AR226-0118
EE-23

ACUTE TOXICITY TO AQUATIC INVERTEBRATES (E.G.,DAPHNIA)

TEST SUBSTANCE

Identity: Perfluorooctanesulfonate; may also be referred to as PFOS or FC-95 or as part of the mixed product FM-3820 (see Remarks). (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 test sample is FM-3820, a mixture of the test substance in diethylene glycol butyl ether and water (approximately 24-28% test substance in diethylene glycol butyl ether and water). Calculations were made to adjust test values using the upper limit concentration of the test substance (28%) in the test sample and no adjustment was made for the presence of the diethylene glycol butyl ether or water when noted below. These calculations assumed that all toxicity was due to the presence of the Perfluorooctanesulfonate substance.

METHOD

Method: OECD 202
Test type: Static acute
GLP: Yes
Year Completed: 1991
Species: *Daphnia magna*
Analytical monitoring: DO, pH, Conductivity, and temperature were monitored daily.
Statistical methods: EC_{50} values calculated, when possible by standard statistical techniques (Stephan, 1983)
Test daphnid source: Obtained from cultures maintained by EnviroSystems Division, Resource Analysts, Inc., Hampton, NH.
Test daphnid age at study initiation: < 24-hours

Test conditions

Dilution water: Well water from wells at EnviroSystems in Hampton, New Hampshire.
Dilution water chemistry:

pH:	7.8*
Conductivity:	1200 umhos/cm*
TOC:	<2.0 mg/L

* Values measured at time of test.

Lighting: Cool white fluorescent lights, intensity 23 uE/s/m^2. Photoperiod of 16-hours light, 8-hours dark. No transition period noted.

Stock and test solutions preparation: A primary stock solution was prepared in dilution water at 1000 mg/L. The primary stock was proportionally diluted with dilution water to prepare the five test concentrations.
Exposure vessels: 250 mL plastic beakers containing 200 mL of test solution. The approximate depth of test solution was 6 cm.
Number of replicates: Four
Number of daphnids per replicate: Five
Number of concentrations: five plus a negative control
Water chemistry during the study:

Dissolved oxygen range (0 – 48 hours):
8.2 – 8.5 mg/L (control exposure)
8.1 – 8.5 mg/L (150 mg/L exposure)

pH range (0 – 48 hours)
7.8 – 8.6 (control exposure)
7.8 – 8.6 (150 mg/L exposure)

Test temperature range (0 – 48 hours)
20.8 – 21.0°C (control exposure)
20.7 – 20.9°C (150 mg/L exposure)

Conductivity range (0 – 48 hours)
1200 – 1300 umhos/cm (control exposure)
1200 – 1300 umhos/cm (150 mg/L exposure)

Element basis: mortality

RESULTS

Nominal concentrations: Bk control, 25, 40, 60, 100, 150 mg/L
Element values: 24-hour EC_{50} = >150 mg/L (C.I. not calculable)
48-hour EC_{50} = 49 (43-56) mg/L

Perfluorooctanesulfonate concentration adjusted Element value:
24-hour EC_{50} = >42 mg/L
48-hour EC_{50} = 14 mg/L

All element values based on nominal concentrations

Biological observations: Ninety five percent survival occurred in the control exposure. The number of surviving organisms and the occurrence of sublethal effects and immobilization or other sublethal effects were determined visually and recorded initially and after 24 and 48 hours.

Cumulative percent mortality:

Nominal Test Conc., mg/L	24-hours	48-hours
Neg. Control	0	5
25	0	0
40	5	25
60	0	25
100	0	100
150	20	100

Control response: satisfactory

CONCLUSIONS

The test substance 48-hour EC_{50} for *Daphnia magna* was determined to be 49 mg/L with a 95% confidence interval of 43-56 mg/L. If you assume all toxicity of the mixture is due to the Perfluorooctanesulfonate, the adjusted 48-hour EC_{50} value is 14 mg/L (49 mg/L X 0.28).

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

DATA QUALITY

Reliability: Klimisch ranking = 2. The study lacks analytical measurement of test substance concentrations in the test solutions and sample purity is not sufficiently characterized. Additionally, data is for a mixture and toxicity cannot be positively attributed to Perfluorooctancesulfonate as the diethylene glycol butyl ether could also contribute to the toxicity. The basic water quality parameters (hardness, alkalinity and calcium/magnesium ratio) were not included in the final report.

REFERENCES

This study was conducted at EnviroSystems Division, Resource Analysts, Incorporated, Hampton, NH at the request of the 3M Company.

OTHER

Last changed: 5/3/00

LAB REQUEST NO. H2864

REQUESTOR NAME: EA REINER/SAB
DEPARTMENT: 0535
PROJECT NO: 5918340000
DATE RECEIVED: 11/09/1990
DESC: FC-203 & COMPONENTS

CONTRACT LAB: ESI
CONTRACT LAB COST: $12,000.00
3M E-L HOURS: 0
EXP COMP DATE: 03/05/1991
DATE COMPLETED: 08/19/1991

SAMPLE	DATE	CODE	DESCRIPTION	RESULT	MDL OR (C.I.)
1		RM 3017	----------		
		*DAPHNIA ACUTE	TEST	COMPLETE	
2		RM 8887	----------		
		*DAPHNIA ACUTE	TEST	COMPLETE	
3		RM 3021	----------		
		*DAPHNIA ACUTE	TEST	COMPLETE	
4		RM 27513	----------		
		*DAPHNIA ACUTE	TEST	COMPLETE	
5		FM 4115	----------		
		*DAPHNIA ACUTE	TEST	COMPLETE	
6		FM 3820	----------		
		*DAPHNIA ACUTE	TEST	COMPLETE	
7		RM 55040	----------		
		*DAPHNIA ACUTE	TEST	COMPLETE	
8		RD 199	----------		
		*DAPHNIA ACUTE	TEST	COMPLETE	
9		FC 203	----------		
		*DAPHNIA ACUTE	TEST	COMPLETE	
10		VW 160390	----------		
		*DAPHNIA ACUTE	TEST	COMPLETE	

* = CONTRACT LAB

SUBMITTED BY:_____ DATED:_____