

STABILITY IN WATER (PHOTOLYSIS)

TEST SUBSTANCE

Identity: Perfluorooctanesulfonate-potassium salt. May also be referred to as: PFOS, PFOS-potassium salt, 1-Perfluorooctanesulfonic acid-potassium salt, or 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-potassium salt. CAS: #2795 39-3.

Remarks: 3M production lot number 171. Test substance is a light-colored powder at 25°C. Purity determined to be 86.4% by LC/MS, ¹H-NMR, ¹⁹F-NMR and elemental analyses techniques.

METHOD

References: 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 were employed.

Year completed: 2001

Type: Direct and Indirect Photolysis

Light source: Suntest CPS+ or Suntest XLS+ lamp

Light intensity: 680 w/m²

Wavelength range: 290-800 nm

Duration: 67-167 hours

Test matrices:

Direct: Water

Indirect: H₂O₂/water (1:1 molar equivalent)

Fe₂O₃/water (Fe³⁺ at 24X molar excess)

Fe₂O₃/water with H₂O₂

Commercial (Aldrich) humic material prepared as in OPPTS 835.5270

All tests 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 PFOS 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 photoreactor.

Analytical Procedures: A UV/Vis spectrum of a saturated aqueous solution of PFOS was recorded between 190 and 1100 nm. Samples were analyzed by quantitative LC/MS and GC/MS techniques.

RESULTS

Degradation and breakdown products: No evidence of direct or indirect photolysis of PFOS was observed under any of the conditions tested. Direct photolytic decomposition of PFOS was not observed based on loss of starting material, nor were any of the predicted degradation products detected above their limits of quantitation.

Data obtained from the Fe₂O₃ matrix samples (with and without H₂O₂) were pooled to provide sufficient statistical data to estimate the minimum half-life. The mean and standard deviation of these data indicate that the minimum environmental half-life of PFOS due to indirect photolysis at 25°C is greater than 3.7 years.

CONCLUSIONS

No evidence of direct or indirect photolysis of PFOS was observed under any of the conditions tested. The mean and standard deviation of the observed PFOS concentrations in an aqueous Fe₂O₃/H₂O₂ matrix indicate that the indirect photolytic half-life of PFOS at 25°C is greater than 3.7 years.

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 W2775. See 3M Environmental Laboratory Report No. W2775 (dated April 23, 2001).

OTHER

Last Changed: January 25, 2002