

ACUTE TOXICITY TO FISH

TEST SUBSTANCE

Identity: N-Ethylperfluorooctanesulfonamide; may also be referred to as U1464, EtFOSA, EtPOSA, F-6309, or FX-12. (1-Octanesulfonamide, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-N-ethyl-, CAS # 4151-50-2)

Remarks: Material is a white solid. Sample purity and lot number were not recorded.

METHOD

Method: Adapted from OECD 203 – Water accommodated fractions

Type: Static acute

GLP: No

Year completed: 1998

Species: *Pimphales promelas*

Supplier: AScl in-house culture, Duluth, MN

Analytical monitoring: Nominal concentrations only. Temperature, pH and dissolved oxygen recorded.

Exposure period: 96-hours

Statistical methods: LL₅₀ (lethal loading) values were calculated using the probit method. The NOEL was calculated by Fisher's Exact Test, TOXSTAT Software Package, Version 3.5, Laramie, Wyoming.

Test fish age: < 24-hour old

Length and weight: Not measured

Loading: Not measured

Pretreatment: None

Test conditions:

Dilution water: Carbon-treated dechlorinated City of Duluth, MN tap water aerated for 24-hours prior to use in the test.

Dilution water chemistry during the study:

Hardness:	40-42 mg/L as CaCO ₃
DO:	8.1-8.9 mg/L
Alkalinity	40-42 mg/L as CaCO ₃
pH:	7.8-8.1
Conductivity	113-122 µmhos/cm
Test temp. range:	21.1-21.4°C

Stock and test solution preparation: Test solutions prepared by mass addition of test substance to 1.5L aliquots of dilution water (one per concentration). The solutions were vigorously stirred

(vortex 1/3 to 1/2 solution depth) for 20 hours. The aqueous phase was siphoned from the vessel at mid-depth.

Concentrations dosing rate: Once

Stability of the test chemical solutions: Not recorded

Exposure vessels: 250 mL borosilicate glass beakers

Exposure volume: 200 mL

Number of replicates: two

Number of fish per replicate: ten

Number of concentrations: Five plus a negative control

RESULTS

Nominal loading concentrations: Bk control, 78, 130, 216, 360, 600 mg/L

Element value: 24-hour LL₅₀: 308 (238-380) mg/L
48-hour LL₅₀: 216 (168-264) mg/L
72-hour LL₅₀: 216 (168-264) mg/L
96-hour LL₅₀: 206 (162-247) mg/L
96-hour LL₁₀: 115 (66-150) mg/L
96-hour NOEL: 130 mg/L

Percent Mortality

Nominal Loading Concentration, mg/L	24-Hours	48-Hours	72-Hours	96-Hours
Negative Control	5	5	5	5
78	5	5	5	5
130	5	10	10	10
216	35	70	70	75
360	60	80	80	80
600	90	95	95	100

Remarks: All values reported are for nominal loading concentrations. No measurement of test concentrations was conducted.

CONCLUSIONS

The Et FOSA 96-hour LL₅₀ for fathead minnow was determined to be 206 mg/L with a 95% confidence interval of 162-247 mg/L

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

DATA QUALITY

Reliability: Klimisch ranking 2. This study, while well conducted using the methodology acceptable at the time, lacks analytical data for determination of the test substance concentration in the test solutions and determination of the sample purity. Testing was also done well above the solubility limit of the test substance with the use of water accommodated fractions.

REFERENCES

Study conducted at the request of 3M Company by, AScl Corporation, Duluth, MN.

OTHER

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

Last changed: 5/18/00

STUDY TITLE

ACUTE TOXICITY OF U1464 TO LARVAL
FATHEAD MINNOW (*Pimephales promelas*)

DATA STANDARD

ADAPTED OECD GUIDELINE 203

STUDY COMPLETED

May 4, 1998

TESTING FACILITY

ASCI Corporation/ASCI-Duluth
Environmental Testing Division
4444 Airpark Boulevard
Duluth, MN 55811

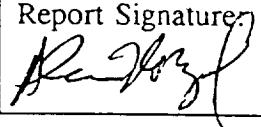
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STUDY IDENTIFICATION NUMBERS

ASCI Study ID# 5010-068

3M Company Lab Request# U1464

1.0 GENERAL INFORMATION

Study Title	Acute Toxicity of U1464 to Larval Fathead Minnow (<i>Pimephales promelas</i>).	
Data Standard	Adapted OECD Guideline 203.	
Sponsor	3M Environmental Technology and Safety Services, Building 2-3E-09, 935 Bush Avenue, St. Paul, MN 55133; Tel No. (612) 778-7452.	
Sponsor's Representative	Rochelle R. Robideau, 3M Environmental Technology and Safety Services, Building 2-3E-09, 935 Bush Avenue, St. Paul, MN 55133; Tel No. (612) 778-7065.	
Sponsor's Lab Request#	U1464.	
Testing Facility	ASCI Corporation/ASCI-Duluth Environmental Testing Division, 4444 Airpark Boulevard, Duluth, MN 55811; Tel. No. (218) 722-4040.	
Principal Investigator	Todd McGuire	
Project Manager	Joe Amato	
Testing Facility Director	Donald Mount	
Definitive Test Dates	April 15-19, 1998.	
Data Validation and Report Review	Alan Mozol	Report Signature 
Retention of Raw Data and Final Report	Two years from the date study is completed.	
Location of Raw Data and Final Report	ASCI Corporation/ASCI-Duluth Environmental Testing Division, 4444 Airpark Boulevard, Duluth, MN 55811; Tel. No. (218) 722-4040.	

2.0 OBJECTIVE(S)

To determine the 96-hour 10% and 50% lethal loadings (LL₁₀ and LL₅₀), and the 96-hour no observable effect loading (NOEL) of the test substance, U1464, for larval fathead minnow (*Pimephales promelas*) under static test conditions.

This study was conducted according to the ASCI study plan retained by the Sponsor and OECD Guideline 203 (OECD 1993). The test solutions were water-accommodated fractions (WAF) prepared following Girling, Whale, & Adema 1994.

3.0 TEST METHODS

Test Substance	<i>Properties:</i> U1464, white crystals, specific gravity = 1.7 (water = 1), stable, and negligible solubility in water. <i>Test loadings:</i> 0 (dilution water control) 78 mg/L, 130 mg/L, 216 mg/L, 360 mg/L and 600 mg/L. Test solutions were prepared by mass addition of test substance to 1.5 L aliquots of dilution water. The solutions were vigorously stirred (vortex 1/3 to 1/2 solution depth) for 20 h. The aqueous phase was siphoned from the vessel at mid depth.
Test Organisms	<i>Source:</i> Healthy, $\leq$ 24 hour old fathead minnow larvae (<i>Pimephales promelas</i>) obtained from ASCI-DETD in-house culture. <i>Holding/acclimation:</i> The fish used in the tests were obtained from ASCI's in-house culture. The fish were cultured in water of the same quality as the test diluent. <i>Use in test:</i> Used 10 organisms/replicate and 2 replicates/test concentration.
Dilution Water	<i>Source:</i> Carbon-treated dechlorinated City of Duluth, MN, tap water. The most recent chemical analysis of post carbon (PC) water is in the Raw Data Package. <i>Characteristics:</i> At test time, the water had a hardness of 40 mg/L (as CaCO₃) and a pH of 7.87. Aerated for 24 h prior to use in the test.
Exposure Chambers	<i>Type:</i> 250-ml borosilicate glass beakers. <i>Use in test:</i> 200 ml of dilution water or test solution/chamber. During the test, kept covered, except when experimental observations were made. Solutions were not aerated during the exposures.

Incubation	<i>Duration:</i> 96 hours. <i>Daily photoperiod:</i> 16 h light and 8 h dark, maintained using cool-white fluorescent lamps. <i>Temperature:</i> 21.0° ± 1°C.
Observations	<i>Biological:</i> Daily- Test organisms with abnormal behavior and signs of stress, and dead test organisms. <i>Water chemistry:</i> (1) At test initiation- total hardness and alkalinity, (2) daily- temperature, DO, conductivity, and pH. All determinations were made according to APHA methods (1995).
Endpoint Calculations	24-, 48-, 72-, and 96-h median lethal loading (LL_{50}'s), 96-h lethal loading (LL_{10}), and 96-h no observable effect loading (NOEL) LL_{10} and LL_{50}: EPA Probit method. NOEL: Fisher's Exact Test. TOXSTAT Software Package. Version 3.5. Laramie, Wyoming.

3.0 RESULTS

Test Substance Toxicity (95% Confidence Interval) Pertinent Data are in Table 1	24-h LL_{50} : 308 mg/L (238-380 mg/L). 48-h LL_{50} : 216 mg/L (168-264 mg/L). 72-h LL_{50} : 216 mg/L (168-264 mg/L). 96-h LL_{50} : 206 mg/L (162-247 mg/L). 96-h LL_{10} : 115 mg/L (66-150 mg/L). 96-h NOEL: 130 mg/L.
Ranges of Water Chemistry Parameters	Total hardness (as $CaCO_3$ mg/L): 40-42. Alkalinity (as $CaCO_3$ mg/L): 40-42. Temperature ($^{\circ}C$): 21.1-21.4. DO (mg/L): 8.1-8.9. pH: 7.8-8.1. Specific conductivity ($\mu mhos/cm$): 113-122.

4.0 TEST QA/QC

QA/QC Criteria	Data
Mortality in control exposure must not be more than 10%.	5% mortality.
The lowest DO concentration at test termination must be at least 60% of the air saturation value at test temperature.	The lowest DO concentration measured was 91% of the air saturation value at 21.0 $^{\circ}C$.
Test duration must be 96 h.	The test duration was 96 h.
Reference Substance Toxicity Test (this test is optional).	Control chart for sodium chloride reference toxicity testing is in Raw Data Package.

5.0 REFERENCES

American Public Health Association (APHA). 1995. Standard Methods for the Examination of Water and Wastewater. APHA, Washington, D.C.

Girling, A.E., G.F. Whale, and D.M.M. Adema. 1994. A Guideline Supplement for Determining the Aquatic Toxicity of Poorly Water-Soluble Complex Mixtures using Water-Accommodated Fractions. Chemosphere, Vol. 29, No. 12, pp. 2645-2649.

Organization for Economic Cooperation and Development (OECD). 1981/1993. OECD Guidelines for Testing of Chemicals. OECD Publication Information Center, Washington, D.C.

West Inc. and University of Wyoming. TOXSTAT Software Package. Version 3.5. Laramie, Wyoming.

USEPA. EPA Probit Analysis Program used for Calculating EC Values. Version 1.4.

TABLE 1. ACUTE TOXICITY OF U1464 TO LARVAL FATHEAD MINNOWS (*P. promelas*)

Test Substance Loading (mg/L)	Cumulative Number of Dead Organisms and Percent Mortality ^a			
	24 h	48 h	72 h	96 h
0 (control)	1 (5)	1 (5)	1 (5)	1 (5)
78	1 (5)	1 (5)	1 (5)	1 (5)
130	1 (5)	2 (10)	2 (10)	2 (10)
216	7 (35)	14 (70)	14 (70)	15 (75)
360	12 (60)	16 (80)	16 (80)	16 (80)
600	18 (90)	19 (95)	19 (95)	20 (100)

^a Percentages are in parenthesis.

**LETHAL AND NO-EFFECT CONCENTRATIONS WITH
CORRESPONDING 95% CONFIDENCE INTERVALS**

Endpoint	Data (mg/L) ^a	95% Confidence Interval
24-h LL ₅₀	308	238-380
48-h LL ₅₀	216	168-264
72-h LL ₅₀	216	168-264
96-h LL ₅₀	206	162-247
96-h LL ₁₀	115	66-150
96-h NOEL	130	Not applicable

^a Values based on nominal test concentrations.