

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-600. (1-Octanesulfonic acid, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-, potassium salt, CAS # 2795-39-3)

Remarks: The 3M production lot number was not noted. The test sample is FC-600 (SCAS Treated Effluent*). Current information indicates FC-600 is a mixture of 1.0% PFOS, 81.20% water, 12.00% diethylene glycol butyl ether, 1.00% sodium octyl sulfate, 2.00% propane Sultone foamer, 1.00% sodium decyl sulfate, 0.85% xanthan gum, 0.1% N-(3-chloroallyl) hexaminium chloride, 0.80% starch, and 0.05 % benzotriazole.

The following summary applies to a mixture with incompletely characterized concentration of impurities that was treated in a SCAS reactor. Data may not accurately reflect the toxicity of the fluorochemical component of the test sample.

This study is the second of 3 daphnia studies conducted to determine the toxicity of FC-600 after being treated through a SCAS reactor. This study used the supernatant of a mixed microbial culture that initially contained FC-600 at 667 mg/L*. The effluent was collected after 4 hours of treatment in a SCAS reactor. The inoculum used came from the Metro Wastewater Treatment Plant, St. Paul, MN.

* The study references a "1,000 mg/L" concentration. This value is not accurate as it does not include dilution by the sewage mixed liquor.

METHOD:

Method: Not noted.

Type: Static acute

GLP: No

Year completed: 1977

Species: *Daphnia magna*

Supplier: Not noted.

Analytical monitoring: Dissolved oxygen

Exposure period: 48-hours

Test organism age: Not noted.

Statistical method: EC₅₀ calculated by graphing data and by probit analysis.

Test conditions:

Dilution water: Carbon-filtered well water, aerated.

Dilution water chemistry:

Dissolved oxygen: 9.4 mg/L

**Exhibit
1143**

State of Minnesota v. 3M Co.,
Court File No. 27-CV-10-28862

3M_MN01658221

1143.0001

Lighting: Not noted.

Stock and test solution preparation: Volume/volume addition

Exposure vessels: Not noted.

Number of replicates: two

Number of daphnids per replicate: 10

Number of concentrations: six (control was written up as a separate study)

Water chemistry during the study:

Dissolved oxygen (final):

5.6 mg/L (control)

0.6 mg/L (100% effluent exposure)

RESULTS

Nominal concentrations: 5.6%, 10%, 18%, 32%, 56%, and 100%

Element values: 48-hour $EC_{50} = 12.6$ (10 – 15) %

Element values based on nominal concentrations

Remarks: Testing was conducted on the SCAS treated mixture as described in the Test Substance Remarks field. The value reported applies to that mixture and not the fluorochemical proportion alone.

CONCLUSIONS

The SCAS treated FC-600 effluent 48-hour EC_{50} was determined to be 12.6% with a 95% confidence interval of 10 to 15%.

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

DATA QUALITY

Reliability: Klimisch ranking = 3. This study lacks description of the methodology used, reporting of test conditions and information on the amount of test substance remaining after SCAS treatment. The 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 3M Company, Environmental Laboratory, St. Paul, MN, 1977.

OTHER

Last changed: 6/16/00

740101

 ENVIRONMENTAL ENGINEERING LABORATORY
 AQUATIC TOXICITY WORK SHEET

Type Test 48⁹⁶ Hours - TOLERANCE STUDY Material Tested FC 600 (SEAB TREATED) ~1000
 Test Organism DAPHNIA MAGNA Avg. Weight _____ Avg. Size _____
 Date Started 8/8/77 Date Completed 8/10/77
 Time Started 1:30 PM Plotted LC₅₀ 13%
 Dilution Water Carbon Filtered - Well Water (AERATED TO 9.4 mg/l)

	2 hrs	24 hrs	48 hrs	96 hrs	
	%	%	%	%	
Conc.	Survival	Survival	Survival	Survival	D.O.
	pH	pH	pH	pH	ppm
#1	5.6%	100	100	95	5.9
#2	10%	100	80	70	5.2
3-1	18	70	30	25	5.0
3-2	32	10	0	0	4.6
3-3	56	0	0	0	1.9
3-4	100*	0	0	0	0.6
3-5					
3-6					

Average Temperature

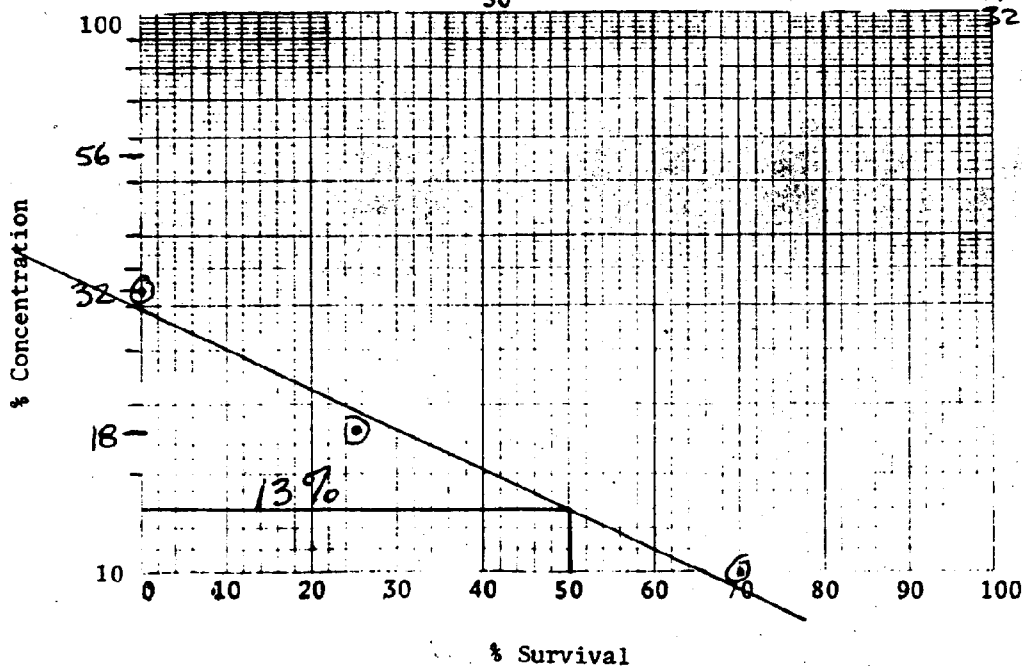
69

69

68

Comments: * 100% ~ 1,000 ppm FC 600

INITIAL D.O. 4.0 mg/l

LC₅₀ Calculation

3M_MN01658223

1143.0003

INTERCEPT SLOPE CHI-SQ FOR CHI-SQ FOR
H2 H2 LINEARITY PROBABILITY

-4.860153 5.11405229 2.159488 0.706352

HOETEROGENEITY FACTOR (H) = 1 G = 0.2260103

50 = 2781.941

95% LOWER CONF. LIMIT = 1705.501

95% UPPER CONF. LIMIT = 8100.754

NO. OF CONC. FOR CURVE 2 ?

INPUT DATA CONC. NO. EXPOSED NO. DEAD

50 20 1

10 20 6

18 20 15

12 20 20

LOG FRACTION FITTED
CONC. RESPONDING FRACTION

0.748188 0.05 0.03697681

1 0.9 0.3073466

1.255273 0.75 0.7874975

1.50515 1 0.9808404

SC PROBABILITY IS > 0.05

INTERCEPT SLOPE CHI-SQ FOR CHI-SQ FOR
INTERACTIONS (A) (B) LINEARITY PROBABILITY

-5.600499 5.097114 0.6590621 0.7192609

HOETEROGENEITY FACTOR (H) = 1 G = 0.1238887

50 = 12.55333

95% LOWER CONF. LIMIT = 10.47605

95% UPPER CONF. LIMIT = 15.01223

NO. OF CONC. FOR CURVE 3 ?

FC-600
2/3/27
RAW

FC-600
SCAS TREATED
~1,000 ppm