

ACUTE TOXICITY TO FISH (FATHEAD MINNOW)

TEST SUBSTANCE

Identity: A mixture containing perfluorooctanesulfonate, which may also be referred to as PFOS, FC-95, or as a component of FC-600. (1-Octanesulfonic acid, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-, potassium salt, CAS # 2795-39-3)

Remarks: The 3M production lot number was not noted. The test sample is FC-600. Current information indicates it is a mixture of 1.0% PFOS, 81.20% water, 12.00% diethylene glycol butyl ether, 1.00% sodium octyl sulfate, 2.00% propane Sultone foamer, 1.00% sodium decyl sulfate, 0.85% xanthan gum, 0.1% N-(3-chloroallyl) hexaminium chloride, 0.80% starch, and 0.05 % benzotriazole.

The following summary applies to a mixture with incompletely characterized concentration of impurities. Data may not accurately reflect the toxicity of the fluorochemical component of the test sample.

METHOD:

Method: Not noted.

Test type: Acute static

GLP: No

Year Completed: 1975

Species: *Pimephales promelas*

Supplier: Not noted

Analytical monitoring: Temperature, pH, DO

Exposure period: 96-hours

Statistical methods: LC₅₀ values graphed. 95% confidence intervals calculated by probit analysis.

Test fish age: Not noted

Average Length and weight: Length = 2.0 inches
Weight = 1.5 grams

Loading: Not noted

Pretreatment: Not noted.

Test conditions:

Dilution water: Carbon-filtered water, City of St. Paul, MN.

Dilution water chemistry: Not noted

Lighting: Not noted

Stock and test solution preparation: Test solutions were created by direct weights additions.

Concentrations dosing rate: Once

Stability of the test chemical solution: Not noted

Exposure vessels: Not noted.

Number of replicates: One

Number of fish per replicate: 10
Number of concentrations: 5 plus a blank control
Water chemistry during the study:

pH range (0-96 hours):

7.0 – 7.2 (control exposure)

7.3 – 7.4 (2,000 mg/L exposure)*

Temperature range (0-96 hours):

72°F

Dissolved oxygen range (0-96 hours):

5.7 – 7.0 mg/L (control exposure)

4.0 – 5.7 mg/L (2,000 mg/L exposure)*

* Values for the 2,000 mg/L exposure (third highest concentration) were used because total mortality occurred in the highest concentrations tested.

RESULTS

Nominal concentrations: Bk control, 1,000, 1,500, 2,000, 3,000 and 4,000 mg/L

Element value: 96-hour LC_{50} = 1,700 (1,465 – 1,972) mg/L

Element value based on nominal concentrations.

Remarks: Testing was conducted on the mixture as described in the Test Substance Remarks field. The value reported applies to that mixture and not the fluorochemical proportion alone.

CONCLUSIONS

The FC-600 96-hour LC_{50} for *Pimephales promelas* was determined to be 1,700 mg/L with a 95% Confidence Interval of 1,465 to 1,972 mg/L.

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

DATA QUALITY

Reliability: Klimisch ranking 3. The study lacks proper documentation of the method followed. The sample purity was not properly characterized and the study lacks analytical confirmation of the amount of fluorochemical proportion in the solutions.

REFERENCES

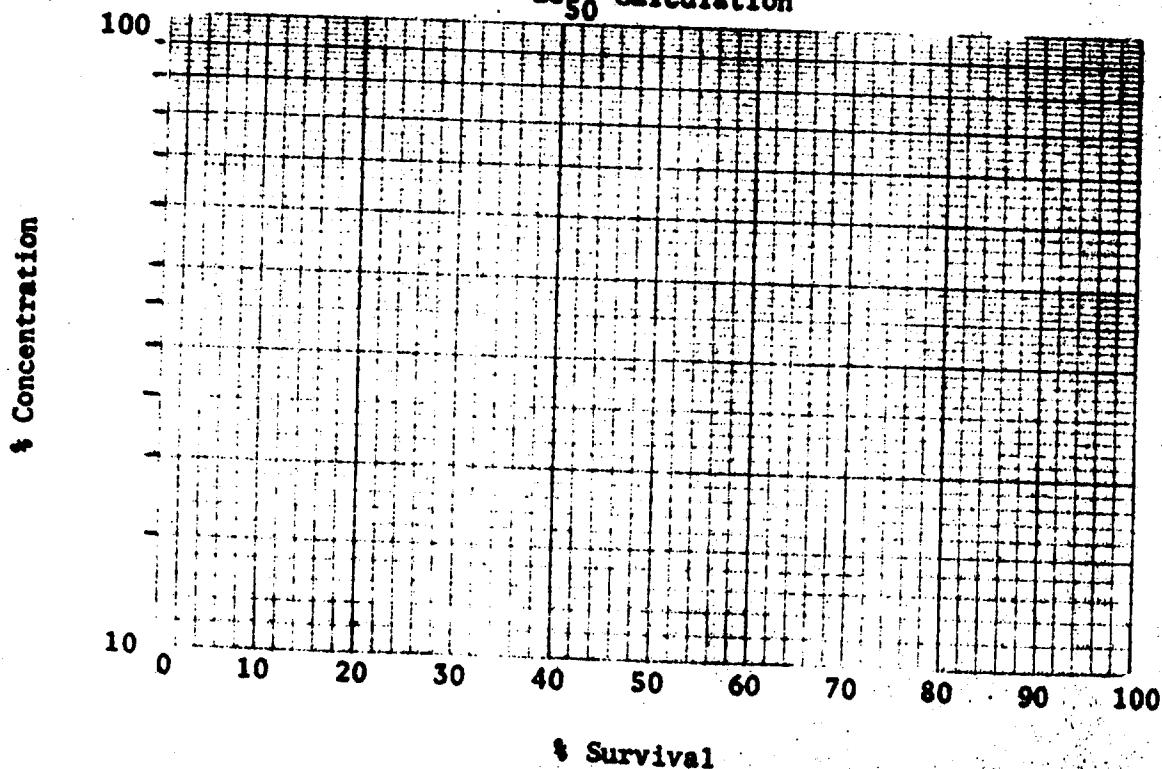
This study was conducted by 3M Company, Environmental Laboratory, St. Paul, MN, 1975.

OTHER

Last changed: 6/28/00

ENVIRONMENTAL ENGINEERING LABORATORY
 AQUATIC TOXICITY WORK SHEET
Type Test 96-Hour StaticMaterial Tested FC-600Test Organism Fathead MinnowAvg. Weight 1.5g Avg. Size 2 InchDate Started 8-25-75Date Completed 8-29-75Time Started 2:00 PMPlotted LC₅₀ _____Dilution Water Carbon filtered-city waterpimephales promelas

Conc.	24 hrs			48 hrs			72 hrs			96 hrs		
	% Survival	pH	D.O ppm	% Survival	pH	D.O ppm	% Survival	pH	D.O ppm	% Survival	pH	D.O ppm
Control	100	7.2	7.0	100	7.2	6.5	100	7.2	6.1	100	7.0	5.7
1000ug/l	100	7.3	6.2	100	7.2	5.9	100	7.2	5.5	100	7.3	5.0
1500	100	7.3	5.9	100	7.3	5.4	80	7.2	5.0	60	7.3	4.5
2000	100	7.4	5.7	90	7.3	5.0	50	7.3	4.7	40	7.3	4.0
3000	20	7.4	5.2	10	7.4	4.5	0	7.3	4.2	0	—	—
4000	0	7.6	5.0	0	—	—	0	—	—	0	—	—
Average Temperature			72	72			72			72		

Comments: 9/16 liter10 F. Minnow per test containerLC₅₀ Calculation

ENVIRONMENTAL ENGINEERING LABORATORY
AQUATIC TOXICITY - PROBIT ANALYSIS WORK SHEET

Date Started: 8-25-75 Material Tested: FC-600
 Time Started: 2:00 (AM) (PM) Test Organism (Fathead minnow)
 Type Test: (Continuous Flow) (Static) Avg. Wt. 1.5 (gram) Avg. Size 2.0 (inch)
 Exposure Period: 96 -Hour Date Completed: 8-29-75
 Diluent: (carbon-filt.-St.P. City Wtr.) Analysis by: M.T. Elshabrawy

(1)		(2)		(3)			
K	No. of Doses Plotted	Conc.	Observed % Mortality	Expected % Mortality	Corrected Values	O - E Observed-Expected	Contribution to chi (from Nomograph #1)
	1	1000 mg/l	0	17	5.2	11.8	.280
	2	1500	40	40		—	—
	3	2000	60	60		—	—
	4	3000	100	83	94.8	11.8	.280
	5						
	6						
	7						

K = 4 Animals/Dose = 10 Total contribution to chi = .560
 Total Animals = 40 (chi²) = contrib. to chi x Tot. Animals = 5.600
 chi² (P-.05) for (K-2) 2 degree of freedom (from Table 2) = 5.99
5.6 is less than 5.99; therefore, the data are not significantly heterogenous.

95% Confidence Limits for LC₅₀*

LC₈₄ = 2400 mg/l LC₅₀ = 1700 mg/l LC₁₆ = 1250 mg/l
 Slope function (S) = $\frac{LC_{84}/LC_{50} + LC_{50}/LC_{16}}{2} = \frac{2400/1700 + 1700/1250}{2} = \frac{1.412 + 1.360}{2} = 1.39$

Total number of animals used between 16% and 84% expected effects (N) = 40
 $FLC_{50} = (S)^{2.77/\sqrt{N}} = (1.39)^{2.77/\sqrt{40}} = (from\ Nomograph\ \#2)\ 1.16$
 $LC_{50}/FLC_{50} = \text{lower limit} = 1700/1.16 = 1465\ mg/l$
 $LC_{50} \times FLC_{50} = \text{upper limit} = 1700 \times 1.16 = 1972\ mg/l$
 LC₅₀ = 1700 (95% confidence limits 1465 to 1972)

- (1) Do not list more than two consecutive 0% effects or more than two consecutive 100% effects.
 - (2) Expected value for any dose should be greater than 0.01% or less than 99.99%.
 - (3) Corrected value for each 0% or 100% effect (from Table 1).
- * There is a 95% chance that the true value of LC₅₀ lies within these limits.

001996

% mortality

