

BIODEGRADATION

TEST SUBSTANCE

Identity: Perfluorooctanesulfonylamido(ethyl)acetate; may also be referred to as PFOSAA, FC-128 or as the major component of FC-127, FC-129, FC-109, FC-109-X or R1904. (Glycine, N-ethyl-N-[(heptadecafluorooctyl)sulfonyl]-, potassium salt, CAS # 2991-51-7)

Remarks: The test sample is FC-129 referred to by the test laboratory as R1904. Current information indicates it is a mixture of 42% test substance, 32% water, 14% 2-butoxyethanol, 4% ethanol, and 8% C₄-C₇ fluoroalkyl carboxylate compounds. Test material was from 3M production lot 930014, mfg. date 3/97.

The following summary is abbreviated because the test sample is a mixture of the test substance in a water/organic solvent solution. Data does not accurately relate biodegradation of the test sample with that of the test substance.

METHOD:

Method: Not noted.
Type: Aerobic
GLP: No
Year completed: 1997
Contact time: 28 days
Inoculum: Polyseed NX, lot D257

RESULTS

COD: 462,000 mg O₂ / kg chemical
BOD

Day	First Replicate BOD Mean Value (mg/kg)	Second Replicate BOD Mean Value (mg/kg)
5	<39,800	<39,800
10	186,900	156,750
20	82,700	179,400
28	289,000	289,000

Remarks: The BOD and COD values are expected to be the result of biodegradation of the organic solvent components of the test sample. These values are not expected to be representative of the Perfluorooctanesulfonylamido(ethyl)acetate.

CONCLUSIONS

This testing indicated that some portion of the test sample biodegraded in aerobic environments capable of supporting biodegradation.

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

DATA QUALITY

Reliability: Klimisch ranking 3. This study lacks information on the methodology. Testing cannot conclude what portions of the test sample were responsible for the apparent biodegradation values. Comparison with the COD value for determination of the level of biodegradation is not valuable without a description of how the COD value was obtained.

REFERENCES

This study was conducted at AScl Corporation of Duluth, Minnesota at the request of the 3M Company.

OTHER

Last changed: 5/17/00

000354

**R1904 BOD REPORT FOR
3M COMPANY**

Submitted to

**3M Environmental Technology and Safety Services
935 Bush Avenue
Building 2-3E-09
PO Box 33331
St. Paul, MN 55133-3331**

Prepared by

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

JULY 1997

COD = 462,000 mg O₂ / kg chemical.

Dates of BOD test: 6/11/97 - 7/9/97.

Water bath temperature range during the test: 19.0 - 20.0°C.

Lot number of Polyseed NX: D257.

TABLE 1. BOD Dilution Information for R1904

Sample ID (mg/L)	Stock Solution Concentration (mg/L)	Sample Volume (ml)	Sample Concentration (mg/L)
10	1005.04	3.0	10.1
18	1005.04	5.5	18.4
25	1005.04	7.5	25.1
50	1005.04	15.0	50.3

TABLE 2. BOD Blank Calculations for R1904

Sample ID	Day	FIRST REPLICATE			SECOND REPLICATE		
		Initial D.O.	Final D.O.	D.O. Drop	Initial D.O.	Final D.O.	D.O. Drop
Blank	5	8.89	8.90	-0.01	8.84	8.84	0
Blank	10	8.89	8.78	0.11	8.84	8.64	0.20
Blank	20	8.89	8.52	0.37	8.89	8.50	0.34
Blank	28	8.89	8.40	0.49	8.84	8.52	0.32

TABLE 3. BOD Seed Correction Factor Calculations for R1904

Seed Conc. ml/Bottle	Day	FIRST REPLICATE				SECOND REPLICATE				Average SCF
		Initial D.O.	Final D.O.	D.O. Drop	SCF ^a	Initial D.O.	Final D.O.	D.O. Drop	SCF	
10	5	8.90	6.01	2.89	0.58	8.91	5.63	3.28	0.66	0.62
10	10	8.90	5.87	3.03	0.61	8.91	6.02	2.89	0.58	0.60
10	20	8.90	4.46	4.44	0.89	8.91	4.05	4.85	0.97	0.93
10	28	8.90	3.52	5.38	1.08	8.91	3.56	5.35	1.07	1.08

^a SCF = (D.O. drop * ml seed in test) / ml seed in seed blank.

TABLE 4. BOD Reference^a and Tox Blanks Calculations for R1904

Conc. mg/L	Day	SCF	FIRST REPLICATE					SECOND REPLICATE				
			Initial D.O.	Final D.O.	D.O. Drop	Corrected Drop	BOD mg/L ^b	Initial D.O.	Final D.O.	D.O. Drop	Corrected Drop	BOD mg/L
0	5	0.62	8.90	4.80	4.72	4.10	205	8.89	4.64	4.25	3.63	182
50.3	5	0.62	8.91	2.34	6.57	5.95	298	8.90	3.62	5.28	4.66	233

^a Reference = 150 mg glucose and 150 mg glutamic acid in 1 liter BOD dilution water, tested at 2% dilution.

^b BOD mg/L = (corrected D.O. drop) * 300 ml BOD volume / 6 ml reference.

TABLE 5. BOD Calculations for R1904

Conc. mg/L	Day	SCF	FIRST REPLICATE					SECOND REPLICATE				
			Initial D.O.	Final D.O.	D.O. Drop	Corrected Drop	BOD mg/kg ^a	Initial D.O.	Final D.O.	D.O. Drop	Corrected Drop	BOD mg/kg
10.1	5	0.62	8.90	8.00	0.90	0.28	--	8.91	8.32	0.59	-0.03	--
18.4	5	0.62	8.89	7.96	0.93	0.31	--	8.90	7.83	1.07	0.45	--
25.1	5	0.62	8.90	7.74	1.16	0.54	--	8.90	7.72	1.18	0.56	--
50.3	5	0.62	8.88	6.61	2.27	1.65	32,800	8.90	6.70	2.20	1.58	31,400
			Mean <39,800					Mean <39,800				
10.1	10	0.60	8.90	6.28	2.62	2.02	200,000	8.91	7.60	1.31	0.71	--
18.4	10	0.60	8.89	7.20	1.69	1.09	--	8.90	6.02	2.88	2.28	123,900
25.1	10	0.60	8.90	2.74	6.16	5.56	222,000	8.90	3.54	5.36	4.76	189,600
50.3	10	0.60	8.88	1.31	7.57	6.97	138,600	8.90	0.05	8.85	8.25	--
			Mean 186,900					Mean 156,750				
10.1	20	0.93	8.90	7.02	1.88	0.95	--	8.91	7.28	1.63	0.70	--
18.4	20	0.93	8.89	6.00	2.89	1.96	--	8.90	6.04	2.86	1.93	--
25.1	20	0.93	8.90	5.69	3.21	2.28	90,800	8.90	1.48	7.42	6.49	258,600
50.3	20	0.93	8.88	4.20	4.68	3.75	74,600	8.90	2.95	5.95	5.02	100,200
			Mean 82,700					Mean 179,400				
10.1	28	1.08	8.90	4.96	3.94	2.86	283,000	8.91	5.06	3.85	2.77	274,000
18.4	28	1.08	8.89	2.40	6.49	5.41	294,000	8.90	2.25	6.65	5.57	303,000
25.1	28	1.08	8.90	0.48	8.42	7.34	--	8.90	0.12	8.78	7.70	--
50.3	28	1.08	8.88	0	--	--	--	8.90	0	--	--	--
			Mean 289,000					Mean 289,000				

^a BOD = corrected drop x 1,000,000 / test concentration.

Omitted data points: D.O. drop corrected for SCF too low (<2.0).
Final D.O. <0.50 mg/L.

APPENDIX A

-- Raw Data Sheets

BIODEGRADATION (METHYLENE BLUE ACTIVE SUBSTANCE)

TEST SUBSTANCE

Identity: Perfluorooctanesulfonylamido(ethyl)acetate; may also be referred to as PFOSAA, FC-128 or as the major component of FC-127, FC-129, FC-109, FC-109-X or R1904. (Glycine, N-ethyl-N-[(heptadecafluorooctyl)sulfonyl]-, potassium salt, CAS # 2991-51-7)

Remarks: The test sample is FC-129 referred to by the test laboratory as sample G1208-1 and replicate analysis as sample G1208-4. Current information indicates it is a mixture of 42% test substance, 32% water, 14% 2-butoxyethanol, 4% ethanol, and 8% C₄-C₇ fluoroalkyl carboxylate compounds. Test material was from 3M production lot 564.

The following summary is abbreviated because the test sample is a mixture of the test substance in a water/organic solvent solution. Data does not accurately relate biodegradation of the test sample with that of the test substance.

METHOD:

Method: EPA Method 425.1
Type: Methylene Blue Active Substance
GLP: No
Year completed: 1989

RESULTS

G1208-1: 2200 mg/kg
G1208-4: 2800 mg/kg (duplicate of G1208-1)
Duplicate EPA LAS Reference samples: 60,000 mg/kg
60,000 mg/kg

CONCLUSIONS

This testing indicated that the test sample exhibited minimal activity in this MBAS study.

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

DATA QUALITY

000360

Reliability: Klimisch ranking 2. This study lacks information on the methodology and testing parameters. Test substance purity within the test sample was not sufficiently characterized.

REFERENCES

This study was conducted at Pace Analytical of Minneapolis, Minnesota at the request of the 3M Company.

OTHER

Last changed: 5/17/00

000361

1

000362

February 10, 1989

G1208

Rec 2/14/88
WHS

Mr. Wade Scheil
3M Environmental Laboratory
935 Bush Avenue
Bldg. 2-3E
St. Paul, MN 55133

Dear Mr. Scheil:

Enclosed is the report of laboratory analyses for samples received 02/03/89.

If you have any questions concerning this report, please feel free to contact Tom Halverson or me.

Sincerely,

Peggy F. Gaskill for
Roger C. Splinter, Ph.D.
Director, Laboratory Services

Enclosures

000363



REPORT OF LABORATORY ANALYSIS

Offices:
Minneapolis, Minnesota
Tampa, Florida
Coralville, Iowa
Novato, California

3M Environmental Laboratory
935 Bush Avenue
Bldg. 2-3E
St. Paul, MN 55133

February 10, 1989
PACE Project Number: 890203509

Attn: Mr. Wade Scheil

G1208

Date Sample(s) Collected: By Client
Date Sample(s) Received: 02/03/89

PACE Sample Number:

Parameter

Units

MDL

032110

G1208-1

032120

G1208-2

032130

G1208-3

INORGANIC ANALYSIS

INDIVIDUAL PARAMETERS

Surfactants (1)

mg/kg

5

2200

1000

60000

MDL Method Detection Limit

000364

Mr. Wade Scheil
Page 2

February 10, 1989
PACE Project Number: 890203509

PACE Sample Number:
Parameter

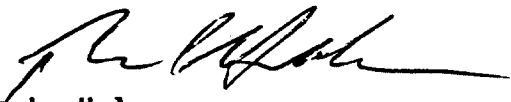
<u>Units</u>	<u>MDL</u>	<u>032140</u> <u>G1208-4</u>	<u>032150</u> <u>G1208-5</u>	<u>032160</u> <u>G1208-6</u>
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INORGANIC ANALYSIS
INDIVIDUAL PARAMETERS
Surfactants (1)

mg/kg	5	2800	1200	60000
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MDL Method Detection Limit
(1) Analysis performed by EPA Method 425.1.

The data contained in this report were obtained using EPA or other approved methodologies. All analyses were performed by me or under my direct supervision.


Thomas L. Halverson
Inorganic Chemistry Manager

000365

ANALYSIS:

MBAS

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DATE ANALYZED:

2/6/89

ANALYZED BY:

BT

TIME:

DATA REVIEWED BY:

TLB z/s

ENTERED BY:

BT

FOR CLP USE ONLY?

☐

CLIENT NAME:

PROJECT NUMBER:

PROJECT NAME:

FILE #:

DATE RECEIVED:

DATE COLLECTED:

SAMPLE	ANALYSIS			ml Sample	ABS	μg LAS
	RESULTS	UNITS	COMMENTS			
BIK	<0.05	mg/L		100	0	<5
Std	100	μg	10ml @ 100 μg/ml TV = 100 μg 100%	100	.255	100
2879	<0.5	mg/L		10	<.005	<5
3211	2200	mg/kg	ig → 100 ml 61208-1	1.5	0.05	22
3212	1,000		" -2	1.3	0.02	10
3213	60,000		" -3	0.25	0.305	119
3214	2600		Ave = 2800 " -4	1.5	0.06	26
↓ (A)	3100			1.5	0.075	31
3215	1200		" -5	1.5	0.025	12
3216	60,000	↓	↓ " -6	0.25	0.305	119

000366