

ACUTE TOXICITY TO FISH (FATHEAD MINNOW)

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 1. The test sample is FC-206. 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 monoethylphenyl 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: Not given.

Type: Acute static and continuous flow

GLP: No

Year completed: 1974

Species: *Pimephales promelas*

Supplier: Not given.

Analytical monitoring: Temperature, pH, and DO.

Exposure period: 96-hours

Statistical methods: LC₅₀ value calculated using graphic interpolation.

Test fish age: Juveniles

Length and weight: Average length = 2 in.
Average weight = 1.6 g (wet)

Loading: Not given

Pretreatment: None

Test conditions:

Dilution water: Carbon-filtered city water, St. Paul, MN

Dilution water chemistry: Not given.

Lighting: Not given.

Stock and test solution preparation: A 50% primary stock solution was prepared for the continuous flow study. The test material was added directly to the dilution water on a volume/volume basis for the static study.

Diluter Flow rate: Not given.

Concentrations dosing rate: Continuous for the flow study, once for the static study.

Stability of the test chemical solutions: Not noted.

Exposure vessels: Not given.

Number of replicates: 1

Number of fish per replicate: Not given.

Number of concentrations: five plus a blank control

Water chemistry during the static study:

pH range (0-96 hours):

6.9 – 7.0 (control exposure)

7.1 – 7.2 (1250 mg/L exposure)*

Temperature range (0-96 hours): 67 - 72 °F

Dissolved oxygen range (0-96 hours):

4.7 – 5.7 mg/L (control exposure)

3.9 – 5.7 mg/L (1250 mg/L exposure)*

* 1250 mg/L (intermediate concentration) exposure values used because the highest three concentrations resulted in total mortality by 72 hours.

Water chemistry during the continuous flow study:

pH range (0-96 hours):

6.9 – 7.0 (control exposure)

7.0 – 7.1 (2500 mg/L exposure)*

Temperature range (0-96 hours): 67 - 72 °F

Dissolved oxygen range (0-96 hours):

6.0 – 6.3 mg/L (control exposure)

4.5 – 6.0 mg/L (2500 mg/L exposure)*

* 2500 mg/L (intermediate concentration) exposure values used because the highest two concentrations resulted in total mortality by 48 hours.

RESULTS

Nominal concentrations: Blank control, 500, 1250, 2500, 3750, and 5000 mg/L

Element values: 96-hour LC₅₀ (static) = 1750 mg/L
96-hour LC₅₀ (continuous flow) = 3000 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 sample 96-hour LC₅₀ for fathead minnow was determined to be 1750 mg/L under static conditions and 3000 mg/L under continuous flow conditions.

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

DATA QUALITY

Reliability: Klimisch ranking 3. Testing lacks record of methodology used and documentation. The sample purity was not properly characterized and the study lacks analytical confirmation of the amount of fluorochemical proportion in the solution.

REFERENCES

This study was conducted by the 3M Company, Environmental Laboratory, St. Paul, MN, Lab Request number 2083, 1974.

OTHER

Last changed: 6/27/00

cc: LAB REQUEST BOOK - 42-5W

File: _____

Water and Wastewater

REQUEST FOR LABORATORY WORK

Lab Request No. _____

2083

TO: ENVIRONMENTAL ENGINEERING LABORATORY - BUILDING 53-6N

Requestor

Lab Personnel

Name: Dale Bacon Request Date _____

Project No. _____ Prob. No. _____ Code # _____

Description: L-3243 Lot #1Sample Date: Feb-26 Date Needed: _____

Hold Sample For _____ Days Est. Time: _____ Hrs.

Date Rec'd. Sample: _____

Analyst: MTEY _____ B _____ P Bio-AssayDate Completed: 2-15-74Hrs. Spent: 16Testsee

Sample Description

static C.FlowTotal Hardness, mg/l as CaCO₃Calcium Hardness, mg/l as CaCO₃"P" Alkalinity, mg/l as CaCO₃"M" Alkalinity, mg/l as CaCO₃

pH

Sulfate, mg/l as SO₄Nitrate, mg/l as NO₃

Chloride, mg/l as Cl

Silica, mg/l as SiO₂

Fluoride, mg/l as F

Ortho Phosphate, mg/l as P

Total Phosphate, mg/l as P

Total Chromium, mg/l as Cr

Hex. Chromium, mg/l as Cr

Total Cyanide, mg/l as CN

Ferrocyanide, mg/l as CN

Iron, mg/l as Fe

Manganese, mg/l as Mn

Surfactant, mg/l as LAS

Phenol, mg/l

BOD, mg/l

COD, mg/l (Short, Long, Dilute)

Total Suspended Solids, mg/l

Volatile Suspended Solids, mg/l

Turbidity, mg/l Silica

Total Solids, mg/l

Total Volatile Solids, mg/l

Conductivity, mhos

Total Bacteria, No./100 ml

Total Coliform, No./100 ml

Fecal Coliform, No./100 ml

Fecal Streptococcus, No./100 ml

Ammonia Nitrogen, mg/l as N

Kjedahl Nitrogen, mg/l as N

Oil and Grease, mg/l

Bioassay 96 hour LC50* 1,750
ppm** 3,000
ppm

Comments:

* 0.175%** 0.3%

ENVIRONMENTAL ENGINEERING LABORATORY

AQUATIC TOXICITY WORK SHEET

Material tested L-3243 Lot #1

Avg. Weight 1.6g Size 2 Inches

Date Completed 2-15-74

Time Started 2:30 PM

Dilution Water city water after carbon filter

	24 hrs			48 hrs			72 hrs			96 hrs		
Conc.	Survival %	pH	D.O ppm	Survival %	pH	D.O ppm	Survival %	pH	D.O ppm	Survival %	pH	D.O ppm
Control	100	7.0	6.3	100		6.0	100		6.0	100	6.9	6.1
500 ppm	100	7.0	6.0	100		5.7	100		5.2	100	6.9	5.2
1,250	100	7.1	6.1	100		5.5	100		5.0	100	7.2	4.7
2,500	100	7.1	6.0	90		5.7	90		4.5	90	7.0	4.5
3,750	50	7.1	5.9	0		5.0	0	—	—	0	—	—
5,000	0	7.2	5.9	0	—	—	0	—	—	0	—	—
Average Temperature	72			70			69			67		

Average Temperature

Comments:

start with 50% stock solution

$$\begin{array}{r} 3525 \\ 2785 \end{array}$$

%	→ 0.05	0.125	0.25	0.375	0.5
mm/l	→ 16	40	80	120	160

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Dilution Water city water after carbon filter

[illegible]

$\frac{1}{10} \rightarrow 0.05 \quad 0.125 \quad 0.25 \quad 0.375 \quad 0.5$

$\text{Mg} / \text{KCl} \rightarrow 8$

2-11-74

Bioassay study of L-3285 Lot #1

96 hour static $LC_{50} = 1,750 \text{ ppm } [0.175\%]$

96 hour C.Flow $LC_{50} = 3,000 \text{ ppm } [0.3\%]$

EUGENE DIETZEN CO.
MADE IN U. S. A.

NO. 340-L210 DIETZEN GRAPH PAPER
SEMI-LOGARITHMIC
2 CYCLES X 10 DIVISIONS PER INCH

Conc. ppm

