

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 FX-3106. (1-Octanesulfonic acid) (CAS # 2795-39-3).

Remarks: The 3M production lot number was 015G. The test sample is FX-3106, PO# S5233-004, EAI 85548, Sumitomo 3M Japan. Current information indicates it is a mixture of 2.31% PFOS, 2.6% diethylene glycol butyl ether, 83.38% water, 10% ethylene glycol, 1.36% Sultone foamer, 0.2% xanthan gum, 0.1% 2-biphenylol, sodium salt, tetrahydrate, and 0.05% benzotriazole.

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

METHOD:

Method: Not given.

Type: Acute static-renewal

GLP: No

Year completed: 1985

Species: *Pimephales promelas*

Supplier: Fattig Fish Hatchery, Brady, NE.

Analytical monitoring: Temperature, pH, and dissolved oxygen.

Exposure period: 96-hours

Statistical methods: Not applicable. No mortality observed.

Test fish age: Juveniles

Length and weight: Average length = 33 mm
Average weight = 0.27 g (wet)

Loading: 0.45 g/L

Pretreatment: None

Test conditions:

Dilution water: Carbon-filtered well water

Dilution water chemistry:

Hardness: 260 mg/L as CaCO₃

Alkalinity: 220 mg/L as CaCO₃

Conductivity: 450 µmhos/cm

Lighting: Not given.

Stock and test solution preparation: The test material was added directly to the dilution water on a weight/volume basis.

Concentrations dosing rate: Solution renewal during the study.

Stability of the test chemical solutions: Not noted.

Exposure vessels: 4 L glass beakers containing 3 L test solution.

Number of replicates: 2

Number of fish per replicate: 5
Number of concentrations: five plus a blank control
Water chemistry during the study:
 pH range (0-96 hours):
 7.8 – 8.2 (control exposure)
 7.9 – 8.2 (1000 mg/L exposure)
 Temperature range (0-96 hours): 20 °C
 Dissolved oxygen range (0-96 hours):
 6.9 – 9.6 mg/L (control exposure)
 6.6 – 9.6 mg/L (1000 mg/L exposure)

RESULTS

Nominal concentrations: Blank control, 10, 50, 100, 500, and 1000 mg/L

Element values: 96-hour LC_{50} = >1000 mg/L

Element values based on nominal concentrations

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

CONCLUSIONS

The test sample 96-hour LC_{50} for fathead minnow was determined to be >1000 mg/L, the highest concentration tested. No mortality or sublethal effects were observed in this concentration.

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

DATA QUALITY

Reliability: Klimisch ranking = 2. This study meets the criteria for quality testing. However, the study lacks information on purity of the test substance and analytical confirmation of the amount of fluorochemical proportion in solution.

REFERENCES

This study was conducted by the 3M Company, Environmental Laboratory, St. Paul, MN, Lab Request number C2282, 1985.

OTHER

Last changed: 6/26/00

Renewal Static

ENVIRONMENTAL LABORATORY
FISH TOXICITY DATA SHEET
DEFINITIVE (FULL-SCALE TEST)

LR C 2282

96 Hour Acute
TYPE TEST Renewal Static MATERIAL TESTED EAI 85548 Sumitomo 3M Japan LOT 0156
TEST ORGANISM Fathead Minnow SOURCE Fatty Fish Hatchery DATE REC'D 1-23-85 BATCH NO. 3/3
AVG. WT. 0.27 grams AVG. SIZE 3.3 cm NO. ORGANISMS PER DOSE 5 LOADING FACTOR 0.45 g
FISH DISEASE TREATMENT None
TEST SOLUTION VOLUME 3 LITERS/ALL-GLASS TANK TANK DIMENSIONS: 4 LITER PYREX³ GLASS BEAKER
TIME STARTED 9:45 AM DATE STARTED 10-29-85 DATE COMPLETED 11-2-85
DILUTION WATER CARBON-FILTERED WELL WATER (TEMP 20 °C., D.O. 9.6 ppm, pH 8.2)
INVESTIGATOR Susan A. Beach LC₅₀ (95% CONFIDENCE LIMITS) >1000 mg/l

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	mg*	0	8.0	7.1	0	7.9	7.3	0	8.0	7.4	0	7.9	7.1
1-1	10	30	0	8.1	7.2	0	7.8	7.2	0	8.2	7.1	0	7.9	7.3
1-2	50	150	0	8.1	6.8	0	7.9	6.9	0	8.1	6.6	0	7.9	6.9
1-3	100	300	0	8.1	6.7	0	7.9	6.9	0	8.1	6.4	0	7.9	6.9
1-4	500	1500	0	8.1	7.4	0	7.9	6.7	0	8.1	6.4	0	7.9	6.9
1-5	1000	3000	0	8.1	7.7	0	7.9	7.2	0	8.0	6.7	0	7.9	6.8
Test Temp. °C			20			20			20			20		
Initials & Date			SAB 10-30-85			SAB 10-31-85			SAB 11-1-85			SAB 11/2/85		

COMMENTS: * Individual weights

Initial pH of highest conc. tested, 1000 mg/l. = 8.2

Test chemical is a yellow, foamy liquid, soluble in water at room temperature

SECONDARY EFFECTS (OTHER THAN MORTALITY)

EC₅₀

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

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Renewal Static

ENVIRONMENTAL LABORATORY
FISH TOXICITY DATA SHEET
DEFINITIVE (FULL-SCALE TEST)LR C 2282

FX-3106 PO#S 5233-004

96 Hour Acute
TYPE TEST Renewal Static MATERIAL TESTED EAI 85548 Sumitomo 3M Japan LOT 015G
TEST ORGANISM Fathead Minnow SOURCE Fattig Fish Hatchery
Brady, Nebraska DATE REC'D 1-23-85 BATCH NO. 3/8
AVG. WT. 0.27 grams AVG. SIZE 3.3 cm NO. ORGANISMS PER DOSE 5 LOADING FACTOR 0.45 g/l
FISH DISEASE TREATMENT None

TEST SOLUTION VOLUME 3 LITERS/ALL-GLASS TANK TANK DIMENSIONS: 4 LITER PYREX® GLASS BEAKER
TIME STARTED 9:45 AM DATE STARTED 10-29-85 DATE COMPLETED 11-2-85

DILUTION WATER CARBON-FILTERED WELL WATER (TEMP 20 °C., D.O. 9.6 ppm, pH 8.2)

INVESTIGATOR Lisa A. Beach LC₅₀ (95% CONFIDENCE LIMITS) >1000 mg/l
Goodfellow

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
<u>II</u>	<u>CONTROL</u>	<u>mg/l</u>	<u>0</u>	<u>8.0</u>	<u>6.9</u>	<u>0</u>	<u>7.8</u>	<u>7.1</u>	<u>0</u>	<u>8.0</u>	<u>7.0</u>	<u>0</u>	<u>7.9</u>	<u>7.6</u>
<u>2-1</u>	<u>10</u>	<u>30</u>	<u>0</u>	<u>8.1</u>	<u>7.1</u>	<u>0</u>	<u>7.9</u>	<u>7.1</u>	<u>0</u>	<u>8.2</u>	<u>7.1</u>	<u>0</u>	<u>7.9</u>	<u>7.2</u>
<u>2-2</u>	<u>50</u>	<u>150</u>	<u>0</u>	<u>8.1</u>	<u>7.2</u>	<u>0</u>	<u>7.9</u>	<u>7.2</u>	<u>0</u>	<u>8.1</u>	<u>6.9</u>	<u>0</u>	<u>7.9</u>	<u>7.1</u>
<u>2-3</u>	<u>100</u>	<u>300</u>	<u>0</u>	<u>8.1</u>	<u>7.2</u>	<u>0</u>	<u>7.9</u>	<u>7.6</u>	<u>0</u>	<u>8.1</u>	<u>6.9</u>	<u>0</u>	<u>7.9</u>	<u>7.0</u>
<u>2-4</u>	<u>500</u>	<u>1500</u>	<u>0</u>	<u>8.2</u>	<u>7.7</u>	<u>0</u>	<u>7.9</u>	<u>7.5</u>	<u>0</u>	<u>8.1</u>	<u>6.6</u>	<u>0</u>	<u>7.9</u>	<u>6.8</u>
<u>2-5</u>	<u>1000</u>	<u>3000</u>	<u>0</u>	<u>8.1</u>	<u>7.6</u>	<u>0</u>	<u>7.9</u>	<u>7.2</u>	<u>0</u>	<u>8.2</u>	<u>6.6</u>	<u>0</u>	<u>7.9</u>	<u>6.7</u>
Test Temp. °C			<u>20</u>			<u>20</u>			<u>20</u>			<u>20</u>		
Initials & Date			<u>SAB 10-30-85</u>			<u>SAB 10-31-85</u>			<u>SAB 11-1-85</u>			<u>SAB 11/2/85</u>		

COMMENTS: * Individual weights. Initial pH of highest conc. tested, 1000 mg/l = 8.2
Test chemical is a yellow, foamy liquid, soluble in water at room temperature.

SECONDARY EFFECTS (OTHER THAN MORTALITY)

EC₅₀

Tank No.	Symptoms or Reactions	Total Number Affected			
		24-Hr.	48-Hr.	72-Hr.	96-Hr.
<u>II</u>	<u>CONTROL</u>				
<u>2-1</u>		<u>None</u>	<u>None</u>	<u>None</u>	<u>None</u>
<u>2-2</u>					
<u>2-3</u>					
<u>2-4</u>					
<u>2-5</u>					

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2-10-85

ENVIRONMENTAL LABORATORY FINAL REPORT

LAB REQUEST NO. C2466

REQUESTER NAME: RRR
PT: 0222
PROJECT NO: 06
DATE RECEIVED: 12-02-85
DESC: NOVEMBER WELL WATER CHARACTERISTICS

CONTRACT LAB:
CONTRACT LAB COST: 0
3M E-L HOURS: 2
EST CMPLT DATE: 12-09-85
DATE COMPLETED: 12-11-85

SAMPLE	DATE	CODE	DESCRIPTION	TEST	RESULT
1	11-25-85	WELL	WATER		
			COD		<0.4 MG/L
			STANDARD PLATE COUNT		54 COL/ML
			TOTAL COLIFORM		NEGATIVE
			TOT FLUORIDE (DISTILLED)		<0.4 MG/L
			TOTAL ALKALINITY (PH 4.5)		220 MG/L
			TOTAL HARDNESS		260 MG/L
			TOTAL RESIDUAL CHLORINE		<0.2 MG/L
			AMMONIA NITROGEN - AS N		<0.4 MG/L
			PH		8.0
			SPECIFIC CONDUCTANCE		450 UMHQS/CM
			TOTAL SOLIDS		290 MG/L
2	11-28-85	DI	WATER		
			STANDARD PLATE COUNT		1 COL/ML
			TOTAL RESIDUAL CHLORINE		<0.2 MG/L
			PH		6.7
			SPECIFIC CONDUCTANCE		1.3 UMHQS/CM

* = CONTRACT LAB

SUBMITTED BY W. H. Zeman DATED 12-11-85

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