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-206 or L-3243. (1-Octanesulfonic acid) (CAS # 2795-39-3).

Remarks: The 3M production lot number was not noted. The test sample is FC-206, identified by the laboratory as "Sample C". Current information indicates it is a mixture of 0.67% PFOS, 17.5% diethylene glycol butyl ether, 78.91% water, 1.33% Sultone foamer, 1% sodium octyl sulfate, 0.04% sodium lauryl sulfate, 0.5% polyoxyethylene monooctylphenyl ether, and 0.05% benzotriazole.

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: Methods for Toxicity Tests with Aquatic Organisms as formulated by the Committee for Toxicity Tests with Aquatic Organisms
Type: Acute static
GLP: No
Year completed: 1974
Species: *Daphnia magna*
Supplier: In-house cultures maintained at Bionomics, EG&G, Inc., Wareham, MA.
Analytical monitoring: Not given.
Exposure period: 48-hours
Test organism age: 12 - 24 hours old
Statistical method: TL_{50} (median tolerance limit) values calculated using a linear regression equation.
Test conditions:
Dilution water: Well water, aged 24 hours
Dilution water chemistry: Not given
Lighting: Not given
Stock and test solution preparation: Not given.
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:

Temperature range (0-48 hours): 20 ± 1 °C

RESULTS

Nominal concentrations: Blank control, 3200, 4200, 5600, 7500, and 10000 mg/L.

Element values: 48-hour TL_{50} = 5850 (4810 - 7110) mg/L
48-hour NOEL = 3200 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 FC-206 48-hour TL_{50} was determined to be 5850 mg/L with a 95% confidence interval of 4810 to 7110 mg/L. The 48-hour no observed effect level (NOEL) was 3200 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, EG&G, Inc., of Wareham, MA at the request of the 3M Company, St. Paul, MN, 1974.

OTHER

Last changed: 6/28/00.

[redacted]

BIOASSAY REPORT

SUBMITTED TO

3M COMPANY

ST. PAUL, MINNESOTA

ACUTE TOXICITY OF SAMPLE C TO WATER FLEA (*Daphnia magna*), AND SCUD (*Gammarus fasciatus*).

Bionomics
E G & G, Inc.
Environmental Consultants
790 Main Street
Wareham, Massachusetts
August, 1974

METHODS AND MATERIALS

These investigations were performed at the aquatic toxicology laboratory of Bionomics, E G & G, Inc., Wareham, Massachusetts. The susceptibility of water flea (Daphnia magna), and scud (Gammarus fasciatus) to Sample C, a brown liquid, was evaluated under static bioassay conditions for a 48-hour period. Results were expressed as the median tolerance limit (TL_{50}), the nominal concentration of the test compound in water causing 50 percent immobilization for the Daphnia and Gammarus. The TL_{50} value and its 95% confidence intervals were calculated by converting the test concentrations and the corresponding observed percent mortalities to logs and probits, respectively. These values were then used to calculate a linear regression equation.

Procedures for static bioassays as described in the Methods for Toxicity Tests with Aquatic Organisms as formulated by the Committee for Toxicity Tests with Aquatic Organisms were followed, except for those conditions described below. The Daphnia, and Gammarus were acquired from laboratory cultures.

The Daphnia and Gammarus bioassays were conducted at $20^{\circ}C$ ($\pm$ 1.0). The invertebrate tests were conducted in

250 ml beakers containing approximately 200 ml of well water which was aged for 24 hours. Five 12-24 hour old Daphnia, and five fourth instar Gammarus were placed in each beaker (4 replicates/concentration). In the Daphnia bioassays, Daphnia food[1] was added at a rate of 0.5 ml/liter after the introduction of the compound into the test vessels.

RESULTS

The predicted TL_{50} values and 95% confidence intervals for the Daphnia and Gammarus are presented in Table 1. Table 2 presents a summary of observed immobilization for each individual test after 24 and 48 hours.

[1]Food was prepared by homogenizing 5 g of starter trout food and 1 g of cerophyl in 100 ml of water.

SUBMITTED BY:

Bionomics
E G & G, Inc.
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790 Main Street
Wareham, Massachusetts
August, 1974

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Table 1 -- Acute toxicity of Sample C to *Daphnia*[a] and *Gammarus*.[b] The data are based on results of bioassays conducted at the fish toxicology laboratory of Bionomics, E G & G, Inc., Wareham, Massachusetts.

Species	TL_{50}-milligram active ingredient/liter		No Effect Level (mg/l)
	24 hour	48 hour	
Daphnia	>10,000	5,850(4,810-7,110)[c]	3,200
Gammarus	5,310(4,340-6,510)	5,170(4,190-6,370)	3,200

[a]Bioassay conducted at 20°C (± 1.0), *Daphnia* 12-24 hours old at the initiation of tests.

[b]Bioassays conducted at 20°C (± 1.0) *Gammarus* 12-24 hours old at the initiation of tests.

[c]95% confidence intervals.

Table 2 -- Concentrations tested and observed percent immobilization for Daphnia and Gammarus exposed to Sample C after 24 and 48 hours.

Species	Concentration (mg/l)	% immobilization observed 24 hour	48 hou
Daphnia	10,000	20	100
	7,500	25	50
	5,600	0	40
	4,200	0	10
	3,200	0	0
	control	0	0
Gammarus	10,000	100	100
	7,500	80	80
	5,600	60	75
	4,200	45	50
	3,200	0	0
	control	0	0