

AccuTOF-GCv Series

Analysis of Advanced Materials by FD/FI Part II

Multifunctional Thiols, Curing Agents for Functional Polymers

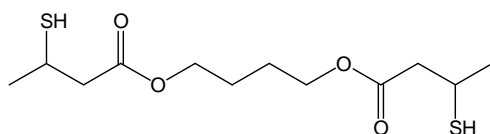
Introduction

Field Ionization (FI) is a soft ionization method which ionizes analytes by electron tunneling from analyte molecules to a solid surface (emitter) in a high electric field. The vaporized analyte molecules are introduced into the proximity of the emitter in order for ionization to occur.

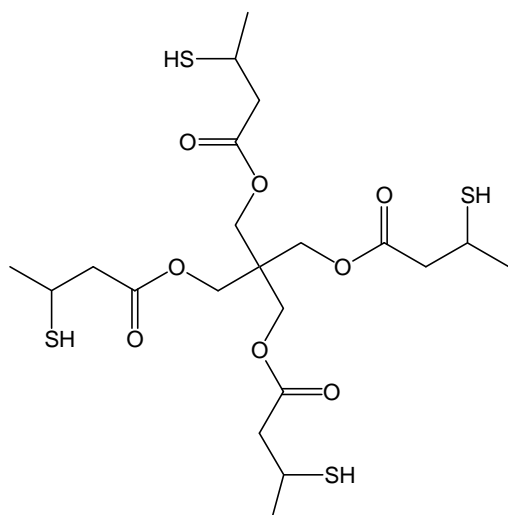
In this work, we have analyzed multifunctional thiols, which are curing agents for functional polymers, by GC/EI and GC/FI methods and then compared the resulting mass spectra.

Methods

Samples : Multifunctional thiols (Showa Denko K.K.)



(1) Karenz MT® BD1 ($C_{12}H_{22}O_4S_2$)



GC conditions

Column: ZB-5ms, 30 m x 0.25 mm, film thickness: 0.25 μ m
 Carrier gas: Helium, 1.0 mL/min (constant flow rate mode)
 Oven: 40 °C (2 min) \rightarrow 30 °C/min \rightarrow 280 °C (12 min)

MS conditions

Mass spectrometer: JMS-T100GC "AccuTOF GC"
 Ionization mode: EI: Electron energy: 70 eV,
 Ionization current: 300 μ A
 FI: Cathode potential: -10 kV,
 Emitter current: 0 mA

Acquired mass range: m/z 35 – 550

Spectral recording interval: 0.4 sec

Results and Discussion

For both Karenz MT® BD1 and PE1, which are multifunctional thiols, the EI analysis method showed a number of fragment ions in the mass spectrum and no molecular ions, as shown in Fig. 1(a) and (c). However, the FI method clearly showed the presence of molecular ions for both samples while only a few fragment ions were observed, as shown in (b) and (d) of Fig. 1. As this work demonstrates, the FI method is suitable for the analysis of multifunctional thiol compounds.

Acknowledgement

We would like to acknowledge the Fine Chemicals Group, Specialty Chemicals Department, Chemicals Division, SHOWA DENKO K.K, for generously providing the samples used in this work.

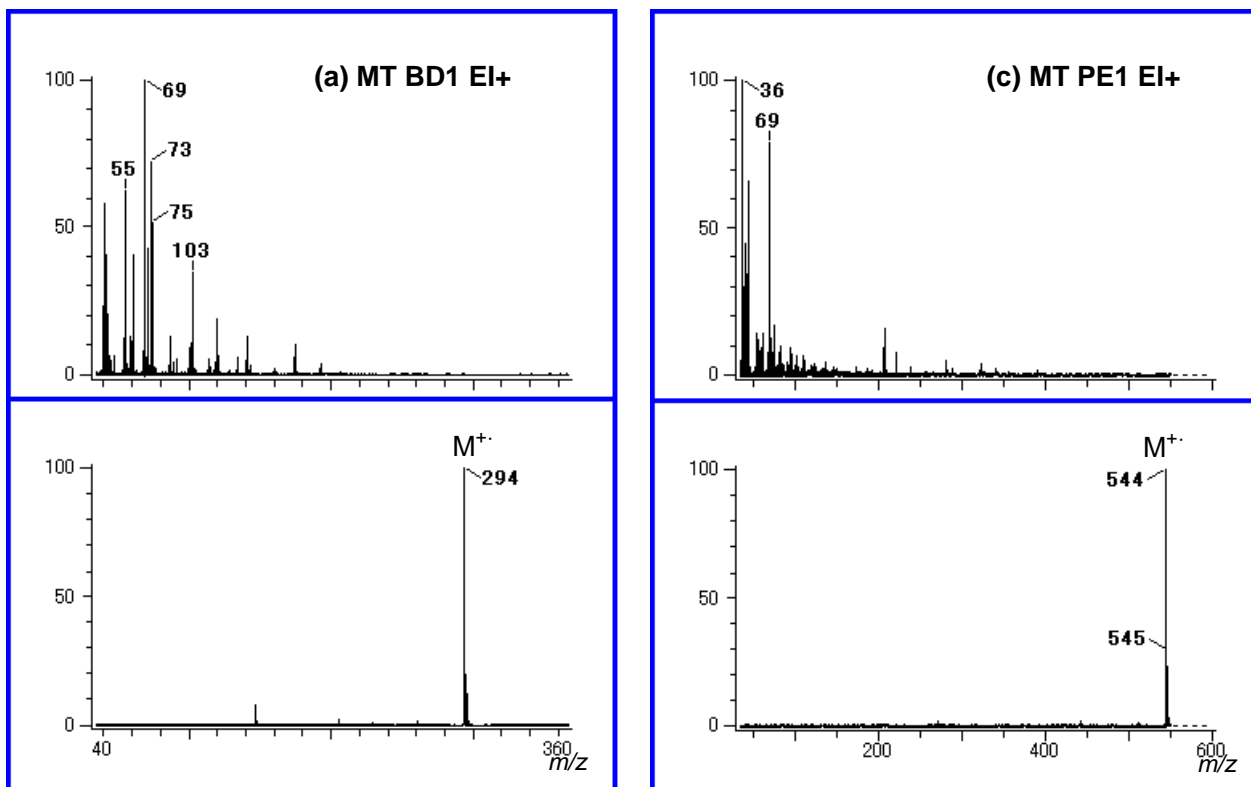
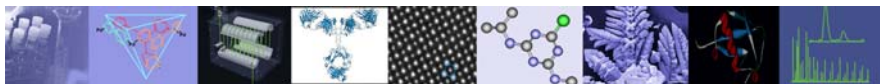


Fig. 1 Mass spectra of Karenz MT® BD1; (a) EI+, (b) FI+
Mass spectra of Karenz MT® PE1; (c) EI+, (d) FI+