

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

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ENVIRONMENTAL LABORATORY

LF 01006

TABLE I. SUMMARY OF ACUTE TOXICITY OF EX1001 (EC-26) 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>1290</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 870mg/l / 50% Mortality.

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DEFINITIVE (FULL-SCALE TEST)
FEDERAL BUREAU OF INVESTIGATION
U.S. DEPARTMENT OF JUSTICE

LR C1006

Type Test Acute Toxic Material Tested EX-100 (15-26) Lot 100
 Test Organism Forced minnow Source Brady, N.J. Date Rec'd 8/22/84 Batch # 2-85(16-84)
 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 NPL 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 Nicks

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	9.5	0	7.7	9.4	0	7.6	9.3	0	7.6	9.3
1-1	690	230	0	7.6	9.8	0	7.6	9.9	0	7.5	9.0	0	7.5	9.1
1-2	750	250	0	7.6	9.7	0	7.6	9.9	0	7.5	9.0	0	7.5	9.1
1-3	810	270	0	7.6	9.2	1	7.6	9.4	1	7.5	9.7	1	7.5	9.9
1-4	840	290	0	7.5	9.1	2	7.5	9.3	2	7.5	9.5	2	7.5	9.7
1-5	930	310	4	7.5	9.1	5	7.5	9.7	5	—	—	5	—	—

Test Temp. °C 20°C Initials & Date 1/30/85 23 1/31/85 3/3 2/1/85 3/3 2/2/85

Comments: 1/29/85: 459/31. Each ml = 15 mg. Amount added: 230, 250, 270, 290, and 310 ml. EX-100 was neutralized with NaOH.
40 x 10/1 7.3 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	NONE	NONE
1-4	Surfacing	2			
1-5	Surfacing	1			

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AQUATIC TOXICITY DATA SHEET
DEFINITIVE (FULL-SCALE TEST)
 E3-107 (EXPERIMENTAL 1-110)

LR C1006i

Type Test 96 HR ACUTE TOXIC Material Tested EXPO1 (F1-26) Lot
 Test Organism Fish (Goldfish) Source Brady, Neb Date Rec'd 8/22/84 Batch # 2-85(16-84)
 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 Tetraacycline HPL 8/23/84
 Test Solution Volume 5 Liters/All-Glass Tank Tank Dimensions: 24 cm ID. and 25 cm deep
95x28 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) 825 (771-884) mg/l
 Full Signature) Proby Analysis

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	7.8	6.3	5	7.5	6.6	5	—	—	5	—	—

Test Temp. °C

Initials & Date

Comments: 100% Mortality Start 3/1/85; 4.5 g/l 3/1/85. Each ml = 15 mg. Amount added: 230, 250, 270, 290, and 310 ml. EXPO1 was neutralized with NaOH.
90% Mortality 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		None	None	None	None
2-3	Surfacing	1	None	None	None
2-4	Surfacing	1	None	None	None
2-5	Surfacing	5	None	None	None

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