

AccuTOF-GCv Series

Analysis of Polymer Additives Using DIP-EI and FD

Introduction

This report shows the analyses of the phenolic polymer antioxidants shown in Fig. 1. These samples were analyzed by using the AccuTOF-GCV with both direct insertion probe (DIP) electron ionization (EI) and field desorption (FD).

Methods

Samples

Phenolic antioxidant

AO-80 (1mg/mL in methanol)

Irganox1098 (1mg/mL in methanol)

Irganox1010 (1mg/mL in methanol)

Measurement Conditions

The measurement conditions are listed in Table 1.

Instrument	JMS-T100GCV (JEOL Ltd.)
Direct probe	DIP
Ionization mode	EI+ (70eV, 300μA)
Probe condition	50°C → 64°C/min → 400°C
Ion source temp.	280°C
<i>m/z</i> range	<i>m/z</i> 50-1500
Spectrum recording time	1.0sec
Direct probe	FDP
Ionization mode	FD+ (Cathode volt.: -10kV)
Probe condition	0mA → 51.2mA/min → 40mA
Ion source temp.	Heater OFF
<i>m/z</i> range	<i>m/z</i> 50-1500
Spectrum recording time	0.5sec

Table 1. Measurement conditions

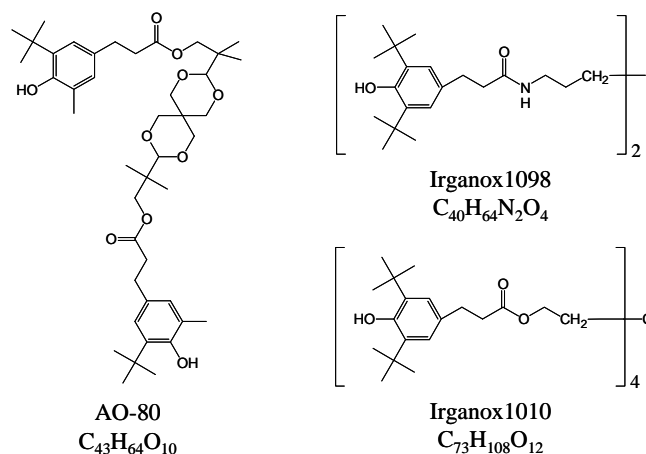


Fig. 1 Structural formula for each sample compound

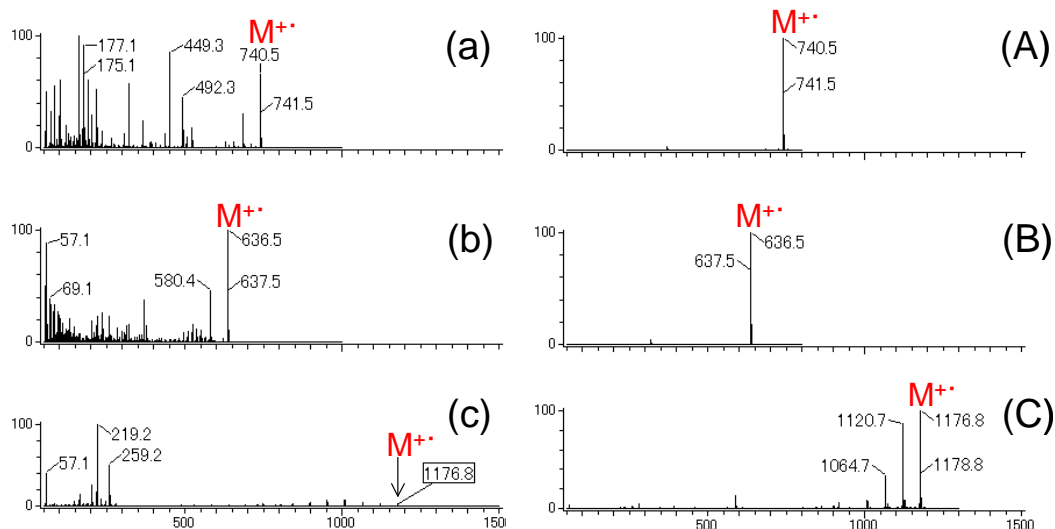


(a) DIP (Direct Insertion Probe)



(b) FDP (Field Desorption Probe)

Fig. 2 Direct probes



*Fig.3 Mass spectra of phenolic antioxidant by DIP-EI and FD.
EI mass spectra: (a) AO-80, (b) Irganox1098, (c) Irganox1010
FD mass spectra: (A) AO-80, (B) Irganox1098, (C) Irganox1010*

Results

The DIP-EI analysis time was approximately 5 minutes and the FD measurement took 1 minute using the conditions listed in Table 1. The mass spectra for each sample are shown in Fig. 3. The molecular ion was observed in all mass spectra. However, the ion intensity of the molecular ion of Irganox1010 by using DIP-EI was much lower than the ion intensity for the fragment ions. Conversely, the molecular ion was observed as the base peak in all of the FD mass spectra.

Conclusions

The JMS-T100GCV is capable of analyzing antioxidants by using the simple and quick direct probe methods, DIP-EI and FD. While the JMS-T100GCV can be used for classical GC/MS, this report shows that it is also a very useful tool for qualitative analysis by using direct probe/MS.