

ACUTE TOXICITY TO FISH

TEST SUBSTANCE

Identity: Perfluorooctanoic acid; may also be referred to as PFOA, FC-26, or FX-1001. (Octanoic acid, pentadecafluoro-, CAS # 335-67-1)

Remarks: The 3M production lot number was not noted. The test sample is FX-1001. It's purity was not sufficiently characterized, though current information indicates it is a mixture of 95 - 98% test substance and 1 - 5% perfluorochemical inerts.

METHOD:

Method: Not noted.

Type: Static acute

GLP: No

Year completed: 1985

Species: *Pimephales promelas*

Supplier: Dale Fattig of Brady, Nebraska.

Analytical monitoring: Temperature, pH and DO

Exposure period: 96-hours

Statistical methods: Probit analysis

Test fish age: Not noted.

Length and weight: Average length = 4.1 cm
Average weight = 0.50 g

Pretreatment: 25.0 mg/L tetracycline HCl, 5 months prior to study initiation.

Test conditions:

Dilution water: Carbon-filtered well water.

Dilution water chemistry at test initiation:

Temperature: 19°C

Dissolved Oxygen: 9.5 ppm

pH: 7.8

Stock and test solution preparation: A stock solution was prepared by dissolving 45 g test substance (neutralized with NaOH to pH 7.5) in 3 liters of water and transferring appropriate aliquots to test vessels to make 5 liters of test solution at the selected test concentrations.

Concentrations dosing rate: Once

Stability of the test chemical solutions: Not noted

Exposure vessels: 24 cm inside diameter and 26 cm deep glass beakers containing 5 liters test solution.

Number of replicates: two

Number of fish per replicate: 5

Loading rate: 0.50 g/L

Number of concentrations: five plus a blank control

Water chemistry during the study:

Dissolved oxygen range (24 – 96 hours):

7.3 – 7.7 mg/L (control exposure)

6.1 – 6.7 mg/L (870 mg/L exposure)*

pH range (24 – 96 hours):

7.5 – 7.7 (control exposure)

7.5 – 7.5 (870 mg/L exposure)*

* 870 mg/L test group (second highest concentration) data given because total mortality occurred in the highest test concentration by 48 hours.

Test temperature (24 – 96 hours): 19 - 20°C

RESULTS

Nominal concentrations: Bk control, 690, 750, 810, 870, and 930 mg/L

Element value: 96-hour LC₅₀ = 843 (811 - 878) mg/L

Element value based on nominal concentrations

CONCLUSIONS

The test sample 96-hour LC₅₀ for fathead minnow was determined to be 843 mg/L with a 95% Confidence Interval of 811 to 878 mg/L.

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

DATA QUALITY

Reliability: Klimisch ranking 2. Testing meets the criteria for quality testing. However, sample purity was not properly characterized and it lacks analytical confirmation of test substance concentrations.

REFERENCES

This study was conducted by the 3M Company, Environmental Laboratory, St. Paul, MN, Lab Request Number C1006, completed on February 2, 1985.

OTHER

Last changed: 5/24/00

ENVIRONMENTAL LABORATORY

LF 01006

TABLE I. SUMMARY OF ACUTE TOXICITY OF EX1001 (EC-216) ACID
TO FATHEAD MINNOW UNDER STATIC EXPOSURE CONDITIONS⁽¹⁾

CHEMICAL CONCENTRATION (mg/l)	PERCENT MORTALITY			
	24-HR.	48-HR.	72-HR.	96-HR.
CONTROL	0	0	0	0
<u>1690</u>	0	0	0	0
<u>750</u>	10	10	10	10
<u>810</u>	10	30	30	30
<u>870</u>	10	40	40	50
<u>930</u>	40	100	100	100
LC ₅₀ (95% CONFIDENCE LIMITS) ⁽²⁾ mg/l	>930	849(817-887)	849(817-887)	843(811-878)

- (1) Data were averages of two replications for each concentration with ^{five (5)} ~~ten (10)~~ fish per ~~ten~~ ^{five (5)} replicate. A total of ~~twenty~~ ^{ten} fish were used per concentration. *2/12/85*
- (2) LC₅₀ values were calculated using logistic regression methods (Probit Analysis).
- (3) Note the dose/response. 870 mg/l / 50% Mortality.

DEFINITIVE (FULL-SCALE TEST)
ENVIRONMENTAL TOXICITY

LR C1006

Type Test Acute Static Material Tested EX1001 (17-26) Lot 1001
 Test Organism Fish (Goldfish) Source Brady, NCD Date Rec'd 8/22/84 Batch # 2-85 (1-84)
 Avg. Wt. 0.50 grams Avg. Size 4.1 cm No. Organisms per dose 5 Loading Factor 0.50 g/l
 Fish Disease Treatment: 250 mg/l Tetracycline NCD 8/25/84
 Test Solution Volume 5 Liters/All-Glass Tank Tank Dimensions: 24 cm x 20 cm and 25 cm deep
 Time Started 4:00 PM Date Started 1/29/85 Date Completed 2/2/85
 Dilution Water Carbon-filtered well water (Temp. 19 °C., D.O. 9.5 ppm, pH 7.8)
 Investigator [Signature] LC₅₀ (95% Confidence Limits) 861 (812-914) mg/l
 (Full Signature) Frank H. Hays

Tank No.	Initial Conc. mg/l	Total Amount Added	24 Hours			48 Hours			72 Hours			96 Hours		
			Total No. Dead	pH	D.O. ppm	Total No. Dead	pH	D.O. ppm	Total No. Dead	pH	D.O. ppm	Total No. Dead	pH	D.O. ppm
I	Control	+ ml	0	7.7	7.5	0	7.7	7.4	0	7.6	7.3	0	7.6	7.3
1-1	690	230	0	7.6	6.8	0	7.6	6.9	0	7.5	7.0	0	7.5	7.1
1-2	750	250	0	7.6	6.7	0	7.6	6.9	0	7.5	7.0	0	7.5	7.1
1-3	810	270	0	7.6	6.2	1	7.6	6.4	1	7.5	6.7	1	7.5	6.9
1-4	840	290	0	7.5	6.1	2	7.5	6.3	2	7.5	6.5	2	7.5	6.7
1-5	930	310	4	7.5	6.1	5	7.5	6.7	5	—	—	5	—	—
Test Temp. °C			20°C			20°C			19°C			19°C		
Initials & Date			8/3 1/30/85			8/3 1/31/85			8/3 2/1/85			8/3 2/2/85		

Comments: 1/2 ml of stock solution: 4.5 g/l. Each ml = 15 mg. Administered: 230, 250, 270, 290, and 310 ml. EX1001 was neutralized with NaOH.
40 mg/l 7.5 white solid. Miscible in water
 Secondary Effects (other than Mortality): EC50

Tank No.	Symptoms or Reactions	Total Number Affected			
		24-Hr.	48-Hr.	72-Hr.	96-Hr.
Control	I				
1-1					
1-2					
1-3	Surfacing	1	NONE		
1-4	Surfacing	2			
1-5	Surfacing	1			

LR Clock

Type Test NOVA SCORE TEST Material Tested EXPO1 (F-26) Lot _____
Test Organism F. heteroclitus Source Brady NCD Date Rec'd 3/22/84 Batch # 2-85(1684)
Avg. Wt. 0.50 grams Avg. Size 4.1 cm No. Organisms per dose 5 Loading Factor 0.50 g/l
Fish Disease Treatment: 25.0 mg/l Tetracycline NPL 8/23/84
Test Solution Volume 5 Liters/All-Glass Tank Tank Dimensions: 24 cm ID. and 25 cm deep
Time Started 4:00 pm Date Started 1/29/85 Date Completed 2/2/85
Dilution Water Carbon-filtered well water (Temp. 19 °C., D.O. 9.5 ppm, pH 7.8)
Investigator Dr. J. M. Brady LC₅₀ (95% Confidence Limits) 825 (771-884) mg/l
(Full Signature) Dr. J. M. Brady Brady, J. M.

Tank No.	Initial Conc. mg/l	Total Amount Added	24 Hours			48 Hours			72 Hours			96 Hours		
			Total No. Dead	pH	D.O. ppm	Total No. Dead	pH	D.O. ppm	Total No. Dead	pH	D.O. ppm	Total No. Dead	pH	D.O. ppm
II	Control	4ml	0	7.7	7.7	0	7.7	7.5	0	7.6	7.5	0	7.5	7.4
2-1	1.90	230	0	7.6	6.8	0	7.6	7.0	0	7.5	7.2	0	7.5	7.5
2-2	7.50	250	1	7.6	6.8	1	7.6	7.1	1	7.5	7.3	1	7.5	7.6
2-3	8.10	270	1	7.6	6.5	2	7.6	6.8	2	7.5	6.9	2	7.5	7.0
2-4	8.70	290	1	7.5	6.2	2	7.5	6.3	2	7.5	6.5	3	7.5	6.5
2-5	9.30	310	0	7.5	6.3	5	7.5	6.6	5	—	—	5	—	—
Test Temp. °C			20°C			20°C			19°C			19°C		
Initials & Date			2/3/1/85			2/3/1/85			2/3/1/85			2/3/1/85		

Comments: * (annular) stark, salmonid: 4.5 g/3%. Each ml = 15 mg. Amount order:
230, 250, 270, 290, and 310 ml. #X1001 132.5 neutralized with NaOH.
90.0% white solid. Miscible in water.
 Secondary effects (other than mortality): EC50

Tank No.	Symptoms or Reactions	Total Number Affected			
		24-Hr.	48-Hr.	72-Hr.	96-Hr.
Control	II				
2-1		NONE	NONE	NONE	NONE
2-2					
2-3	Surfacing	1	NONE	NONE	NONE
2-4	Surfacing	1			
2-5	Surfacing	5	—	—	—