

ACUTE TOXICITY TO AQUATIC INVERTEBRATES – *Daphnia magna*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 202 – Water accommodated fractions

Type: Static acute

GLP: No

Year completed: 1998

Species: *Daphnia magna*

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

Statistical methods: : EL₅₀ (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 daphnid source: AScI in-house culture, Duluth, MN

Test daphnid age at study initiation: < 24-hour old neonates

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	44 mg/L as CaCO ₃
DO:	8.1-8.9 mg/L
Alkalinity:	42 mg/L as CaCO ₃
pH:	7.9-8.2
Conductivity	113-125 µmhos/cm
Test Temp. Range:	21.3-21.5

Stock and test solution preparation: Test solutions prepared by mass addition of test substance to 2.0L aliquots of dilution water (one per concentration). The solutions were vigorously stirred (vortex 1/3 to 1/2 solution depth) for 18.5 hours. The aqueous phase was siphoned from the vessel at mid-depth.

Exposure vessels: 250 mL borosilicate glass beakers

Exposure volume: 200 mL
Number of replicates: four
Number of daphnids per replicate: 5
Number of concentrations: Five plus a negative control
Element basis: mortality

RESULTS

Nominal loading concentrations: Bk control, 5.8, 9.6, 16, 27, and 45 mg/L

Element value: 24-hour EL₅₀: 24.6 (21.3-28.6) mg/L
48-hour EL₅₀: 14.5 (12.1-17.4) mg/L
48-hour EL₁₀: 7.3 (5.0-9.2) mg/L
48-hour NOEL: 5.8 mg/L

Mortality of controls: 0% after 48-hours exposure

Percent Mortality

Nominal Loading Concentration, mg/L	24-Hours	48-Hours
Negative Control	0	0
5.8	0	0
9.6	0	35
16	15	50
27	50	85
45	100	100

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

CONCLUSIONS

The test sample 48-hour EL₅₀ for *Daphnia magna* was determined to be 14.5 mg/L with a 95% confidence interval of 12.1 – 17.4 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

006051

STUDY TITLE

ACUTE TOXICITY OF U1464 TO *DAPHNIA MAGNA*

DATA STANDARD

OECD GUIDELINE 202

STUDY COMPLETED

May 20, 1998

TESTING FACILITY

ASCI Corporation/ASCI-Duluth
Environmental Testing Division
4444 Airpark Boulevard
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STUDY IDENTIFICATION NUMBERS

ASCI Study ID# 5010-068

3M Company Lab Request# U1464

006052

1.0 GENERAL INFORMATION

Study Title	Acute Toxicity of U1464 to <i>Daphnia magna</i> .	
Data Standard	OECD Guideline 202.	
Sponsor	3M Environmental Technology and Services, Building 2-3E-09, 935 Bush Avenue, St. Paul, MN 55133.	
Sponsor's Representative	Rochelle R. Robideau, 3M Environmental Technology and 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 28-30, 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 48-h EL's (effective loading's) EL_{10} and EL_{50} , and 48-h NOEL (no observed effect loading) of the test substance, U1464, for *Daphnia magna*.

This study was conducted according to the ASCI study plan retained by the Sponsor and OECD Guideline 202 (OECD 1993). Test solution preparation was water-accommodated fraction (WAF) per Girling & Whale 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. Test loadings: 0 (dilution water control), 5.8, 9.6, 16, 27, and 45 mg/L. Each test solution prepared by mass addition of test substance to 2.0-L aliquots of dilution water. Each solution was vigorously stirred (vortex 1/3 to 1/2 of flasks' depth) for 18.5 hours to obtain WAF's. Test solution obtained from flasks by siphoning aqueous phase from mid-depth.
Test Organisms	<i>Source:</i> Healthy, $\leq$ 24-h old <i>Daphnia magna</i> neonates obtained from ASCI mass organism cultures maintained in dechlorinated City of Duluth tap water. <i>Use in test:</i> Gravid adults isolated 24 h before test initiation. Used 5 organisms/replicate and 4 replicates/test loading. Did not feed during the test.
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 44 mg/L (as $CaCO_3$) and a pH of 7.99. Aerated for 24 h prior to using 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.

Incubation	<i>Duration:</i> 48 h. <i>Daily photoperiod:</i> 16 h light and 8 h dark, maintained using cool-white fluorescent bulbs. <i>Temperature:</i> 21°C.
Observations	<i>Biological:</i> Daily- counted dead test organisms. Did not remove any daphnids from the exposure chambers at 24 h. <i>Water chemistry:</i> (1) At test initiation- total hardness and alkalinity, (2) daily- temperature, pH, DO, and conductivity. All determinations were made according to APHA methods (1995).
Endpoint Calculations	<i>EL₁₀ and EL₅₀:</i> EPA Probit Method. <i>NOEL:</i> Fisher's Exact Test (TOXSTAT statistical software, Version 3.5, University of Wyoming & West Inc.).

3.0 RESULTS

Test Substance Toxicity (95% Confidence Interval) Pertinent Data are in Table 1	<i>24-h EL₅₀:</i> 24.6 mg/L (21.3-28.6 mg/L). <i>48-h EL₅₀:</i> 14.5 mg/L (12.1-17.4 mg/L). <i>48-h EL₁₀:</i> 7.3 mg/L (5.0-9.2 mg/L). <i>48-h NOEL:</i> 5.8 mg/L.
Ranges of Water Chemistry Parameters	<i>Total hardness (as CaCO₃ mg/L):</i> 44. <i>Alkalinity (as CaCO₃ mg/L):</i> 42. <i>Temperature (°C):</i> 21.3-21.5°C. <i>DO (mg/L):</i> 8.1-8.9. <i>pH:</i> 7.9-8.2. <i>Specific conductivity (µmhos/cm):</i> 113-125.

4.0 TEST QA/QC

QA/QC Criteria	Data
Test organism dead, immobilized or trapped in control exposure must not be more than 10%.	0% dead, immobilized or trapped.
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°C.
Test duration must be 48 h.	The test duration was 48 h.
Reference substance toxicity test (this test is optional).	Current control chart for <i>D. magna</i> acute testing is included in the 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). 1993. OECD Guidelines for Testing of Chemicals. OECD Publication Information Center, Washington, D.C.

University of Wyoming & West Inc. 1996. Toxstat Version 3.5. Cheyenne, Wyoming 82001.

USEPA Probit Analysis Program. Version 1.4.

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AScl Corporation/AScl-Duluth
Environmental Testing Division
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TABLE 1. ACUTE TOXICITY OF U1464 TO *DAPHNIA MAGNA*

Test Substance Loading (mg/L)	Cumulative Number and Percent of Dead Organisms ^a	
	24 h	48 h
0	0 (0)	0 (0)
5.8	0 (0)	0 (0)
9.6	0 (0)	7 (35)
16	3 (15)	10 (50)
27	10 (50)	17 (85)
45	20 (100)	20 (100)

^a Percentages are in parenthesis.

**EFFECT AND NO-EFFECT LOADINGS WITH
CORRESPONDING 95% CONFIDENCE INTERVALS**

EL's and NOEL	Data (mg/L)	95 % Confidence Interval
24-h EL ₅₀	24.6	21.3-28.6
48-h EL ₅₀	14.5	12.1-17.4
48-h EL ₁₀	7.3	5.0-9.2
48-h NOEL	5.8	Not Applicable