

STUDIES OF ORGANOSILICONE SURFACTANT DEGRADATION BY ATMOSPHERIC PRESSURE IONISATION MASS SPECTROMETRY (API/MS)

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Trisiloxane ethoxylate surfactants have become widely used as adjuvants for agrichemical spray formulations in the last decade¹. There is increasing concern with environmental contamination and studies have been made of organic surfactants in river and drinking water². It is well known that some of the trisiloxane structures are relatively labile under strong acid or alkaline conditions³, but little or nothing is known about their degradation products, rates or routes, in or on plant surfaces, and in the natural environment. Some studies have been made of polydimethylsiloxane degradation in soils which showed rapid conversion to water soluble products⁴.

Sensitive methods developed for the quantitation of surfactants using Atmospheric Pressure Ionisation Mass Spectrometry (API/MS) have been applied to the analysis of trisiloxane surfactants for degradation product identification. API/MS conditions have been developed that provide linear quantitative responses down to ppb levels of surfactants⁵. Degradation rates of representative trisiloxane surfactants under various chemical conditions have been investigated by Atmospheric Pressure Chemical Ionisation Mass Spectrometry (APCI/MS). This technique has also been used to compare the behaviour of trisiloxane surfactants on several different substrates, including such media as clays and other inorganic substances inherently present in the natural environment.

Comparisons were made, and will be presented, of degradation rates and by-products produced under different environmental conditions.

1. P J G Stevens, *Pestic. Sci.*, 1993, 38, 103-123.
2. C Crescenzi, A Di Corcia, R Samperi, *Anal. Chem.*, 1995, 67, 1797-1804.
3. M Knoche, H Tamura and M J Bukovac, *7th Int. Congress of Pesticide Chemistry*, IUPAC, Hamburg, 1990, 05A-08.
4. J C Carpenter, J A Cella and S B Dorn, *Environ. Sci. Technol.*, 1995, 29, 864-868.
5. J A Zabkiewicz, WA Forster, L S Bonnington, and W Henderson, *Procs. 50th New Zealand Plant Protection Conf.*, 1997, 50, 550.