

STABILITY IN WATER (HYDROLYSIS)

TEST SUBSTANCE

Identity: N-ethylperfluorooctane sulfonamidoethanol; may also be referred to as N-EtFOSE alcohol. (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: 3M production lot number was 936. Test substance is an off-white powder at 25°C.

METHOD

Method: Based on OPPTS: 835.2110

GLP (Y/N): No, but many GLP 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-EtFOSE alcohol concentration in all test samples (sample duplicates and matrix spike samples) was approximately 1000 ug/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-EtFOSE alcohol. In the first method, direct observations of N-EtFOSE alcohol concentrations show that the loss of N-EtFOSE 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-EtFOSE alcohol.

In the second method, direct measurements of both N-EtFOSE and PFOS were taken into account. The minimum pseudo first order hydrolytic half-life of N-EtFOSE alcohol was calculated by estimating how fast N-EtFOSE alcohol or other degradation products might degrade to generate PFOS. This estimate assumes that PFOS is the only hydrolytic product of N-EtFOSE 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*-EtFOSE 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	7.3
<i>N</i> -EtFOSE alcohol Initial Concentration and LOQ of PFOS	≥ 31

CONCLUSIONS

Based on the observed loss of *N*-EtFOSE alcohol the hydrolytic half-life can be estimated at approximately 7.3 years. An alternative calculation considering the initial *N*-EtFOSE alcohol concentration and the LOQ of the potential product PFOS yields a hydrolytic half-life greater than 31 years.

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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 W1872. See 3M Environmental Laboratory Report No. W1872 (dated March 23, 2001).

OTHER

Last Changed: June 21, 2001