

ACUTE TOXICITY TO FISH (FATHEAD MINNOW)

TEST SUBSTANCE

Identity: Mixture containing Perfluorooctanesulfonate, which may also be referred to as PFOS, FC-95, or as a component of FC-206A. (1-Octanesulfonic acid) (CAS # 2795-39-3).

Remarks: The 3M production lot number was cc 785-22. The test sample is FC-206A. Current information indicates it is a mixture of 0.92% PFOS, 18.75% diethylene glycol butyl ether, 75.44% water, 1.83% Hydroxy foamer, 1.75% sodium octyl sulfate, 1.2% poloxyethylene monooctylphenyl ether, 0.06% sodium lauryl sulfate, 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 continuous flow

GLP: No

Year completed: 1979

Species: *Pimephales promelas*

Supplier: Commerical supplier in Brady, NE

Analytical monitoring: Temperature, pH, and DO.

Exposure period: 96-hours

Statistical methods: LC₅₀ value calculated using probit computer program.

Test fish age: Juveniles

Length and weight: Average length = 41 mm
Average weight = 0.64 g (wet)

Loading: 0.64 g/L

Pretreatment: None

Test conditions:

Dilution water: Carbon-filtered well water

Dilution water chemistry:

Hardness: 236 mg/L as CaCO₃

Alkalinity: 221 mg/L as CaCO₃

Conductivity: 430 µmhos/cm

Lighting: Not given.

Stock and test solution preparation: A primary stock solution was prepared at 210,000 mg/L. General dilution factor of 70, equivalent to 3,000 mg/L. The primary stock was proportionally diluted with dilution water for the additional concentrations: dilution series 100%, 60%, 40%, 20%, 10%, and 0%.

Flow-through rate: Approximately 4.5 volume additions of test solution every 24 hours.

Concentrations dosing rate: Continuous

Stability of the test chemical solutions: Not noted.

Exposure vessels: Glass tanks (36x21x24 cm) containing 16 L of test solution.

Number of replicates: 1

Number of fish per replicate: 16

Number of concentrations: five plus a blank control

Water chemistry during the study:

pH range (0-96 hours):

7.9 – 8.0 (control exposure)

7.6 – 8.0 (3000 mg/L exposure)

Temperature range (0-96 hours): 18 - 21 °C

Dissolved oxygen range (0-96 hours):

7.0 – 9.3 mg/L (control exposure)

4.5 – 9.3 mg/L (3000 mg/L exposure)

RESULTS

Nominal concentrations: Blank control, 300, 600, 1200, 1800, and 3000 mg/L

Element values: 96-hour LC₅₀ = >3000 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 LC₅₀ for fathead minnow was determined to be >3000 mg/L, the highest concentration tested. This concentration caused a 12.5% mortality.

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

DATA QUALITY

Reliability: Klimisch ranking 3. Testing lacks record of methodology used. There is a lack of characterization of the test sample 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 4970S, 1979.

OTHER

Last changed: 6/26/00

**ENVIRONMENTAL LABORATORY
AQUATIC TOXICITY DATA SHEET**

LR 4970 S

Type Test 96-Hour C.Flow Material Tested FC-206 A CC 785-22
Lot
 Test Organism Fathead Minnow Source Brady, Neb. Date Rec'd. 6-7-79 Batch No. 8
 Avg. Wt. .64 ± .2 grams Avg. Size 4.1 ± .4 cm No. Organisms per dose 16
 Test Solution Volume 16 Liters/All-Glass Tank Tank Dimensions: 36x21 cm and 24 cm deep
 Time Started 11:00 am Date Started 7-17-79 Date Completed 7-21-79
 Dilution Water Carbon-filtered well water (Temp. 18 °C., D.O. 9.3 ppm, pH 8.0)
 Investigator M.T.E. Chasaray LC₅₀ (95% Confidence Limits) _____
 (Full Signature)

Tank No.	Init. 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
-	Control	<u>mf</u>	0	7.9	8.3	0	7.9	7.3	0	7.9	7.2	0	7.9	7.1
1	300	4,800	0	7.9	8.0	0	7.8	7.0	0	7.7	7.0	0	7.7	7.1
2	600	9,600	1	7.6	8.0	1	7.8	6.5	1	7.7	6.7	1	7.7	6.5
3	1200	19,200	0	7.6	7.7	0	7.6	5.9	0	7.6	5.9	0	7.7	5.7
4	1800	28,800	1	7.6	7.3	1	7.6	5.4	1	7.6	5.5	1	7.7	5.2
5	3,000	48,000	1	7.6	7.3	1	7.6	4.8	2	7.6	4.5	2	7.6	4.1
Test Temp. °C.			20°C			20°C			21°C			20°C		
Signature & Date			M.T.E. Chasaray 7-18-79			M. Chasaray 7-19-79			M.T.E. Chasaray 7-20-79			M.T.E. Chasaray 7-21-79		

Comments: The flow-through system was terminated on Sat. 7-21-79
and remaining fish were kept in the same test solutions.
A 48-Hour Static exposure indicated complete mortality
 Effects other than Mortality EC₅₀
in the concentrations 1800, 3000 mg/l.

Init. Conc. mg/l	Symptoms or Reactions	Total No. Affected			
		24-Hr.	48 Hr.	72-Hr.	96-Hr.
Control					
		None	None	None	None
		None	None	None	None
		None	None	None	None
		None	None	None	None
Signature & Date					

Comments: _____

REMI

PROB 19820

WEDNESDAY JULY 24 1975 13:44:00

ON ENVIRONMENTAL LABORATORY

PROB 19820 ANALYSIS FOR BIODASSAY DATA

NO OF CURVES 2 1

NO OF CONC FOR CURVE 1 5

INPUT DATA CONC NO EXPOSED NO DEAD

3000 16 0

1800 16 1

1200 16 0

1800 16 1

3000 16 2

COMMENTS FOR CURVE 1

FC 206A

CONC	LOG	FRACTION RESPONDING	FILTER FRACTION
3000	2.477121	0	0.009721071

1800	3.079161	0.009721071	0.009721071
1200	3.255279	0.009721071	0.009721071
1800	3.472121	0.009721071	0.009721071

ONE SD PROBABILITY IS 0.05

INTERCEPT	SLOPE	CHECK FOR LINEARITY
-5.011083	0.081956	0.009721071

HETEROGENEITY FACTOR 15 2.274671
SINCE G IS GREATER THAN 1 THE CONF LIMITS ARE NOT DEFINED

LOG 50 4.695529

50 LOWER CONF LIMIT

50 UPPER CONF LIMIT

C. Flow Diluter Calibration

7-17-79
9:00 am

One Cycle per 4 min (360 cycles per day)

200 ml per cycle (a complete change every 5.3 H)

4.5 changes per day

* General dilution factor 70 (7.5 ml stock per 525 ml dilution water)

* Series of dilutions:

40%
80/200

10%
20/200

Control

60%
120/200

20%
40/200

100%

Stock Solution: 210,000 mg/l → Control

Dilution factor 70 → 3,000 mg/l

Dilution %	Conc. mg/l	Conc. mg/l/liters
0 (Control)	—	—
10	300	4,800
20	600	9,600
40	1,200	19,200
60	1,800	28,800
100	3,000	48,000

LAB REQUEST NO. 4382 (STANDING)

DATE SHEET

ATTACHMENT #1

YSIS FORM

SAMPLE DESCRIPTION:
CARBON FILTERED WELL
H₂O - BIOASSAY ROOM

	PH	TOTAL CL ₂ RESIDUAL	C.O.D.	CONDUCTIVITY μmhos/cm	M-ALK.	P-ALK.	TOTAL SOLIDS	TOTAL HARDNESS	AMMONIA
7-18-78	7.8	-	<1	430	221	0	287	236	<0.1
7-25-78	7.7	-	<1	440	219	0	288	236	<0.1
7-31-78	7.7	-	<1	420	221	0	287	236	<0.1
8-14-78	7.7	-	<1	420	222	0	293	236	<0.1
8-21-78	7.6	-	<1	445	221	0	287	236	<0.1
9-01-78	7.7	-	<1	480	220	0	276	236	<0.1
9-07-78	7.7	-	<1	480	220	0	287	236	<0.1
9-15-78	7.7	<0.1	<1		222	0		232	<0.1
9-22-78	7.7	<0.1		405	222	0		232	<0.1
9-29-78	7.5	<0.1	<1	405	220	0	313	232	<0.1