

STABILITY IN WATER (HYDROLYSIS)

TEST SUBSTANCE

Identity: N-methylperfluorooctane sulfonamidoethanol; may also be referred to as 2-(*N*-Methylperfluorooctanesulfonamido)-ethyl alcohol, N-MeFOSE Alcohol, FC-790, or FM-3925. (1-Octanesulfonamide, N-methyl-1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptafluoro-N-(2-hydroxyethyl)-, CAS # 24448-09-7).

Remarks: 3M production lot number was not noted. The test substance is an amber waxy solid at 25°C.

METHOD

Method: Based on OPPTS: 835.2110
GLP (Y/N): No, but many GPL procedures followed.
Year completed: 2001
Type: Hydrolysis as a function of pH

Test sample preparation: Test solutions consisted of 1.0 mL of buffered aqueous solutions at six pH levels (1.5, 3.0, 5.0, 7.0, 9.0, and 11.0). The *N*-MeFOSE alcohol concentration in all test samples (sample duplicates and matrix spike samples) was approximately 473 µg/L. Samples were shielded from light during incubation at 50° for periods of 0 to 49 days. Control samples and blanks addressed potential non-hydrolytic degradation routes.

Analytical Procedures: All samples were analyzed using HPLC/MS.

Remarks: This study was conducted at 50°C in order to facilitate hydrolysis. Rates measured at 50°C were extrapolated to 25°C by dividing by a factor of 10, which is valid for reactions with Arrhenius heats of activation near 18 kcal/mole.

RESULTS

Breakdown products: No formation of PFOS observed.

Degradation: Two independent methods were used to estimate the hydrolytic half-life of *N*-MeFOSE alcohol. In the first method, direct observations of *N*-MeFOSE alcohol concentrations show that the loss of *N*-MeFOSE alcohol is independent of pH. Data over all pH ranges were therefore pooled to provide an estimated range for the pseudo first-order half-life of *N*-MeFOSE alcohol.

In the second method, direct measurements of both *N*-MeFOSE and PFOS were taken into account. The minimum pseudo first-order hydrolytic half-life of *N*-MeFOSE alcohol was calculated by estimating how fast *N*-MeFOSE alcohol or other degradation

products might degrade to generate PFOS. This estimate assumes that PFOS is the only hydrolytic product of *N*-MeFOSE alcohol and that the hydrolysis is independent of pH. The study did not firmly establish the limit of detection (LOD) for PFOS, so these calculations were based on the measured initial *N*-MeFOSE alcohol concentration and the calculated limit of quantification (LOQ) for PFOS. The two half-life estimates are presented below.

Mathematical Method/Quantities Employed	Hydrolytic Half-Life at 25°C (years)
Least Squares Log-Concentration Slope Estimate	6.3
<i>N</i> -MeFOSE alcohol Initial Concentration and LOQ of PFOS	≥ 27

CONCLUSIONS

Based on the observed loss of *N*-MeFOSE alcohol the hydrolytic half-life can be estimated at approximately 6.3 years. An alternative calculation considering the initial *N*-MeFOSE alcohol concentration and the LOQ of the potential product PFOS yields a hydrolytic half-life greater than 27 years.

Submitter: 3M Company, Environmental Laboratory, P.O. Box 3331, St Paul, Minnesota, 55133

DATA QUALITY

Reliability: Klimisch ranking: 2

Remarks: Study was well conducted, though not under GLP.

REFERENCES

This study was conducted at the 3M Environmental Laboratory under Lab Request Number W1880. See 3M Environmental Laboratory Report No. W1880 (dated March 30, 2001).

OTHER

Last Changed: June 21, 2001