*. FC-94-X (Li salt of PFOS)

ACUTE TOXICITY TO AQUATIC INVERTEBRATES (E.G., DAPHNIA)

TEST SUBSTANCE

Identity: Perfluorooctanesulfonate, Lithium salt; may also be referred to as PFOS Li salt, FC-94, or FC-94-X. (1-Octanesulfonic acid, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptafluoro-, lithium salt, CAS # 29457-72-5)

Remarks: The test sample is a mixture of the test substance in water (approximately 24.5% test substance and 75.5% water). No calculations were made to adjust for the actual concentration of the test substance in the test sample.

METHOD

Method: Not noted.

Test type: Static acute

GLP: No

Year Completed: 1994

Species: *Daphnia magna*

Analytical monitoring: pH and DO content

Statistical methods: EC₅₀ values calculated using Trimmed Spearman-Kärber method

Test daphnid source: Obtained from U.S. EPA-NETAC, Duluth, Minnesota.

Test daphnid age at study initiation: < 24-hours

Test conditions

Dilution water: Carbon-filtered well water

Dilution water chemistry:

pH: 8.4

DO: 8.6 mg/L

Stock and test solutions preparation: A primary stock solution was prepared in dilution water to yield a test sample concentration of 1000 mg/L. All test solutions were made by diluting the appropriate amount of stock solution with dilution water to make 50 mL of solution per concentration.

Exposure vessels: 100 mL glass beakers containing 50 mL of test solution.

Number of replicates: 4

Number of daphnids per replicate: 5

Number of concentrations: five plus a negative control

Water chemistry during the study:

Dissolved oxygen at test termination:

7.0 mg/L (control exposure)

7.8 mg/L (1000 mg/L exposure)
pH at test termination:
8.6 (control exposure)
8.6 (1000 mg/L exposure)
Test temperature range (0 – 48 hours)
20.1-21.0°C
Element basis: mortality and immobilization

RESULTS

Nominal concentrations: Bk control, 100, 180, 320, 560, 1000 mg/L

Element value: 24-hour EC₅₀ = 330 (290-370) mg/L
48-hour EC₅₀ = 210 (190-230) mg/L
48-hour NOEC = 100 mg/L

Statistical Evaluation: The EC₅₀ values and 95% confidence intervals were calculated using the Trimmed Spearman-Kärber method with trim set to 0%.

Mortality of controls: None

Remarks: Values reported are for the test sample. No calculations were made to adjust for the concentration of the test substance in the test sample.

CONCLUSIONS

The test sample containing 24.5% Perfluorooctanesulfonate, Lithium salt exhibited a 48-hour EC₅₀ for *Daphnia magna* of 210 mg/L.

Submitter: 3M Company, Environmental Laboratory, P.O. Box 33331, St. Paul, Minnesota, 55133

DATA QUALITY

Reliability: Klimisch ranking 2. This study, while well conducted, lacks analytical data for: determination of the test substance concentration in the test solutions; and determination of the sample purity.

REFERENCES

This study was conducted by the 3M Company, Environmental Laboratory, Lab Request number M1018, 2/10/94.

OTHER

Last changed: 5/2/00

48-HR ACUTE TOXICITY TO DAPHNIA, *DAPHNIA MAGNA*TYPE TEST: STATIC X STATIC RENEWAL _____TEST SUBSTANCE: EC-94-XDILUTION WATER: CARBON-FILTERED WELL WATER (3M WELL #2, ST. PAUL, MN)
TEMP. 19 °C, pH 8.4 D.O. 8.6 mg/LTEST DAPHNID SOURCE: U.S.EPA-NETAC, Duluth, Mn DATE RECEIVED: 6-28-90DAPHNID AGE: 24 HR OLD NEONATES NO. OF DAPHNIDS/TEST CHAMBER: 5LOADING RATE: 1 organism / 10 mL TEST SOLUTION VOLUME: 50 mL SIZE OF TEST VESSELS: 100 mLDATE INITIATED: 2-8-94 @ 14:15DATE TERMINATED: 2-10-94 @ 14:15

TEST VESSEL	INITIAL CONC. mg/L	TOTAL AMOUNT ADDED*	MORTALITY			
			24-HR	48-HR	pH	D.O. mg/L
BK1	CONTROL	-	0	0	8.6	7.0
BK2	CONTROL	-	0	0		
BK3	CONTROL	-	0	0		
BK4	CONTROL	-	0	0		
1.1	100	20	0	0	8.6	7.6
1.2			0	0		
1.3			0	0		
1.4			0	0		
2.1	180	36	0	3	8.6	7.4
2.2			0	0		
2.3			0	2		
2.4			0	0		
3.1	320	64	2	5	8.6	7.2
3.2			4	5		
3.3			1	5		
3.4			2	5		
4.1	560	112	5	5	8.5	6.7
4.2			5	5		
4.3			5	5		
4.4			5	5		
5.1	1000	200	5	5	8.6	7.8
5.2			5	5		
5.3			5	5		
5.4			5	5		
TEMP. °C 20.1°			21.0°			
DATE / ANALYST 2-9-94 / JBD			2-10-94 / JBD			
EC50 (95% C.I.) mg/L 48h EC50 = 210 mg/L (190-230)						

Method:
Trimmed Spear
Kärber (no tric)

COMMENTS

*ml of 1000 mg/L stock soln. diluted to 200 mL. This 200 mL of soln. was then divided into 4-50 mL replicates for each treatment.

ANALYST:

JBDInitial pH of highest conc. tested (1000 mg/L) = 8.5
Replicates were combined @ test termination for pH & D.O. measurements.

ENVIRONMENTAL LABORATORY

LR: M1018
 Date: 2/8/94
 Analyst: JBD

Daphnia magna 48-hour Toxicity Test Data Summary

SAMPLE: FC-94-X

Sample Conc. (mg/L)	No. Organisms Exposed	% Immobilized @	
		24 hours	48 hours
100	20	0	0
180	20	0	25
320	20	45	100
560	20	100	100
1000	20	100	100

24 h EC50 (95% C.I.) = 330 mg/L (290-370)

48 h EC50 (95% C.I.) = 210 mg/L (190-230)

EC50 Estimation Method: Trimmed Spearman-Kärber
 24 h: 0% trim
 48 h: 0% trim

Handwritten notes:
 FC-94-X is a Lithium salt
 FC-95 (Potassium)
 Use
 at 1000

10010
DARLINGTON RESEARCH, INC.

TRIMMED SPEARMAN-KARBER METHOD FOR CALCULATION OF
EC50 AND LC50 VALUES IN BIOASSAYS

FOR REFERENCE. CITE

M.A. HAMILTON, R.C. RUSSO, AND R.V. THURSTON. 1977.

TRIMMED SPEARMAN-KARBER METHOD FOR ESTIMATING MEDIAN
LETHAL CONCENTRATIONS IN TOXICITY BIOASSAYS.

ENVIRON. SCI. TECHNOL. 11(7) 714-719

CORRECTION 12(4) 417 (1978).

DATE 2/8/94
TEST # M1018
CHEMICAL FC-94-X
SPECIES D. magna
DURATION 24 hours

RAW DATA

CONCENTRATION(mg/L)	100.00	180.00	320.00	560.00	1000.00
NUMBER EXPOSED	20	20	20	20	20
MORTALITIES	0	0	9	20	20

SPEARMAN-KARBER TRIM

0.00

SPEARMAN-KARBER ESTIMATES

EC50

327.9162292

95% LOWER CONFIDENCE

289.02

95% UPPER CONFIDENCE

372.05

DATE 2/8/94
TEST # M1018
CHEMICAL FC-94-X
SPECIES D. magna
DURATION 48 hours

RAW DATA

CONCENTRATION(mg/L)	100.00	120.00	320.00	560.00	1000.00
NUMBER EXPOSED	20	20	20	20	20
MORTALITIES	0	5	20	20	20

SPEARMAN-KARBER TRIM

0.00

SPEARMAN-KARBER ESTIMATES eC50 207.5236053

95% LOWER CONFIDENCE 185.42

95% UPPER CONFIDENCE 232.26
