

ACTIVATED SLUDGE RESPIRATION INHIBITION TEST

TEST SUBSTANCE

Identity: A mixture containing perfluorooctanesulfonate, which may also be referred to as PFOS, FC-95, or as a component of FC-206A. (1-Octanesulfonic acid) (CAS # 2795-39-3).

Remarks: The 3M production lot number was 2052. The test sample is FC-206A. Current information indicates it is a mixture of 0.92% PFOS, 18.75% diethylene glycol butyl ether, 75.44% water, 1.83% Hydroxy foamer, 1.75% sodium octyl sulfate, 1.2% poloxyethylene monooctylphenyl ether, 0.06% sodium lauryl sulfate, and 0.05% benzotriazole.

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

METHOD

Method: 3M Environmental Laboratory Protocol for Determining Acute Toxicity of a Compound to Activated Sludge

GLP: No

Year Completed: 1979

Analytical monitoring: Dissolved oxygen concentrations.

Statistical methods: Not given.

Test organism source: Activated sludge mixed liquor collected from the Metropolitan Wastewater Treatment Plant (Pig's Eye Plant), St. Paul, MN.

Test condition:

Dilution water: Deionized water.

Reference and test solution preparation: A primary stock solution was created by diluting 0.60 g test sample to 100 mL with dilution water.

Test vessels: Not given.

Number of concentrations: one plus 1 blank control

Temperature: Not given.

Total suspended solids and pH on day of testing: Not given.

Element Basis: Respiration inhibition as determined by oxygen consumption.

RESULTS

Nominal concentrations: 1 Blank control and 1000 mg/L

Element values: No acute inhibitory effects on activated sludge respiration rate at 1000 mg/L with a contact time of 5 minutes.

Element values based on nominal concentrations.

Remarks: Testing was conducted on a mixture as described in the Test Substance Remarks field. The values reported apply to that mixture and not the fluorochemical component alone.

CONCLUSIONS

The test sample exhibited no inhibitory effects at 1000 mg/L over a 5-minute exposure period.

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

DATA QUALITY

Reliability: Klimisch ranking 3. Study lacks documentation. The inoculum is not properly characterized. There is no characterization of the test substance purity and the study lacks analytical confirmation of the amount of fluorochemical proportion in solution.

REFERENCES

This study was conducted by the 3M Company, Environmental Laboratory, St Paul, MN, Lab Request number 4970S, 1979.

OTHER

Last changed: 6/26/00

LR 49705
File: Page No.

ENVIRONMENTAL ENGR. LAB - WORK SHEET

SAMPLE DESCRIPTION

FC-206A, LOT 2502

Date: 8-08-79

Analyst: W. G. Schild

Hrs.: _____

Acute Toxicity of a Compound to
Activated Sludge Mixed Liquor

TIME -		DISSOLVED OXYGEN CONCENTRATION		- mg/l
MINUTES	SECONDS	D.I. H ₂ O CONT.	1000 mg/l SAMPLE	
	30	7.55	7.2	
1		7.0	6.45	
2		5.85	4.90	
3		4.7	3.25	
4		3.55	1.65	
4	30	—	0.85	
4	45	—	0.5	
5		2.4	<0.5	
6		1.25		
7		<0.5		

The mixed liquor was obtained from Pige Eye
Metro Sewage Plant and used the same day.

Reviewed by: _____

ENVIRONMENTAL LABORATORY SUMMARY SHEET

LAB REPORT NO. **49705**

WEAK TOXICITY OF A COMPOUND TO ACTIVATED
SLUDGE FROM LIVER

COMPOUND: **EC-206A, LOT 2502**

ANALYST: **W. G. Schind**

DATE: **8-28-79**

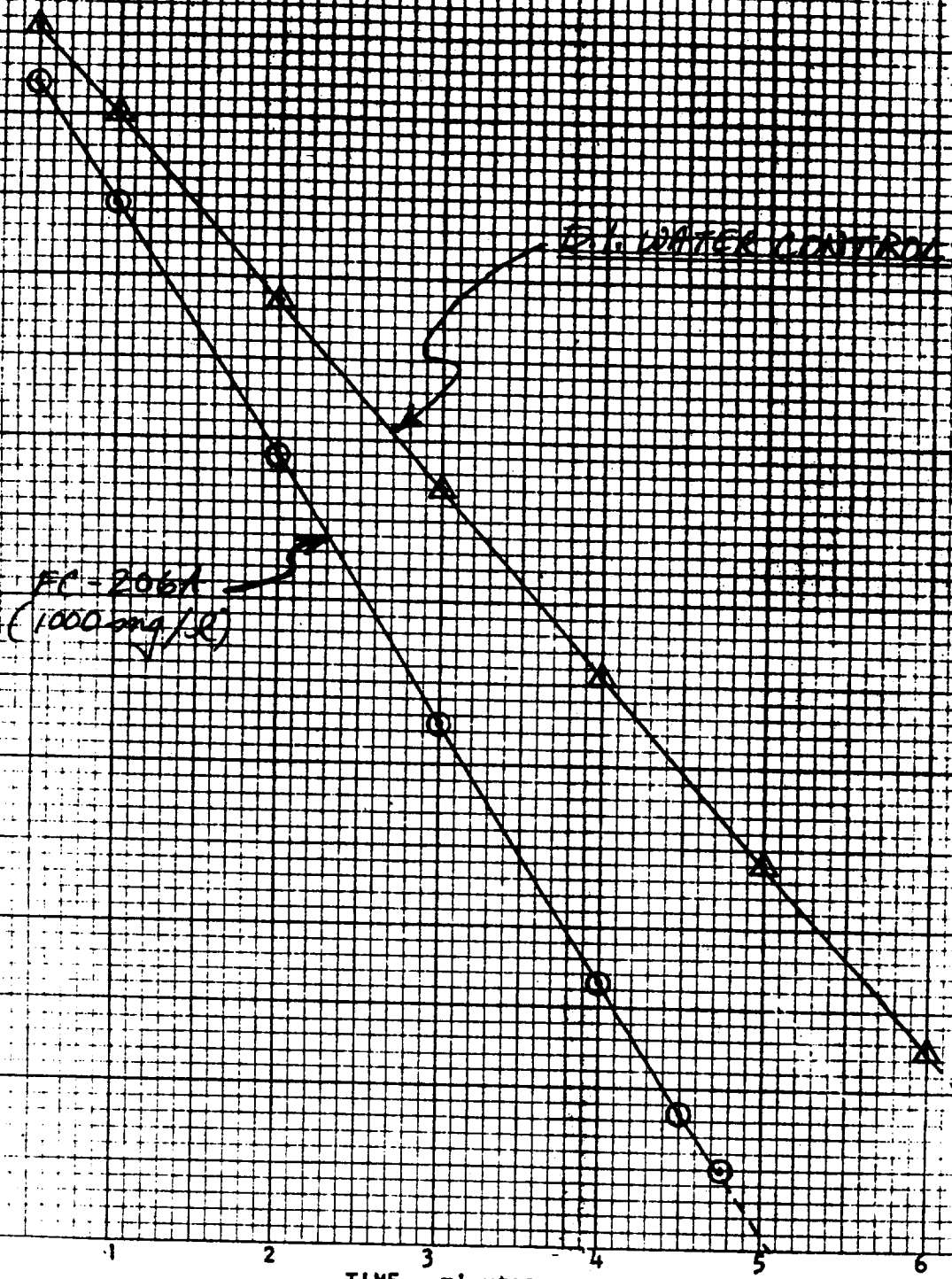
DIETZEN COMPENSATION
MADE IN U.S.A.

NO. 340-10 DIETZEN GRAPH PAPER
10 X 10 PER INCH

DISSOLVED OXYGEN CONCENTRATION - mg/l

9
8
7
6
5
4
3
2
1
0

TIME - minutes



3/16/79

PROCEDURE

MATERIALS AND REAGENTS

- 1 Obtain 4 liters of activated sludge from an aeration basin at the Metro Wastewater Treatment plant.
- 2 Use sludge within 4 hours of collection.
- 0 Prepare a 100-ml, 6,000-mg/l stock solution of the material to be tested in air-saturated deionized (DI) water.
- 0 Starting with this stock solution, make serial dilutions by transferring 10 ml of the preceding solution into 100-ml volumetric flasks and bringing to volume with air-saturated water. In this manner, prepare 600-, 60-, 6-, and 0.6-mg/l solutions.
- 1 Prepare a 1,200 mg/l nutrient broth solution by dissolving 1.2 g in approximately 100 ml of DI water at 95 C and diluting to 1 liter with air-saturated water.
- 2 Aerate to bring to air saturation.
- 1 Pass the sludge through a 100-mesh stainless steel sieve.
- 2 Place 3 liters of the activated sludge in a 4-liter beaker.
- 3 Place the beaker on an insulating sheet on top of a magnetic mixer.
- 4 Set the mixer speed so that it keeps the sludge completely suspended.
- 5 Aerate the sludge rapidly to bring it to near air saturation.
- 1 Place a 1-in. magnetic stirring bar in a BOD bottle.
- 2 Place the BOD bottle on a sheet of foam insulation on top of a magnetic mixer.
- 3 Add 50 ml of nutrient broth solution and 50 ml of aerated DI water.
- 4 Start the mixer at a rate that will keep sludge suspended.
- 5 Transfer enough of the completely dispersed, aerated, activated sludge to fill the BOD bottle using a 500-ml beaker.

The following materials and reagents are required for this procedure:

- | | |
|-----------------------------|---------------------------------|
| 1) Oxygen meter | 11) 300 ml BOD bottles |
| 2) DO probe | 12) 3-in. Magnetic stirring bar |
| 3) ASTM thermometer | 13) 1-in. Magnetic stirring bar |
| 4) 4-liter beaker | 14) Magnetic mixer |
| 5) 500 ml beaker | 15) 3/4 in. Foam insulation |
| 6) 10 ml pipets | 16) Stop watch |
| 7) 100 ml volumetric flasks | 17) 100-mesh steel sieve |
| 8) Compressed air | 18) Deionized water |
| 9) Air spargers | 19) Nutrient broth |
| 10) Plastic tubing | 20) Activated sludge |

- 6.6 Start the stopwatch immediately.
- 6.7 Insert the DO probe into the BOD bottle, and record the time and DO concentration at frequent intervals for 10 min or until the DO concentration reaches 0.5 mg/l.
- 6.8 Obtain fresh sludge if the DO is greater than 0.5 mg/l at 10 min.
- 6.9 If the DO is depleted to 0.5 mg/l in less than 5 min., bring the time required for complete O_2 uptake to between 5 and 10 min by diluting the sludge stock with air-saturated DI water.
- 7.1 Repeat the procedure described in steps 6.1 to 6.7, except substitute 50 ml of the test material solutions or aerated DI water controls for the aerated DI water used in step 6.3.
- 7.2 Run the O_2 assays in the following order:
 - 1) 6,000-mg/l test material, 2) DI control No. 1, 3) 0.1 mg/l, 4) 100 mg/l, 5) 1 mg/l, 6) Control No. 1, 7) 10 mg/l.
- 8.1 Use a full sheet of graph paper to plot the oxygen concentration as a function of time for the control and each test concentration.
- 8.2 Label each plot with the final concentration of test material in each BOD bottle. These concentrations are 1,000, 100, 10, 1, and 0.1 mg/l.

CR 49705