

NITRIFICATION INHIBITION

TEST SUBSTANCE

Identity: Mixture containing perfluorooctanesulfonate, which may also be referred to as PFOS, FC-95, or as a component of FC-203CF-X or FC-203CF. (1-Octanesulfonic acid) (CAS # 2795-39-3).

Remarks: The 3M production lot number was 501. The test sample is FC-203CF-X. Current information indicates it is a mixture of 1% PFOS, 20% diethylene glycol monobutyl ether, 70.2% water, 2.75% Acrylic foamer, 3% sodium octyl sulfate, 1% triethanolamine, 2% sulfonated alkyl ether salts, and 0.05% tolyltriazole.

The following summary applies to a mixture with incompletely characterized concentrations of impurities. Data may not accurately reflect inhibition by the fluorochemical component of the test sample.

METHOD

Method: Nitroseed™-ST Toxicity Test

Test type: Microbial inhibition

GLP: No

Year Completed: 1995

Analytical monitoring: Oxidation of ammonia, pH and temperature.

Statistical methods: Not given.

Test organism source: Polybac Corporation, Bethlehem, PA. Received 8/2/95. Nitroseed™ Lot G315.

Test condition:

Dilution water: Millipore Milli-Q™ water

Medium solutions: Per method. (pH 7-9 Biochemical Buffer and Ammonia solution 1.0 mL equivalent to 10.0 mg NH₃-N/L).

Test solution preparation: Test substance was added directly to test vessels.

Test vessels: 500 mL glass Erlenmeyer flasks with a total test volume of 250 mL.

Number of concentrations: four and blank control

Temperature: 20.1 – 21.2 °C

Total suspended solids and pH on day of testing: Initial TSS 1.153 g/L. Initial and final pH based on the blank control was 7.9 for both time periods.

Element Basis: Reduction in nitrification at pH 7.8.

RESULTS

Nominal concentrations: Blank control, 83, 116, 252, and 498 mg/L

Element values: 4-hour EC₅₀ = >498 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 substance 4-hour EC₅₀ for Nitroseed™-ST Toxicity Test was >498 mg/L, the highest concentration tested. This concentration caused a 19% reduction in nitrification after four hours of exposure.

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

DATA QUALITY

Reliability: Klimisch ranking 2. Testing meets all criteria for quality testing. However, 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 Environmental Laboratory, St Paul, MN, Lab Request number N2977, 1995.

OTHER

Last changed: 6/28/00

Form 10-8-0-100

Nitrosal-SI[®] Testkit/ Test

Lab Request No. N 2977

Environmental Lab — Work Sheet

Page 1 of 4

Sample Description

FC-203CF-X

Lot 501

Test Solutions Preparation

Date: 8/24/95

Analyst: SAF

Buffer Solution: Sigma 7-9 Biochemical Buffer (Tris buffer, 100 mg/L, 131.1
60.55 g / 550 mL Final pH = 10.4; adj. to pH 7.5 with 6.0N HCl

Ammonia Solution: 954 mg NH₄Cl / 100 mL Each 10 mL = 100 mg NH₃-N / L

Nitrosal-SI[®] Received 8/2/95, use before 1/96 Lot 6315

Test

Solutions: FC-203CF-X added by direct weighings

mg/L	mg/250 mL	mL Milliequivalents	mL Buffer	mL NH ₄ Cl	mL Nitrosal-SI [®]	Time 1/2 min
Blank Control	0	202.3	27.7	10	10	250
83.2	20.8	↓	↓	↓	↓	↓
116.4	29.1	↓	↓	↓	↓	↓
252.4	63.1	↓	↓	↓	↓	↓
498	124.5	↓	↓	↓	↓	↓

ENVIRONMENTAL LABORATORY

Nitrates ~~150~~ NITRIFICATION INHIBITION TESTING (ISO/DIS 9509)

RAW DATA

LR N2971DATE 8/24/45ANALYST SABPg 2 of 4TEST SUBSTANCE FC-203CF-X

READINGS IN TEST SOLUTIONS AT EXPOSURE TIMES - OXIDATION OF AMMONIA

EXPOSURE TIME - HOURS

TEST SUBSTANCE CONCENTRATION mg/L	0-HRS			2-HRS			3-HRS			4-HRS				
	NH3 mg/L	pH	Temp. °C	NH3 mg/L	pH	Temp. °C	NH3 mg/L	pH	Temp. °C	NH3 mg/L	pH	Temp. °C		
BLANK CONTROL	132	7.4	20.3	116	7.4	20.6	N.A.			57	7.4	20.3		
83	130	7.4	20.4	112	7.4	20.5				56	7.4	20.3		
116	132	7.4	20.6	114	7.4	20.6				55	7.4	20.4		
252	131	7.4	20.1	122	8.0	21.0				68	7.4	20.5		
498	130	7.4	20.2	123	8.0	21.2				69	8.0	20.1		

ENVIRONMENTAL LABORATORY
NITROSEED[®]-ST TOXICITY TEST
DATA REDUCTION

LR N 2977
DATE 8/24/72
ANALYST SJB
PAGE 3 of 4

TEST SUBSTANCE: EC-303CF-X

	Blank Control	TEST SUBSTANCE CONCENTRATIONS, mg/L			
		83	116	252	498
NH ₃ @ initial mg/L ⁽¹⁾	132	130	132	131	130
NH ₃ @ 2 Hours mg/L	116	112	114	122	123
Δ NH ₃ @ 2 Hours mg/L	16	18	18	9	7
Δ NH ₃ @ 1 Hour mg/L	8	9	9	4.5	3.5
% LN _T ^{7.8} (2)	-	-	-	44	56

(1) Refer to Ammonia Probe Calibration Curve.

(2) Percent Loss of Nitrification (% LN):

$$\% LN_T^{7.8} = \left[1 - \left(\frac{NH_3-N / Hour (Test)}{NH_3-N / Hour (Control)} \right) \right] \times 100$$

Where:

Subscript 7.8 designates the pH of the test.
Subscript T designates the time of exposure to the nitrifiers.

EC₅₀ (95% Confidence Limits) ~ 498 mg/L
Using _____

ENVIRONMENTAL LABORATORY
NITROSEED^R-ST TOXICITY TEST
DATA REDUCTION

LR N 3977
DATE 8/24/15
ANALYST AB
PAGE 4 of 4

TEST SUBSTANCE: FC-2030F-X

	Blank Control	TEST SUBSTANCE CONCENTRATIONS, mg/L			
		83	116	252	498
NH ₃ @ initial mg/L ⁽¹⁾	132	130	132	131	130
NH ₃ @ 4 Hours mg/L	57	56	55	68	69
Δ NH ₃ @ 4 Hours mg/L	75	74	77	63	61
Δ NH ₃ @ 1 Hour mg/L	18.75	18.5	17.35	15.75	15.25
% LN _T ^{7.8} (2)	—	1.3	—	16	19

(1) Refer to Ammonia Probe Calibration Curve.

(2) Percent Loss of Nitrification (% LN):

$$\% LN_T^{7.8} = \left[1 - \left(\frac{NH_3-N / Hour (Test)}{NH_3-N / Hour (Control)} \right) \right] \times 100$$

Where:

Subscript 7.8 designates the pH of the test.

Subscript T designates the time of exposure to the nitrifiers.

EC₅₀ (95% Confidence Limits) > 498 mg/L
Using _____