Decomposition of Perfluorooctane Sulfonate by Combustion Processes

Introduction

To understand the potential degradation pathways for perfluorinated chemicals, it was necessary to model the thermodynamics of incineration processes. For this analysis, 3M contracted with two firms well known in the combustion/incineration field, Pacific Northwest National Laboratory and Focus Environmental, Inc. Attached are two summary reports from these firms that predict the likely pathways of degradation of these perfluorinated substances.

Decomposition of Perfluorinated Alkyl Sulfonates

The most pertinent finding of the reported analysis is that the carbon-sulfur bond in the perfluorooctane sulfonate molecule is a fairly weak bond. Consequently, the perfluorinated alkyl sulfonyl compound would have relatively low thermal stability. The low C-S bond energy would suggest that the PFOS molecule, itself, would be destroyed in solid and hazardous waste combustion units.

To validate this model prediction, 3M is conducting laboratory combustion studies on a series of perfluoroalkyl compounds, including PFOS and two polymeric product formulations. An assessment will be made of combustion by-products through a range of temperatures. These data will be available by the end of year 2001.

Summary

The information presented in the attached report strongly suggests that POSF based products and PFOS would have relatively low thermal stability because of the low bond energy of the C-S bond. It is therefore unlikely that incineration is a major factor in the generation and distribution of PFOS.