STABILITY IN WATER (PHOTOLYSIS)

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: N-EtFOSE alcohol is a white powder originally from 3M production lot number 30107. It was HPLC purified and assigned 3M standard identification # SE-035.

METHOD

Method: Based on OPPTS: 835.5270 and OECD Draft Document "Phototransformation of Chemicals in Water – Direct and Indirect Photolysis", August, 2000.
GLP (Y/N): No, but many GLP procedures followed.
Year completed: 2001
Type: Direct and Indirect Photolysis
Light source: Suntest CPS+ or Suntest XLS+ lamp
Light intensity: 680 w/m^2
Wavelength range: 290-800 nm
Duration: 69.5 to 72 hours
Test matrices:

Direct: Water
Indirect: H_2O_2/water (1:1 molar equivalent)
H_2O_2/water (1:1 molar equivalent)
Soil/dilute aqueous $CaCl_2$ solution (0.7 g/5mL) (3 soil types – loam, clay loam, sandy clay loam)
Soil/dilute aqueous CaCl2 solution with H_2O_2
Fe_2O_3/water (Fe^{3+} at 24X molar excess)
Fe_2O_3/water with H_2O_2
Commercial (Aldrich) humic material prepared as in OPPTS 835.5270

Each of the above direct and indirect test matrices included a series of unexposed controls (kept in the dark) for the evaluation of any degradation reactions occurring without the presence of light.

Temperature: 25±3°C

Test sample preparation: Aliquots of N-EtFOSE alcohol were added to three separate sets of VOA screw cap vials (exposed, unexposed, and control vials) containing 5 ml of appropriate matrix. Test vials were placed in the photoreactor. Control vials were wrapped in aluminum foil, sealed in a plastic bag, and placed in the photoreacter.

Analytical Procedures: A UV/Vis spectrum of a saturated aqueous solution of PFOS was recorded between 190 and 110 nm. Samples were analyzed by quantitative LC/MS and GC/MS techniques.

RESULTS

Degradation and breakdown products: Degradation of *N*-EtFOSE alcohol was observed in each matrix, but the observed rates and product distribution varied from matrix to matrix. The three primary degradation products observed were PFOA, *N*-EtFOSA, and FOSA; however, under certain conditions,

trace levels (near the quantitation limits) of other potential degradation products (heptadecafluorooctanes and PFOS) were also observed. It remains unclear whether these compounds were produced by the degradation of *N*-EtFOSE alcohol; it is also possible that they are degradation products of low-level impurities in the original sample material. Using the iron oxide/H_2O_2 data, the half-life of *N*-EtFOSE alcohol was estimated to be 40 days. However, the actual indirect photolytic half-life in the environment could be higher or lower than this estimate by an order of magnitude or more.

CONCLUSIONS

Using the iron oxide/H_2O_2 data, the half-life of *N*-EtFOSE alcohol was estimated to be 40 days. However, the actual indirect photolytic half-life in the environment could be higher or lower than this estimate by an order of magnitude or more. The three primary degradation products observed were PFOA, *N*-EtFOSA, and FOSA. This study does not provide conclusive evidence of direct photolysis of *N*-EtFOSE alcohol in this or any of the three other matrices considered.

Submitter: 3M Company, Environmental Laboratory, P.O. Box 33331, 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 W2783. See 3M Environmental Laboratory Report No. W2783 (dated April 19, 2001).

OTHER

Last Changed: June 22, 2001