N-EtFOSE ALCOHOL

WATER SOLUBILITY

TEST SUBSTANCE

Identity: N-ethylperfluorooctane sulfonamidoethanol; may also be referred to as N-EtFOSE Alcohol or FM-3422. (1-Octanesulfonamide, N-ethyl-1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-N-(2-hydroxyethyl)-, CAS # 1691-99-2)

Remarks: Material is an off-white, waxy solid of uncharacterized purity.

METHOD:

Method followed: The Veith-Comstock technique, G. D. Veith and V. M. Comstock, J. Fish Res. Board Can., 32, 1849 (1975)

GLP: No

Year study was performed: 1977

Remarks: This experiment was performed 8 times. No information is given on sample purity.

RESULTS

Value (mg/L) at 20 C: Mean value = 0.05 (0.04-0.062 Range over 8 trials)

CONCLUSIONS

The test substance has solubility in the mid part per billion range.

DATA QUALITY

Reliability: Klimisch ranking = 3. It is useful in that it indicates the approximate N-EtFOSE alcohol water solubility. The test water was not sufficiently characterized, nor was the purity of the test material noted.

Testing will be redone using current methods and analytical techniques. Testing will be conducted using a purified sample.

REFERENCES

3M Technical Report Summary, *Fate of Fluorochemicals*, 3M Environmental Laboratory, 3M Environmental Engineering and Pollution Control, A. Mendel, 11/15/77

OTHER

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TECHNICAL REPORT SUMMARY

Date: 11/15/77

TO: TECHNICAL COMMUNICATIONS CENTER – 201-2CN

(Important – If report is printed on both sides of paper, send two copies to TCC.)

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Project: Fate of Fluorochemicals	Project Number: 9970612643
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To: D. L. Bacon	
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SECURITY ▶ ☐ Open (Company Confidential) [ ] Closed (Special Authorization)

3M CHEMICAL REGISTRY ▶ New Chemicals Reported ☐ Yes ☒ No

KEYWORDS: (Select terms from 3M Thesaurus. Suggest other applicable terms.)

EE & PC-Div.
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Analytical

CURRENT OBJECTIVE:

Progress Report

REPORT ABSTRACT: (200-250 words) This abstract information is distributed by the Technical Communications Center to alert 3M'ers to Company R&D. It is Company confidential material.

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DETERMINATION OF SOLUBILITY OF FM 3422 IN WATER

The Veith-Comstock technique (2) was used for this experiment.

Glass beads (ca. 300 g, 3 mm. in diameter) were added to a solution of 100 mg of FM 3422 in about 500 ml of acetone. The solvent was allowed to evaporate, thus depositing the fluorochemical on the beads. The beads were packed into a column (ca. 25 mm. dia. x 450 mm.) whose end was prepacked with a 20 mm. layer of silanized glass wool, followed by a 20 mm. layer of sand.

The top of the column, packed with a 20 mm. layer of silanized glass wool, was attached by Mayon(R) tubing to the top inlet of a 2-liter bottle filled with water. The bottom of the column was attached by tubing through a peristaltic pump, to the bottom outlet of the 2-liter flask. The water was circulated upwards by the pump through the column for about two weeks. By volumetric pipet, one hundred milliliters of saturated liquid was withdrawn, diluted with 10 ml of aqueous saturated salt, and extracted 3 times with a total of 21 ml of ethyl acetate. The combined extract was diluted to 25 ml (volumetric flask). An aliquot was gas-chromatographed. This experiment was performed eight times. The results are reported in TABLE III.

TABLE III

SOLUBILITY OF FM 3422 IN WATER*

Experiment No.	ppm FM 3422
1	0.050
2	0.045
3	0.061
4	0.042
5	0.040
6	0.062
7	0.050
8	0.048
Mean	0.04975

*Temp. = 20° C.
Mean = 0.05 ppm; Range = 0.04-0.062 ppm; Std. Dev. = 0.0084

RECOVERY STUDIES OF AQUEOUS FM 3422 SOLUTIONS IN VARIOUS CONTAINERS (44191-42)

At the low solubility level of FM 3422 in water (0.05 ppm), the possibility was considered of incomplete recoveries due to sorption of FM 3422 by plastics and/or glass. Accordingly, the following study was made:

One hundred milliliters on 0.05 ppm FM 3422 in water (by the Veith-Comstock technique (2) as described earlier) was added to an amber glass - and to a polyethylene - container, respectively. The containers were capped and allowed to stand in the laboratory for one week. The respective contents of the containers were transferred quantitatively to a separatory funnel. The container was rinsed with two milliliters of water only. To the funnel was added 10 ml of saturated aqueous sodium chloride and 19 ml of ethyl acetate. The contents were extracted and the organic extract was transferred quantitatively to a 25 ml volumetric flask. The aqueous phase was re-extracted twice with 5 ml of ethyl acetate. The combined organic extract was diluted to the mark (ethyl acetate) and then gas chromatographed.

To each of the now empty containers used above was added (pipet) 1 ml of methanol. The respective container was sealed, rinsed with this 1 ml of methanol, and an aliquot was gas chromatographed. Experiments were performed in duplicate and the results are indicated in TABLE IV.

TABLE IV

CONTAINER STUDIES WITH FM 3422

Experiment No.	Container	FM 3422 in 100 ml water (µg)	Total FM 3422 in Container: Methanol Rinse (µg)	Total FM 3422 Recovered* (µg)
1	Glass	5.8	0.04	5.8
2	Glass	4.6	0.19	4.8
3	Polyethylene	<3	1.88	<4.9
4	Polyethylene	<3	1.15	<4.2

*Solubility of FM 3422 in water determined as 0.05 ppm or 5 µg/100 ml.

It appears therefore that glass containers may be used but polyethylene must not be used to store solutions at these concentrations; otherwise, severe losses of material are possible.