

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-602. (1-Octanesulfonic acid) (CAS # 2795-39-3).

Remarks: The 3M production lot number was 501. The test sample is FC-602-X. Current information indicates it is a mixture of 1% PFOS, 12% diethylene glycol butyl ether, 61.05% water, 20% ethylene glycol, 2% Sultone foamer, 1% sodium octyl sulfate, 1% sodium decyl sulfate, 1% magnesium sulfate, 0.7% xanthan gum, 0.1% starch, 0.1% n-(3-chloroallyl)hexaminium chloride, 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: OECD Method 203 and U.S. EPA Method EG-9

Type: Acute static

GLP: No

Year completed: 1988

Species: *Pimephales promelas*

Supplier: Kurtz's Fish Hatchery, Elverson, PA.

Analytical monitoring: Dissolved oxygen, pH, and temperature.

Exposure period: 96-hours

Statistical methods: Not applicable. LC₅₀ values not calculated based on study results.

Test fish age: Juveniles

Length and weight: Average length = 27 mm
Average weight = 0.15 g (wet)

Loading: 0.3 g/L

Pretreatment: None.

Test conditions:

Dilution water: Carbon filtered well water

Dilution water chemistry:

Hardness: 240 mg/L as CaCO₃

Alkalinity: 220 mg/L as CaCO₃

Conductivity: 500 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: Once

Stability of the test chemical solutions: Not noted
Exposure vessels: 4 L Pyrex glass beakers containing 3 L of test solution.
Number of replicates: 2
Number of fish per replicate: 6
Number of concentrations: five plus a blank control
Water chemistry during the study:
 pH range (0-96 hours):
 8.0 – 8.2 (control exposure)
 7.3 – 8.2 (1000 mg/L exposure)
 Temperature range (0-96 hours): 20-21 °C
 Dissolved oxygen range (0-96 hours):
 7.6 – 9.2 mg/L (control exposure)
 1.6 – 9.2 mg/L (1000 mg/L exposure)

RESULTS

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

Element values: 96-hour LC₅₀ = >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 FC-602 96-hour LC₅₀ for fathead minnow was determined to be >1000 mg/L in both replicates, the highest concentration tested. Mortality observed was ~17%.

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 the study lacks analytical confirmation of the amount of fluorochemical proportion in the solution.

REFERENCES

This study was conducted by the 3M Company, Environmental Laboratory, St. Paul, MN, Lab Request number F1151, 1988.

OTHER

Last changed: 6/26/00

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

LR 1151

TYPE TEST 96-HR Acute Static CHEMICAL TESTED FC-602 X Light Water AIC Plus LOT 501
TEST ORGANISM Fathead Minnow SOURCE Kurtz's Fish Hatchery Elverson, PA DATE REC'D 1-6-88 BATCH NO. 1/88
AVG. WT. 0.15 grams AVG. SIZE 2.7 cm NO. OF ORGANISMS PER TREATMENT 6
LOADING FACTOR 0.3 g/L FISH DISEASE TREATMENT None
TEST VESSEL: 4 Liter Pyrex Glass Beaker TEST SOLUTION VOLUME 3 L
TIME STARTED 11:30 am DATE STARTED 3-21-88 DATE COMPLETED 3-25-88
DILUTION WATER Carbon-filtered well water (Temp. 21 °C, D.O. 9.2 mg/L, pH 8.2)
ANALYST Aaron A. Beach LC₅₀ (95% Confidence Limits) > 1000 mg/L

Tank No.	Initial Conc. mg/L	Total Amount Added mg*	24 Hours			48 Hours			72 Hours			96 Hours		
			Total No. Dead	pH	D.O. mg/L	Total No. Dead	pH	D.O. mg/L	Total No. Dead	pH	D.O. mg/L	Total No. Dead	pH	D.O. mg/L
I	Control	—	0	8.0	9.6	0	8.0	7.6	0	8.0	8.0	0	8.0	7.9
1-1	100	300	0	8.1	7.0	0	8.0	6.6	0	7.9	6.6	0	7.7	4.5
1-2	180	540	0	8.1	6.8	0	8.0	5.8	0	7.9	6.0	0	7.7	4.8
1-3	320	960	0	8.1	6.3	0	8.0	3.8	0	7.9	4.0	0	7.5	2.4
1-4	560	1680	0	8.0	6.1	0	8.0	2.6	0	7.6	2.2	0	7.3	2.6
1-5	1000	3000	0	8.0	6.2	0	8.1	2.3	0	7.4	1.9	1	7.3	1.6
Test Temp. °C			21			21			21			21		
Initials & Date			SAB 3-22-88			SAB 3-23-88			SAB 3-24-88			SAB 3-25-88		

COMMENTS: *Individual weights. Test substance apparently miscible with water.
Initial pH highest conc. tested, 1000 mg/L; = 8.2
SECONDARY EFFECTS (OTHER THAN MORTALITY)

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

Test methodology conforms with the following two test protocols:

- (1) OECD #203 "Fish, Acute Toxicity Test".
- (2) US-EPA #EG-9 "Fish Acute Toxicity Test".

ENVIRONMENTAL LABORATORY
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Tank No.	Initial Conc. mg/L	Total Amount Added mg*	24 Hours			48 Hours			72 Hours			96 Hours		
			Total No. Dead	pH	D.O. mg/L	Total No. Dead	pH	D.O. mg/L	Total No. Dead	pH	D.O. mg/L	Total No. Dead	pH	D.O. mg/L
<u>II</u>	<u>Control</u>	<u>0</u>	<u>0</u>	<u>8.0</u>	<u>8.4</u>	<u>0</u>	<u>8.0</u>	<u>7.6</u>	<u>0</u>	<u>8.0</u>	<u>8.0</u>	<u>0</u>	<u>8.0</u>	<u>8.0</u>
<u>2-1</u>	<u>100</u>	<u>300</u>	<u>0</u>	<u>8.1</u>	<u>7.9</u>	<u>0</u>	<u>8.0</u>	<u>7.2</u>	<u>0</u>	<u>7.9</u>	<u>7.2</u>	<u>0</u>	<u>7.7</u>	<u>5.1</u>
<u>2-2</u>	<u>180</u>	<u>540</u>	<u>0</u>	<u>8.1</u>	<u>6.7</u>	<u>0</u>	<u>8.0</u>	<u>5.8</u>	<u>0</u>	<u>7.9</u>	<u>6.1</u>	<u>0</u>	<u>7.7</u>	<u>4.5</u>
<u>2-3</u>	<u>320</u>	<u>960</u>	<u>0</u>	<u>8.0</u>	<u>6.2</u>	<u>0</u>	<u>8.0</u>	<u>4.0</u>	<u>0</u>	<u>7.9</u>	<u>2.9</u>	<u>0</u>	<u>7.4</u>	<u>3.1</u>
<u>2-4</u>	<u>560</u>	<u>1680</u>	<u>0</u>	<u>8.0</u>	<u>6.2</u>	<u>0</u>	<u>8.1</u>	<u>2.7</u>	<u>0</u>	<u>7.6</u>	<u>2.0</u>	<u>0</u>	<u>7.3</u>	<u>1.4</u>
<u>2-5</u>	<u>1000</u>	<u>3000</u>	<u>0</u>	<u>8.0</u>	<u>6.0</u>	<u>0</u>	<u>8.1</u>	<u>2.8</u>	<u>0</u>	<u>7.4</u>	<u>2.1</u>	<u>1</u>	<u>7.3</u>	<u>1.7</u>
Test Temp. °C			<u>20</u>			<u>21</u>			<u>21</u>			<u>21</u>		
Initials & Date			<u>SAB 3-22-88</u>			<u>SAB 3-23-88</u>			<u>SAB 3-24-88</u>			<u>SAB 3-25-88</u>		

COMMENTS: * Individual weights. Test substance apparently miscible with water
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SECONDARY EFFECTS (OTHER THAN MORTALITY)

Tank No.	Symptoms or Reactions	Total Number Affected			
		24-Hr.	48-Hr.	72-Hr.	96-Hr.
<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>					

Test methodology conforms with the following two test protocols:

- (1) OECD #203 "Fish, Acute Toxicity Test".
- (2) US-EPA #EG-9 "Fish Acute Toxicity Test".

03/24/1988

ENVIRONMENTAL LABORATORY FINAL REPORT

1

LAB REQUEST NO. F1286

REQUESTOR NAME: RR ROBIDEAU/SAB

DEPARTMENT: 0222

PROJECT NO: 06

DATE RECEIVED: 03/02/1988

DESC: CARBON-FILTERED WELL WATER - FEB. 1988

CONTRACT LAB: PACE

CONTRACT LAB COST: 144

3M E-L HOURS: 1

EXP COMP DATE: 03/23/1988

DATE COMPLETED: 03/23/1988

ORIGINAL SOURCE OF, WELL WATER, 3M WELL #2, ST. PAUL, MN.

SAMPLE	DATE	CODE	DESCRIPTION	RESULT	MIN DET LIMIT
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1	03/02/88	ROOM 4	WELL WATER		
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*COD	<5 MG/L	5
*SPECIFIC CONDUCTANCE	500 UMHOS/CM	
*AMMONIA NITROGEN - as N	<0.1 MG/L	
*PH	8.6 UNITS	0.1
*SOLUBLE FLUORIDE (PROBE)	0.1 MG/L	
*STANDARD PLATE COUNT	17 COL/ML	
*TOTAL DISSOLVED SOLIDS	280 MG/L	
*TOTAL ALKALINITY (PH 4.5)	220 MG/L	
*TOTAL COLIFORM	<1 COL/100ML	1
*TOTAL HARDNESS	240 MG/L	
*TOTAL RESIDUAL CHLORINE	<0.02 MG/L	
*TOTAL SOLIDS	280 MG/L	
*TOTAL SUSPENDED SOLIDS	<1 MG/L	1

* = CONTRACT LAB

SUBMITTED BY: V. Hoffman DATED: 3-24-88