

ACUTE TOXICITY TO AQUATIC INVERTEBRATES (DAPHNIA MAGNA)

TEST SUBSTANCE

Identity: A 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, an amber liquid. Current information indicates it is a mixture of 0.92% PFOS, 18.75% diethylene glycol butyl ether, 75.44% water, 1.83% Sultone foamer, 1.75% sodium octyl sulfate, 1.2% poloxyethylene monoethylphenyl 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 static

GLP: No

Year completed: 1979

Species: *Daphnia magna*

Supplier: In-house culture. Initially from OSH Wis.

Analytical monitoring: Temperature, pH, and dissolved oxygen.

Exposure period: 48-hours

Test organism age: Not given

Statistical method: Probit analysis

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 μ mhos/cm

Lighting: Not given

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

Exposure vessels: vessels with 100 mL exposure solution

Number of replicates: 2

Number of daphnids per replicate: 20

Number of concentrations: five plus a blank control

Water chemistry during the study:

pH range (0-48 hours):

8.0 – 8.0 (control exposure)
7.6 – 8.0 (1800 mg/L exposure)
Temperature range (0-48 hours): 19 – 20 °C
Dissolved oxygen range (0-48 hours):
6.9 – 8.5 mg/L (control exposure)
4.9 – 8.5 mg/L (1800 mg/L exposure)

RESULTS

Nominal concentrations: Blank control, 560, 750, 1000, 1350, and 1800 mg/L.

Element values: 48-hour EC_{50} = >1,800 mg/L (Replicate 1)
48-hour EC_{50} = >1,800 mg/L (Replicate 2)

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 48-hour LC_{50} was >1,800 mg/L, the highest concentration tested. The combined percent mortality for the replicates at this concentration was 27.5.

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 components 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.

001617

ENVIRONMENTAL LABORATORY
AQUATIC TOXICITY DATA SHEET

LR 49705

Type Test 48-H Acute Static Material Tested FC-206 A Lot CC 785-22
Test Organism Daphnia magna Source OSH, Wis. Date Rec'd. 4-11-79 Batch No. 1783
Avg. Wt. _____ grams Avg. Size _____ CM No. Organisms per dose 20
Test Solution Volume 100 ml Liters/All-Glass Tank Tank Dimensions: 36x21 cm and 24 cm deep
Time Started 10:30 am Date Started 7-12-79 Date Completed 7-14-79
Dilution Water Carbon-filtered well water (Temp. 20 °C., D.O. 8.5 ppm, pH 8.0)
Investigator M. S. Chasakany EC₅₀* (95% Confidence Limits) 2640 5365
(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
	Control	<u>ml</u>	0	8.0	7.2	0	8.0	6.9	/				
	566	56	0	8.0	7.0	0	7.9	6.2					
	750	75	0			0							
	1000	100	0			0							
	1350	135	1			1							
	1800	180	3	7.6	6.2	6	7.6	4.9					
Test Temp. °C.			<u>19°C</u>			<u>19°C</u>							
Signature & Date			<u>M. S. Chasakany</u> <u>7-12-79</u>			<u>M. S. Chasakany</u> <u>7-14-79</u>							

Comments: * Immobilization

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Effects other than Mortality

EC₅₀

Init. Conc. mg/l	Symptoms or Reactions	Total No. Affected			
		24-Hr.	48 Hr.	72-Hr.	96-Hr.
Control					
Signature & Date					

Comments:

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ENVIRONMENTAL LABORATORY
AQUATIC TOXICITY DATA SHEET

1249705

Type Test 48-H Acute Static Material Tested FC-206 A cc 785-22
Lot

Test Organism Daphnia magna Source OSH Wisc. Date Rec'd. 4-11-79 Batch No. 1825

Avg. Wt. _____ grams Avg. Size _____ CM No. Organisms per dose 20

Test Solution Volume 100 ml Liters/All-Glass Tank Tank Dimensions: 36x21 cm and 24 cm deep

Time Started 10:30 am Date Started 7-12-79 Date Completed 7-14-79

Dilution Water Carbon-filtered well water (Temp. 20 °C., D.O. 8.5 ppm, pH 8.0)

Investigator M. S. Krasaw EC₅₀ (95% Confidence Limits) 2154 18865
(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
	Control	<u>mf</u>	0	8.0	7.5	0	8.0	7.2	X				
	500	5.6	0	8.0	7.0	0	8.0	6.3					
	750	7.5	0			0	7.8	5.9					
	1000	10.0	0			0	7.7	5.9					
	1350	13.5	0			1	7.7	5.6					
	1800	18.0	2	7.7	6.5	5	7.7	5.5					
Test Temp. °C.			<u>19°C</u>			<u>19°C</u>							
Signature & Date			<u>M. S. Krasaw</u> <u>7-13-79</u>			<u>M. S. Krasaw</u> <u>7-14-79</u>							

Comments: * Immobilization

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Effects other than Mortality

EC₅₀

Init. Conc. mg/l	Symptoms or Reactions	Total No. Affected			
		24-Hr.	48 Hr.	72-Hr.	96-Hr.
Control					
Signature & Date					

Comments:

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◆◆◆PROBIT ANALYSIS FOR BIOASSAY DATA◆◆◆

NO. OF CURVES ? 4
NO. OF CONC. FOR CURVE 1 ? 4
INPUT DATA-CONC., NO. EXPOSED, NO. DEAD
? 560r16r0
? 750r16r1
? 1000r16r2
? 1350r16r11

COMMENTS FOR CURVE 1
? FC-206A FISH

CONC.	LOG	FRACTION RESPONDING	FITTED FRACTION
560	2.748188	0	0.001130384
750	2.875061	0.0625	0.02755678
1000	3	0.125	0.2119698
1350	3.130334	0.6875	0.6432121

CHI-SQ PROBABILITY IS > 0.05

NO. OF ITERATIONS	INTERCEPT (A)	SLOPE (B)	CHI-SQ FOR LINEARITY	CHI-SQ FOR PROBABILITY
6	-27.65447	8.951618	1.608148	0.447502

HETEROGENEITY FACTOR (H) = 1
G = 0.2756303

LD-50 = 1228.363

95 PCT. LOWER CONF. LIMIT = 1098.326
95 PCT. UPPER CONF. LIMIT = 1495.013

NO. OF CONC. FOR CURVE 2 ? 5
INPUT DATA-CONC., NO. EXPOSED, NO. DEAD
? 560r16r1
? 750r16r2
? 1000r16r2
? 1350r16r10

COMMENTS FOR CURVE 2
? FC-206A FISH

CONC.	LOG	FRACTION RESPONDING	FITTED FRACTION
420	2.623249	0	0.005238648
560	2.748188	0.0625	0.0281254
750	2.875061	0.125	0.1059364
1000	3	0.125	0.2749694
1350	3.130334	0.625	0.5322085

CHI-SQ PROBABILITY IS > 0.05

NO. OF ITERATIONS	INTERCEPT (A)	SLOPE (B)	CHI-SQ FOR LINEARITY	CHI-SQ FOR PROBABILITY
5	-16.21943	5.207192	3.195752	0.3624176

HETEROGENEITY FACTOR (H) = 1
G = 0.2767633

LD-50 = 1302.605

95 PCT. LOWER CONF. LIMIT = 1094.272
95 PCT. UPPER CONF. LIMIT = 1929.568

NO. OF CONC. FOR CURVE 3 ? 3
INPUT DATA-CONC., NO. EXPOSED, NO. DEAD
? 1000r20r0
? 1350r20r1
? 1800r20r6

COMMENTS FOR CURVE 3
? DAPHNIA FC-206A

CONC.	LOG	FRACTION RESPONDING	FITTED FRACTION
1000	3	0	0.001701208
1350	3.130334	0.05	0.04492807
1800	3.255273	0.3	0.3034518

CHI-SQ PROBABILITY IS > 0.05

NO. OF ITERATIONS	INTERCEPT (A)	SLOPE (B)	CHI-SQ FOR LINEARITY	CHI-SQ FOR PROBABILITY
6	-31.30478	9.458595	0.84704249	0.8282919

HETEROGENEITY FACTOR (H) = 1
G = 0.6615363

LD-50 = 2040.161

95 PCT. LOWER CONF. LIMIT = 1782.836
95 PCT. UPPER CONF. LIMIT = 5364.881
NO. OF CONC. FOR CURVE 4 ? 3
INPUT DATA-CONC., NO. EXPOSED, NO. DEAD
? 1000r20r0
? 1350r20r1
? 1800r20r5

COMMENTS FOR CURVE 4
? DAPHNIA FC-206A

CONC.	LOG	FRACTION RESPONDING	FITTED FRACTION
1000	3	0	0.002415658
1350	3.130334	0.05	0.04306271
1800	3.255273	0.25	0.2546487

CHI-SQ PROBABILITY IS > 0.05

NO. OF ITERATIONS	INTERCEPT (A)	SLOPE (B)	CHI-SQ FOR LINEARITY	CHI-SQ FOR PROBABILITY
4	-28.18185	8.45457	0.07407743	0.7854

HETEROGENEITY FACTOR (H) = 1
G = 0.7854512

LD-50 = 2154.405

95 PCT. LOWER CONF. LIMIT = 1824.618
95 PCT. UPPER CONF. LIMIT = 18864.85

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LR-49703

DATE _____

SEE

ANALYSIS FORM

PH	TOTAL CL ₂ RESIDUAL ₂	C.O.D.	CONDUCTIVITY	M-ALK.	P-ALK.	TOTAL SOLIDS	TOTAL HARDNESS	AMMONIA
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1	7-18-78	7.8	-	<1	430	221	0	287	236	<0.1		
2	7-25-78	7.7	-	<1	440	219	0	288	236	<0.1		
3	7-31-78	7.7	-	<1	420	221	0	287	236	<0.1		
4	8-14-78	7.7	-	<1	420	222	0	293	236	<0.1		
5	8-21-78	7.6	-	<1	445	221	0	294	236	<0.1		
6	9-01-78	7.7	-	<1	400	220	0	276	236	<0.1		
7	9-07-78	7.7	-	<1	400	220	0	276	236	<0.1		
8	9-15-78	7.7	<0.1	<1		222	0		232	<0.1		
9	9-22-78	7.7	<0.1		405	222	0		232	<0.1		
10	9-29-78	7.5	<0.1	<1	405	220	0	313	232	<0.1		

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