

ACUTE TOXICITY TO FISH (FATHEAD MINNOW)

TEST SUBSTANCE

Identity: Perfluorooctanoic acid, ammonium salt; may also be referred to as PFOA ammonium salt, Ammonium perfluorooctanoate, PFO, FC-116, FC-126, FC-169, or FC-143. (Octanoic acid, pentadecafluoro-, ammonium salt, CAS # 3825-26-1)

Remarks: The 3M production lot number was 427. The test sample is FC-143, referred to by the test laboratory as N2803-4. The T.R. Wilbury study number is 895-TH. The purity of the sample was not sufficiently characterized, although current information indicates it is a mixture of 96.5 - 100% test substance and 0 – 3.5% C6, C7, and C9 perfluoro analogue compounds.

METHOD

Method: U.S. EPA-TSCA Guideline 797.1400

Type: Acute static

GLP: Yes

Year completed: 1995

Species: *Pimephales promelas*

Supplier: Aquatic Biosystems, Fort Collins, CO

Analytical monitoring: DO, conductivity, pH and temperature

Exposure period: 96-hours

Statistical methods: LC50 values calculated, when possible, by probit analysis, moving average method or binomial probability with non-linear interpolation using the computer software of C.E. Stephan.

Test fish age: Not noted.

Length and weight: Average length = 28.6 cm
Average weight = 0.19g (wet)

Loading: 0.13 g/L

Pretreatment: None

Test conditions:

Dilution Water: Deionized water adjusted to a hardness of 40-48 mg/L as CaCO₃/L

Dilution water chemistry: Not noted.

Lighting: Cool-white fluorescent bulbs with an intensity of 30 ft-c. Photoperiod of 16-hours light, 8-hours dark with a 15 minute transition period.

Stock and test solutions preparation: Test substance added directly to the dilution water in the test vessels.

Concentrations dosing rate: Once

Stability of the test chemical solutions: No insoluble material was noted during the test.

Exposure vessels: 20 L glass aquaria containing approximately 15 L of test solution, water depth approximately 18 cm.

Number of replicates: 2

Number of fish per replicate: 10

Number of concentrations: five plus a negative control

Water chemistry during the study:

Dissolved oxygen range (0 – 96 hours):

7.2 – 8.5 mg/L (control exposure)

6.7 – 8.5 mg/L (1,000 mg/L exposure)

Conductivity range (0 – 96 hours)

140 – 180 μ mhos/cm (control exposure)

280 – 380 μ mhos/cm (1,000 mg/L exposure)

pH range (0 – 96 hours)

7.3 – 7.6 (control exposure)

7.4 – 7.5 (1,000 mg/L exposure)

Test temperature range (0 – 96 hours)

22.0 – 22.6°C (control exposure)

21.8 – 22.5°C (1000 mg/L exposure)

RESULTS

Nominal concentrations: Bk control, 160, 250, 400, 630, 1,000 mg/L

Element value and 95% confidence interval:

24-hour LC_{50} = > 1,000 mg/L (C.I. not calculable)

48-hour LC_{50} = 790 (630 – 1,000) mg/L

72-hour LC_{50} = 760 (630 – 1,000) mg/L

96-hour LC_{50} = 740 (660 - 830) mg/L

96-hour NOEC = 400 mg/L

Element values based on nominal concentrations

Statistical Evaluation of Mortality: The 48 and 72-hour LC_{50} values were determined by binomial interpolation. Probit was used to calculate the 96-hour LC_{50} .

Biological observations after 96-hours: Fish in the control and the 160, 250, and 400 mg/L exposure concentrations appeared normal. Dark discoloration and erratic swimming of two fish was observed at the 24-hour observation period in the 1,000 mg/L exposure concentration.

Cumulative percent mortality:

Mean Measured Test Conc., mg/L	24-hours	48-hours	72-hours	96-hours
Control	0	0	0	0
160	0	0	0	0
250	0	0	0	0
400	0	0	0	0
630	0	10	20	25
1,000	15	90	90	90

Lowest concentration causing 100% mortality: None
Mortality of controls: None

CONCLUSIONS

The test sample 96-hour LC₅₀ for fathead minnow was determined to be 740 mg/L with a 95% confidence interval of 660 –830 mg/L. The 96-hour no observed effects concentration (NOEC) was 400 mg/L.

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.

REFERENCES

This study was conducted at T.R. Wilbury Laboratories, Inc., Marblehead, MA, at the request of the 3M Company, Lab Request number N2803-4.

OTHER

Last changed: 4/01/01