

ACUTE TOXICITY TO AQUATIC INVERTEBRATES (DAPHNIA MAGNA)

TEST SUBSTANCE

Identity: Mixture containing perfluorooctanesulfonate which may also be referred to as PFOS, FC-95, or as a component of FC-3017. (1-Octanesulfonic acid) (CAS # 2795-39-3).

Remarks: The 3M production lot number was not noted. The test sample is FC-3017 produced in Antwerp, Belgium. Current information indicates FC-3017 is a mixture of 0.67% PFOS, 20% diethylene glycol butyl ether, 55.41% water, 21% ethylene glycol, 1.33% Hydroxy foamer, 1% sodium octyl sulfate, 0.5% polyoxyethylene monooctylphenyl ether, 0.04% sodium lauryl sulfate, and 0.05% tolyltraizole.

The following summary applies to a mixture with incompletely characterized concentrations of impurities. Data may not accurately reflect toxicity of the fluorochemical component of the test sample.

METHOD:

Method: OECD Guideline 202

Type: Acute static

GLP: No

Year completed: 1995

Species: *Daphnia magna*

Supplier: In-house cultures, maintained at ASci-DETD, Duluth, MN

Analytical monitoring: Temperature, pH, conductivity, and dissolved oxygen.

Exposure period: 48-hours

Test organism age: <24 hours old

Statistical methods: LC₅₀ values calculated using a computer program.

Test conditions:

Dilution water: Dechlorinated City of Duluth, MN tap water post carbon filter, aerated for 24 hours prior to use.

Dilution water chemistry:

Hardness: 50 mg/L as CaCO₃

Alkalinity: 46 mg/L as CaCO₃

Conductivity: 127 – 143 µmhos/cm

pH: 7.82

TOC: 1.6 mg/L

Lighting: Cool-white fluorescent lights. A daily photoperiod of 16 hours light and 8 hours dark was maintained throughout the testing period.

Stock and test solution preparation: The test material was added directly to the dilution water on a weight/volume basis and mixed by mechanical stirring at ambient lab temperature.

Exposure vessels: 250 mL beakers with 200 mL test solution.

Number of replicates: 4

Number of daphnids per replicate: 5

Number of concentrations: one plus a blank control

Water chemistry during the study:

pH range (0-48 hours):

7.9 – 8.2 (control exposure)

7.8 – 7.9 (1000 mg/L exposure)

Temperature range (0-48 hours): 20.1 – 20.6 °C

Conductivity range (0-48 hours):

127 – 139 µmhos/cm (control exposure)

142 – 143 µmhos/cm (1000 mg/L exposure)

Dissolved oxygen range (0-48 hours):

8.1 – 8.8 mg/L (control exposure)

7.7 – 8.9 mg/L (1000 mg/L exposure)

RESULTS

Nominal concentrations: Blank control and 1000 mg/L.

Element values: 24-hour EC₅₀ = >1000 mg/L

48-hour EC₅₀ = >1000 mg/L

48-hour NOEC = 1000 mg/L

Element values based on nominal concentrations.

Remarks: Testing was conducted on the 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 substance 48-hour EC₅₀ was determined to be >1000 mg/L. The 48-hour No Observed Effect Concentration (NOEC) was 1000 mg/L.

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

DATA QUALITY

Reliability: Klimisch ranking = 2. This study 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 solution.

REFERENCES

This test was conducted by AScl Corporation, Duluth Environmental Testing Division, Duluth, MN at the request of the 3M Company, Lab Request number N3188, 1995.

OTHER

Last changed: 6/26/00.

BEST COPY AVAILABLE

ASCI Corporation/ASCI-Duluth
Environmental Testing Division
ASCI Study ID# 5010-068

STUDY TITLE

ACUTE TOXICITY OF FC-3017 TO *DAPHNIA MAGNA*

DATA STANDARD

OECD GUIDELINE 202

STUDY COMPLETED

December 23, 1995

TESTING FACILITY

ASCI Corporation/ASCI-Duluth
Environmental Testing Division
112 East Second Street
Duluth, MN 55805-1701

Tel. No. (218) 722-4040
Fax No. (218) 722-2592

STUDY IDENTIFICATION NUMBERS

ASCI Study ID# 5010-068

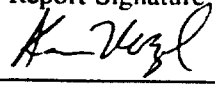
3M Company Lab Request# N3188

Sponsor: 3M Company
Sponsor Study ID# N3188

BEST COPY AVAILABLE

ASCI Corporation/ASCI-Duluth
Environmental Testing Division
ASCI Study ID# 5010-068

1.0 GENERAL INFORMATION

Study Title	Acute Toxicity of FC-3017 Light Water Brand Aqueous Film Forming Foam to <i>Daphnia magna</i> .	
Data Standard	OECD Guideline 202.	
Sponsor	3M Environmental Technology and Services, Building 2-3E-09, 935 Bush Avenue, St. Paul, MN 55106.	
Sponsor's Representative	Susan A. Beach, 3M Environmental Technology and Services, Building 2-3E-09, 935 Bush Avenue, St. Paul, MN 55106. Tel No. (612) 778-7452.	
Sponsor's Lab Request#	N3188.	
Testing Facility	ASCI Corporation/ASCI-Duluth Environmental Testing Division, 112 East Second Street, Duluth, MN 55805; Tel. No. (218) 722-4040.	
Principal Investigator	Joe Dierkes.	
Project Director	Joe Amato.	
Testing Facility Director	Donald Mount.	
Definitive Test Dates	December 21-23, 1995.	
Data Validation and Report Review	Alan Mozol.	Report Signature: 
Retention of Raw Data and Final Report	Two years from the date study is completed.	
Location of Raw Data and Final Report	ASCI Corporation/ASCI-Duluth Environmental Testing Division, 112 East Second Street, Duluth, MN 55805; Tel. No. (218) 722-4040.	

Sponsor: 3M Company
Sponsor Study ID# N3188

BEST COPY AVAILABLE

ASCI Corporation/ASCI-Duluth
Environmental Testing Division
ASCI Study ID# 5010-068

2.0 OBJECTIVE(S)

To determine the 48-h median effect concentration (EC_{50}) and 48-h no observable effect concentration (NOEC) of the test substance, FC-3017 Light Water Aqueous Film Forming Foam, for *Daphnia magna*.

This study was conducted according to the ASCI study plan retained by the Sponsor and OECD Guideline 202 (OECD 1993).

3.0 TEST METHODS

Test Substance	<i>Properties:</i> Clear amber-colored liquid, specific gravity ca. 1.1 (water = 1), miscible with water, and stable. <i>Test concentrations:</i> 0 (dilution water control) and 1000 mg/L. High concentration test solution was prepared by mass addition followed by mechanical stirring at ambient lab temperature.
Test Organisms	<i>Source:</i> Healthy, less than 24-h old <i>Daphnia magna</i> neonates obtained from ASCI stock cultures maintained in water of test dilution water quality. <i>Use in test:</i> Gravid adults isolated in dilution water 24 h before the test initiation. Used 5 organisms/replicate and 4 replicates/test concentration. Handled with a smooth bore pipet with an inside diameter of 6 mm. Did not feed during the test.
Dilution Water	<i>Source:</i> Dechlorinated City of Duluth, MN, tap water. The most recent chemical analysis is in Raw Data Package. <i>Characteristics:</i> At test time, the water had a hardness of 50 mg/L (as $CaCO_3$) and a pH of 7.82. Aerated for 24 h prior to using in the test.
Exposure Chambers	<i>Type:</i> 250-ml borosilicate glass beakers. <i>Use in test:</i> 200 ml of dilution water or test solution/chamber. During the test, kept covered, except when experimental observations were made.

BEST COPY AVAILABLE

ASel Corporation/ASel-Duluth
Environmental Testing Division
ASel Study ID# 3010-068

Incubation	<i>Duration:</i> 48 h. <i>Daily photoperiod:</i> 16 h light and 8 h dark, maintained using cool white fluorescent lamps. <i>Temperature:</i> 20°C.
Observations	<i>Biological:</i> Daily- gently agitated the exposure chambers and then counted immobilized and dead test organisms (immobilized organisms were those that did not swim within 15 seconds after exposure chambers were gently agitated). Did not remove any daphnids from the exposure chambers at 24 h. <i>Water chemistry:</i> (1) At test initiation- total hardness, alkalinity, specific conductivity, pH, and DO, (2) daily- temperature, and (3) at test termination- specific conductivity, pH, and DO. All determinations were made according to APHA methods (1989).
Endpoint Calculations	Formal calculations not needed due to lack of effect.

4.0 RESULTS

Test Substance Toxicity (Pertinent data are in Table 1)	24-h EC_{50}: > 1000 mg/L. 48-h EC_{50}: > 1000 mg/L. 48-h $NOEC$: 1000 mg/L.
---	---

BEST COPY AVAILABLE

ASel Corporation/ASel-Duluth
Environmental Testing Division
ASel Study ID# 5010-068

Ranges of Water Chemistry Parameters	<i>Total hardness (as CaCO₃ mg/L): 50.</i> <i>Alkalinity (as CaCO₃ mg/L): 46.</i> <i>Temperature (°C): 20.1-20.6.</i> <i>DO (mg/L): 7.7-8.9.</i> <i>pH: 7.82-8.20.</i> <i>Specific conductivity (umhos/cm): 127-143.</i>
--------------------------------------	---

5.0 TEST QA/QC

QA/QC Criteria	Data
Test organism dead, immobilized or trapped in control exposure must not be more than 10%.	0% dead, immobilized or trapped.
The lowest DO concentration at test termination must be at least 60% of the air saturation value at test temperature.	The lowest DO concentration measured was 85% of the air saturation value at 20.0°C.
Test duration must be 48 h.	The test duration was 48 h.
Reference substance (sodium chloride) toxicity test.	ASel's updated reference toxicity test control chart is in the Raw Data Package.

6.0 REFERENCES

American Public Health Association (APHA). 1989. Standard Methods for the Examination of Water and Wastewater. APHA, Washington, D.C.

Organization for Economic Cooperation and Development (OECD). 1981/1993. OECD Guidelines for Testing of Chemicals. OECD Publication Information Center, Washington, D.C.

BEST COPY AVAILABLE

ASel Corporation/ASel-Duluth
Environmental Testing Division
ASel Study ID# 5010-068

TABLE 1. Acute toxicity of FC-3017 Light Water Aqueous Film Forming Foam to *Daphnia magna*

Test Substance Concentration (mg/L)	Cumulative Number and % of Dead and Immobilized Organisms*	
	24 h	48 h
0	0 (0)	0 (0)
1000	0 (0)	0 (0)

* Percentages are in parenthesis.

EFFECT AND NO-EFFECT CONCENTRATIONS WITH
CORRESPONDING 95% CONFIDENCE INTERVALS

EC ₅₀ and NOEC	Data (mg/L)	95% Confidence Interval
24-h EC ₅₀	> 1000 mg/L	Not calculable
48-h EC ₅₀	> 1000 mg/L	Not calculable
48-h NOEC	1000 mg/L	Not applicable