

ACUTE TOXICITY TO AQUATIC INVERTABRATES (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-heptafluoro-, 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

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

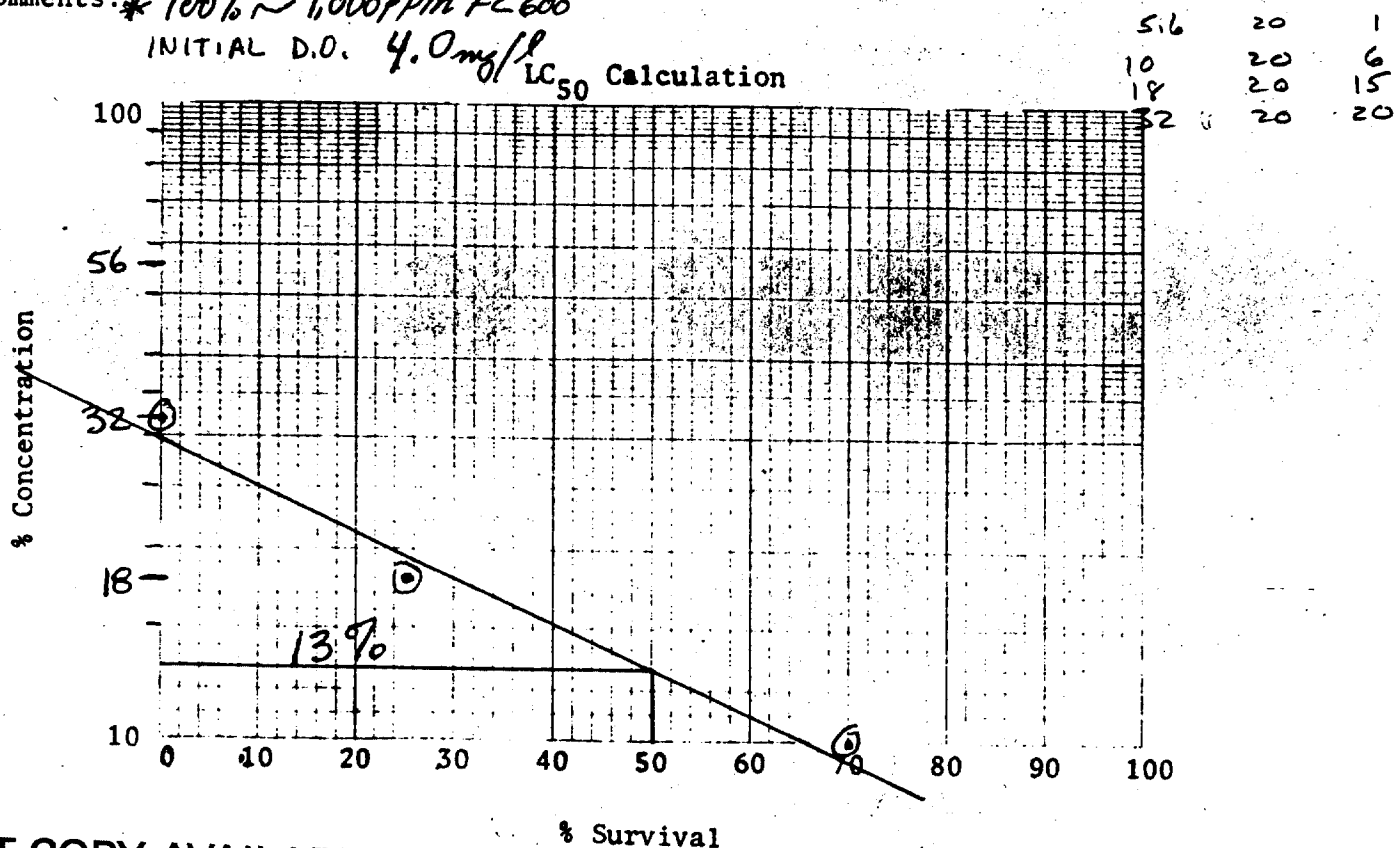
ENVIRONMENTAL ENGINEERING LABORATORY
 AQUATIC TOXICITY WORK SHEET
Type Test 48⁹⁶ Hours - TOLERANCE STUDYMaterial Tested FC 600 (SEAB TREATED) ~1,000Test Organism DAPHNIA MAGNA Fathead Minnow

Avg. Weight _____ Avg. Size _____

Date Started 8/8/77Date Completed 8/10/77Time Started 1:30 pmPlotted LC₅₀ 13%Dilution Water Carbon Filtered - Well Water (AERATED TO 9.4 mg/l)

	2 hrs			24 hrs			48 hrs			96 hrs		
	%		D.O	%		D.O	%		D.O	%		D.O
Conc.	Survival	pH	ppm	Survival	pH	ppm	Survival	pH	ppm	Survival	pH	ppm
#1 #2 3-1 3-1 3-2 3-2 3-3 3-3 3-4 3-4 3-5 3-5	5.6% Control	100		100			95		5.9			
	10%	100		80			70		5.2			
	18	70		30			25		5.0			
	32	10		0			0		4.6			
	56	0		0			0		1.9			
	100*	0		0			0		.8 .6			
Average Temperature			69	69			68					

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

INITIAL D.O. 4.0 mg/lLC₅₀ Calculation

DATA: 0.001
LINEARITY: 0.2260103
PROBABILITY: 0.1238887
HETEROGENEITY FACTOR (H) = 1
G = 0.2260103

NO. OF CONC. FOR CURVE 2: 7
NO. OF DATA CONC.: NO. EXPOSED: NO. DEAD
LOG CONC. FRACTION RESPONDING FITTED FRACTION
0.748188 0.05 0.03697681
1.255273 0.05 0.073466
1.505151 0.05 0.07874975
1.505151 0.05 0.09808404

PROBABILITY IS > 0.05
INTERCEPT (A) SLOPE (B) CHI SQ FOR LINEARITY CHI SQ FOR PROBABILITY
-5.600499 5.097114 0.6590621 0.7192609

HETEROGENEITY FACTOR (H) = 1
G = 0.1238887
LOWER CONF. LIMIT = 10.47605
UPPER CONF. LIMIT = 15.01223

NO. OF CONC. FOR CURVE 3: 2

LOG CONC. FRACTION RESPONDING FITTED FRACTION
0.748188 0.05 0.03697681
1.255273 0.05 0.073466
1.505151 0.05 0.07874975
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