

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-203. (1-Octanesulfonic acid) (CAS # 2795-39-3).

Remarks: The 3M production lot number was not noted. The test sample is FC-203. Current information indicates it is a mixture of 1.34% PFOS, 35% diethylene glycol butyl ether, 37.85% water, 20% ethylene glycol, 2.66 % Sultone foamer, 3% sodium octyl sulfate, 0.1% sodium lauryl sulfate, and 0.05% tolyltriazole.

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: Standard Methods (APHA), 1970 Edition

Type: Acute static

GLP: No

Year completed: 1973

Species: *Daphnia magna*

Supplier: In-house cultures maintained at Bionomics, Inc., Wareham, MA..

Analytical monitoring: Temperature, pH, conductivity and DO

Exposure period: 48-hours

Test organism age: 12 ± 12 hrs. old

Statistical method: TL₅₀ (median tolerance limit) values calculated using a linear regression equation.

Test conditions:

Dilution water: Well water

Dilution water chemistry:

Alkalinity: 35 mg/L as CaCO₃

pH: 7.1

Lighting: Not given

Stock and test solution preparation: Exposure concentrations prepared by direct addition of test substance.

Exposure vessels: 250 mL beakers with 200 mL exposure solution

Number of replicates: 4

Number of daphnids per replicate: 5

Number of concentrations: five plus a blank control

Food: Food, consisting of a homogenization of starter trout food and Cerophyl in water, was added at rate of 0.5 mL/L after introduction of test substance.

Water chemistry during the study:

pH range (0-48 hours): 7.1

Temperature range (0-48 hours): 21 ± 1 °C
Dissolved oxygen range (0-48 hours): 5.3 – 8.9 mg/L

RESULTS

Nominal concentrations: Bk control, 560, 870, 1000, 1800, and 3200 mg/L.

Element values: 48-hour EC₅₀ = 1560 (1280 - 2140) 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 1560 mg/L with a 95% confidence Interval of 1280 to 2140 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, the sample purity was not properly characterized and the study lacks analytical confirmation of the amount of fluorochemical proportion in the solution.

REFERENCES

Test was conducted by Bionomics, Inc., of Wareham, MA at the request of the 3M Company, St. Paul, MN, 1973.

OTHER

Last changed: 6/27/00.

Dec 1973

FC-203
FC-203

BIOASSAY REPORT
SUBMITTED TO
MINNESOTA MINING & MANUFACTURING COMPANY
ST. PAUL, MINNESOTA

FC 200 FC 203

ACUTE TOXICITY OF 3M SAMPLES (A AND B) TO THE WATER FLEA
(Daphnia magna) AND SCUD (Gammarus fasciatus).

Bionomics, Inc.
790 Main Street
Wareham, Massachusetts
December, 1973

METHODS AND MATERIALS

These investigations were performed at the aquatic invertebrate toxicology laboratory of Bionomics, Inc., Wareham, Massachusetts. The susceptibility of the water flea, Daphnia magna and scud Gammarus fasciatus to 3M samples designated as sample numbers A and B (100% active) was evaluated under static conditions for a 48 hour experimental period. Results were expressed as the median tolerance limit (TL₅₀), the nominal concentration of the test compound in water causing 50 percent mortality. The TL₅₀ values and 95% confidence intervals were calculated by converting the test concentration and the corresponding observed percent mortalities to logs and probits, respectively. These values were then used to calculate a linear regression equation.

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Both Daphnia and Gammarus were obtained from laboratory cultures and judged to be in excellent condition. Procedures for the static bioassays adhered to the protocol described by the 1970 edition of Standard Methods (APHA). Static Daphnia and Gammarus bioassays were conducted in 250 ml beakers with 200 ml of the experimental diluent. The diluent water was obtained from a well source and was used as such. The experimental chambers were maintained in a

water bath at $21^{\circ} \pm 1^{\circ}\text{C}$. Five 12 ± 12 hour old Daphnia were introduced into each experimental beaker and five fourth instar Gammarids were introduced into each experimental chamber for the Daphnia and Gammarus bioassays, respectively.

In the Daphnia bioassays, food was added at a rate of 0.5 ml/liter after the introduction of the compound to the test vessels.

Bioassays were conducted using four replicates of each concentration for both compounds (A and B) for both species. The pH of the standard diluent was 7.1 and the methyl orange alkalinity was 35 ppm as CaCO_3 . Dissolved oxygen values for the various test vessels for both compounds ranged from 8.9 initially to 5.3 mg/l at the end of the test.

¹Food was prepared by homogenizing 5 g of starter trout food and 1 g of Cero-phyl in 100 ml of water.

RESULTS

The predicted 48 hour TL_{50} (i.e. that concentration of active compound that allows 50 percent survival to the experimental animals) and 95% confidence intervals for Gammarus and Daphnia exposed to compounds A and B are presented in Table 1. A summary of the observed mortality of Daphnia and Gammarus exposed to various concentrations of compound A is given in Table 2. The observed mortality of Daphnia and Gammarus exposed to experimental concentrations of compound B is given in Table 3.

SUBMITTED BY:

Bionomics, Inc.

790 Main Street

Wareham, Mass.

December, 1973

PREPARED BY:

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Invertebrate Toxicologist

APPROVED BY:

Kenneth J. Macek, Ph.D.

Director

Table 1 - Acute toxicity of 3 M compounds A and B to the water flea^a (Daphnia magna) and scud^b (Gammarus fasciatus) exposed for a 48 hour experimental period.

Species	48 hour TL ₅₀ -mg/liter	
	Compound A 200	Compound B 203
^{water flea} <u>Daphnia magna</u>	31.1 (23.3-41.5) ^c	1560.0 (1280.0-2140.0)
^{Scud} <u>Gammarus fasciatus</u>	15.4 (12.8-20.1)	1130.0 (843.0-1310.0)

^aBioassay conducted at 21° ± 1C, Daphnia, 12 ± 12 hours old at initiation of tests.

^bBioassays conducted at 21°C ± 1C, Gammarus, fourth instar at initiation of tests.

^c95% confidence intervals.

Table 2 - Concentrations tested and corresponding observed percent mortalities for the water flea, (Daphnia magna); and such (Gammarus fasciatus) exposed to 3M compound A for a 48 hour experimental period.

Species	Concentration mg/l	% Mortality Observed 48 hour
Water Flea	42.0	100
(<u>Daphnia magna</u>)	32.0	60
	24.0	0
	12.0	0
	10.0	0
	7.5	0
	Control	0
Scud	32.0	100
(<u>Gammarus fasciatus</u>)	24.0	70
	18.0	60
	12.0	50
	7.5	0
	Control	0

Table 3 - Concentrations tested and corresponding observed percent mortalities for the water flea (Daphnia magna) and scud (Gammarus fasciatus) exposed to 3M compound B for a 48 hour experimental period.

Species	Concentration mg/l	% Mortality Observed 48 hour
Water flea	3200.0	100
(<u>Daphnia magna</u>)	1800.0	45
	1000.0	5
	870.0	0
	560.0	0
	Control	0
Scud	3200.0	100
(<u>Gammarus fasciatus</u>)	1800.0	90
	1000.0	45
	870.0	40
	560.0	0
	Control	0