

BIODEGRADATION (BOD)

TEST SUBSTANCE

Identity: Perfluorooctanoic acid; may also be referred to as PFOA, FC-26, or FX-1001. (Octanoic acid, pentadecafluoro-, CAS # 335-67-1)

Remarks: The 3M production lot number was not noted. The test sample is FX-1001. It's purity was not sufficiently characterized, though current information indicates it is a mixture of 95 - 98% test substance and 1 - 5% perfluorochemical inerts.

METHOD:

Method: Not noted.

Type: Aerobic

GLP: No

Year completed: 1985

Contact time: 20 days

Inoculum: Sewage/3M Chemolite industrial wastewater treatment plant, Cottage Grove, MN

RESULTS

Chemical Oxygen Demand (COD):	2650 mg/kg*
Biochemical Oxygen Demand (carbonaceous BOD):	
5-Day:	<1800 mg/kg
10-Day:	<19,000 mg/kg
20-Day:	<19,300 mg/kg

* Average of two values. This piece of data comes from a summary only. No raw data was found. It was noted that this value was determined by dichromate reflux.

CONCLUSIONS

No reliable conclusions can be derived from this study.

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

DATA QUALITY

Reliability: Klimisch ranking 3. There is no information on the purity of the substance. There is no analytical to confirm test substance

concentration. pH was not noted. Seed does not appear to be sufficiently active. The study indicates a neutralization step was used, but no description of that activity is noted on the data sheets. This step is requested on the computer-generated Archived Final Report for Lab Request No. C1006.

REFERENCES

The COD and BOD studies were conducted by 3M Company, Environmental Laboratory, St. Paul, Minnesota, Lab Request number C1006, 2/14/85.

OTHER

Last changed: 5/24/00

05/22/2000

ENVIRONMENTAL LABORATORY
ARCHIVED FINAL REPORT

1

LAB REQUEST NO. C1006
REQUESTOR NAME: EAR/MTE
DEPARTMENT: 0535
PROJECT NO: 9970012600
DATE RECEIVED: 01/03/1985
DESC: ENVIROMENTAL SCREENS ON FX-1001(FX-26)

CONTRACT LAB(S):
EXP COMP DATE: 02/18/1985
DATE COMPLETED: 02/14/1985
PROJECT LEAD: ST WOLF
PHONE NO: 651-778-4048
3M FAX NO: 651-778-6176

NEUTRALIZE PRODUCT WITH NAOH PRIOR TO BOD + FISH TEST. DILUTE IN WATER PRIOR TO NEUTRALIZING CAREFULLY.

SAMPLE	DATE	CODE	DESCRIPTION	RESULT	MDL or (95% C.I.)
1		ACID	FX-1001		
	96-HR-LC50	FISH ACUTE TEST - 96 HOUR	COMPLETE		
	C-BOD-05	BOD-05 (CARBONACEOUS)	SEE ATTACHED REPORT		
	C-BOD-10	BOD-10 (CARBONACEOUS)	SEE ATTACHED REPORT		
	C-BOD-20	BOD-20 (CARBONACEOUS)	SEE ATTACHED REPORT		
	COD-RFX	COD (DICHROMATE REFLUX)	2700 MG/KG		
2		DUP 1			
	COD-RFX	COD (DICHROMATE REFLUX)	2600 MG/KG		

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003696

Water Laboratory BOD Work Sheet - Controls, and Standards

A-PWO

3M

Lab Req. No. ▶ B.2603, C1006, C1085		BOD Run No. ▶ 85-3	
Analyst <i>K. J. [Signature]</i>		Date Started 1-18-85	
Seed Type & Source <i>Seawater / Chem. Lite</i>		Seed Concentration <i>6 ml / l</i>	
Inoculation Inhibitor Conc. <i>10.15g / 19L</i>		Distilled Water (Y) N	
Analyst <i>K. J. [Signature]</i>		Date 1-23-85	
Incubator Temp. <i>19.7°C</i>		Date <i>1-23-85</i>	

Nonseeded Dilution - Water Blank

Bottle No.	Initial D.O. (A ₁)	Present D.O. (A ₂)	D.O. Depletion (A ₁ - A ₂)	Average D.O. Depletion (A ₁ - A ₂)
36	8.10	8.00	0.10	0.08
8B3	8.15	8.05	0.10	
88	8.10	8.05	0.05	

Seeded Dilution - Water Blank (optional)

Bottle No.	Initial D.O. (C ₁)	Present D.O. (C ₂)	D.O. Depletion (C ₁ - C ₂)	Average D.O. Depletion (C ₁ - C ₂)
49B	8.10	8.00	0.10	0.13
17B	8.15	8.05	0.10	
71	8.20	8.00	0.20	

Seed Controls

Bottle No.	Sample Size	Initial D.O. (B ₁)	Present D.O. (B ₂)	D.O. Depletion (B ₁ - B ₂)
15B	20	7.80	7.70	0.10
59C	40	7.50	6.60	0.90
77	180	6.80	3.70	3.10

Glucose - Glutamic Acid Standard

Bottle No.	Sample Size	Initial D.O. (D ₁)	Present D.O. (D ₂)	Total D.O. Depletion (D ₁ - D ₂)	Depletion Due To Standard	5 Day BOD	Average 5 Day BOD
37C	3	8.00	5.85	2.15	2.02	202	202
10	5	8.00	4.60	3.40	3.27	196	
96	7	8.10	3.15	4.95	4.82	207	

Glucose - Glutamic Acid Standard - no inhibition inhibitor added

Potassium Hydrogen Phthalate Standard (optional)

Bottle No.	Sample Size	Initial D.O. (D ₁)	Present D.O. (D ₂)	Total D.O. Depletion (D ₁ - D ₂)	Depletion Due To Standard	5 Day BOD	Average 5 Day BOD
	3						
	5						
	7						

003697

Environmental Laboratory
Work Sheet - Samples

A-A-PWD

3M

Lab Req. No. ▶ C1006		BOD Run No. ▶ 85-3	
Analyst <i>K. J. St.</i>		Date Started 1-18-85	
Verification Inhibitor Conc. (Y) N 1015g/19L		5 - Day BOD Readings	
Analyst <i>K. J. St.</i>		Date 1-23-85	

Sample Description C1006-1	
Initial Dilution	1.00g of Sample diluted to 1000 ml with DI water
Initial Dilution Factor	(Dilution factor = 1 if undiluted)

Bottle No.	Conc. of Sample ¹	Sample Size ²	Initial D.O. (D _i)	Present D.O. (D _t)	Total D.O. Depletion (D _i - D _t)	Depletion Due To Sample (DDG)	5 - Day BOD	Average ³ 5 - Day BOD
13B4	3.3	1	8.15	7.90	0.25			< 1800 mg/kg
60C	6.7	2	8.00	7.80	0.20			
78C	13	4	7.90	7.50	0.40			
57	27	8	8.00	7.40	0.60			
19C	53	16	7.90	air pocket formed				
9C	106	32	7.80	7.00	0.80			

- Note: 1. Conc. = Concentration of sample (ml/l or mg/l) in BOD bottles.
 2. Sample Size = major g of sample or diluted sample added to BOD Bottle.
 3. Samples with D_i ≥ 1 and DDG ≥ 2 used to calculate average BOD.

Comments

003698

Environmental Laboratory BOD Work Sheet - Controls, and Standards

78-A-PW0

3M

Lab Req. No. ▶ B2603, C1006, C1085		BOD Run No. ▶ 85-3	
Analyst <i>K. J. F.</i>		Date Started 1-18-85	
Seed Type & Source Slate Sample / Chem. Lite		Seed Concentration 6 ml / L	
Inoculation Inhibitor Conc. 10.15g / 19L		Distilled Water (Y) N	
Analyst <i>K. J. F.</i>		Date 1-28-85	
Incubator Temp.		Date 1-18-85	Temp. 19.7°C
		Date 1-28-85	Temp.

Nonseeded Dilution - Water Blank

Bottle No.	Initial D.O. (A ₁)	Present D.O. (A ₂)	D.O. Depletion (A ₁ - A ₂)	Average D.O. Depletion (A ₁ - A ₂)
36	8.10	7.90	0.20	0.18
8B3	8.15	8.00	0.15	
8d	8.10	7.90	0.20	

Seeded Dilution - Water Blank (optional)

Bottle No.	Initial D.O. (C ₁)	Present D.O. (C ₂)	D.O. Depletion (C ₁ - C ₂)	Average D.O. Depletion (C ₁ - C ₂)
49B	8.10	7.70	0.40	0.43
17B	8.15	7.70	0.45	
71	8.20	7.75	0.45	

Seed Controls

Bottle No.	Sample Size	Initial D.O. (B ₁)	Present D.O. (B ₂)	D.O. Depletion (B ₁ - B ₂)
15B	20	7.80	7.50	0.30
59C	40	7.50	6.10	1.40
77	180	6.80	3.8	3.80

Glucose - Glutamic Acid Standard

Bottle No.	Sample Size	Initial D.O. (D ₁)	Present D.O. (D ₂)	Total D.O. Depletion (D ₁ - D ₂)	Depletion Due To Standard	10. Day BOD	Average 10 Day BOD
37C	3	8.00	5.45	2.55	2.12	212	217
10	5	8.00	3.90	4.10	3.67	220	
46	7	8.10	2.60	5.50	5.08	218	

Glucose - Glutamic Acid Standard - no nitritification inhibitor added

Potassium Hydrogen Phthalate Standard (optional)

Bottle No.	Sample Size	Initial D.O. (D ₁)	Present D.O. (D ₂)	Total D.O. Depletion (D ₁ - D ₂)	Depletion Due To Standard	10. Day BOD	Average 10 Day BOD
	3						
	5						
	7						

003699

Lab Req. No. ▶ C1006		BOD Run No. ▶ 85-3	
Analyst <i>K. J. Pitt</i>		Date Started 1-18-85	
Northwest Inhibitor Conc. (Y) N 10.15g/19L		10 Day BOD Readings	
Analyst <i>K. J. Pitt</i>		Date 1-28-85	

Sample Description C1006-1	
Initial Dilution	1.00 g of Sample diluted to 1000 ml with DI water
Initial Dilution Factor	(Dilution factor = 1 if undiluted)

Bottle No.	Conc. of Sample ¹	Sample Size ²	Initial D.O. (D _i)	Present D.O. (D _t)	Total D.O. Depletion (D _i - D _t)	Depletion Due To Sample (DDS)	10 - Day BOD	Average ³ 10 - Day BOD
13B4	3.3	1	8.15	7.30				<19000 7/8 not see attached
60C	6.7	2	8.00	7.10				
78C	13	4	7.90	7.00				
57	27	8	8.00	7.50				
19C	53	16	7.90	air p. let day		5		
90	106	32	7.80	7.40	0.40	0.01	(120)	

- Note: 1. Conc. = Concentration of sample (mM or mg/l) in BOD bottles.
 2. Sample Size = (m) or g of sample or diluted sample added to BOD Bottle.
 3. Samples with D_i ≥ 1 and DDS ≥ 2 used to calculate average BOD.

Comments

mental Laboratory BOD Work Sheet -
Controls, and Standards

A-A-PWO

3M

Lab Req. No. ▶ B2603, C1006, C1085		BOD Run No. ▶ 85-3	
Analyst <i>K. R. L.</i>		Date Started 1-18-85	
Seed Type & Source <i>Auto Sample / Chem. Lite</i>		Seed Concentration 6 ml / L	
Inoculation Inhibitor Conc. 10.15g / 19L		Distilled Water (Y) N	
Analyst <i>K. R. L.</i>		Date 2-7-85	
Incubator Temp. 19.7°C		Date 1-18-85	

Nonseeded Dilution - Water Blank

Bottle No.	Initial D.O. (A _i)	Present D.O. (A _s)	D.O. Depletion (A _i - A _s)	Average D.O. Depletion (A _i - A _s)
36	8.10	7.80	0.30	0.27
8B3	8.15	7.95	0.20	
88	8.10	7.80	0.30	

Seeded Dilution - Water Blank (optional)

Bottle No.	Initial D.O. (C _i)	Present D.O. (C _s)	D.O. Depletion (C _i - C _s)	Average D.O. Depletion (C _i - C _s)
49B	8.10	7.60	0.50	0.52
17B	8.15	7.65	0.50	
71	8.20	7.65	0.55	

Seed Controls

Bottle No.	Sample Size	Initial D.O. (B _i)	Present D.O. (B _s)	D.O. Depletion (B _i - B _s)
15B	20	7.80	7.35	0.45
59C	40	7.50	5.90	1.60
77	180	6.80	2.80	4.00

Glucose - Glutamic Acid Standard

Bottle No.	Sample Size	Initial D.O. (D _i)	Present D.O. (D _s)	Total D.O. Depletion (D _i - D _s)	Depletion Due To Standard	20 Day BOD	Average 20 Day BOD
37C	3	8.00	4.95	3.05	2.54	254	245 mg/L
10	5	8.00	3.60	4.40	3.84	233	
96	7	8.10	1.80	6.30	5.80	248	

Glucose - Glutamic Acid Standard - no inhibition in bottles 10 & 96

Potassium Hydrogen Phthalate Standard (optional)

Bottle No.	Sample Size	Initial D.O. (D _i)	Present D.O. (D _s)	Total D.O. Depletion (D _i - D _s)	Depletion Due To Standard	20 Day BOD	Average 20 Day BOD
	3						
	5						
	7						

003701

Lab Req. No. ▶ C1006		BOD Run No. ▶ 85-3	
Analyst <i>Kaplan</i>		Date Started 1-18-85	
Wastewater Inhibitor Conc. (Y) N 1015g/19L		20 - Day BOD Readings	
Analyst <i>Kaplan</i>		Date 2-7-85	

Sample Description C1006-1	
Initial Dilution	1.00g of Sample diluted to 1000 ml with DI water
Initial Dilution Factor	(Dilution factor = 1 if undiluted)

Bottle No.	Conc. of Sample ¹	Sample Size ²	Initial D.O. (D _i)	Present D.O. (D _t)	Total D.O. Depletion (D _i - D _t)	Depletion Due To Sample (DD _s)	20 - Day BOD	Average ³ 20 - Day BOD
13B4	3.3	1	8.15	7.40	0.75	6.23	(70000)	<19360 mg/kg report in attach
60C	6.7	2	8.00	7.10	0.90	0.39	(58000)	
78C	13	4	7.90	7.10	0.80	0.24	(22000)	
57	27	8	8.00	6.90	1.10	0.60	(22000)	
19C	53	16	7.90	air bubble				
90	106	32	7.80	6.50	1.30	0.90	(7860)	

- Note: 1. Conc. = Concentration of sample (ml/l or mg/l) in BOD bottles.
2. Sample Size = ml or g of sample or diluted sample added to BOD Bottle.
3. Samples with D_i ≥ 1 and DD_s ≥ 2 used to calculate average BOD.

Comments