

## Identification of an Unknown Antidegradant in a Rubber Sample using the Expanded Additive MS Library

**[Background]** Impurities originally contained in the antidegradants and their decomposed products from during the manufacturing process often provide valuable information when analyzing antidegradants found in various rubber formulations. However, conventional MS libraries such as Wiley do not contain information on the impurities or decomposed products of the antidegradants. Frontier Laboratories' MS additive library information on 37 typical antidegradants.

**[Library structure]** The expanded additive MS library includes mass spectral data for the major peaks found in the chromatograms of the antidegradants obtained by thermal desorption (TD)-GC/MS. In addition, the fragment names, retention indices (RI), the chemical names of the original antidegradants and the total ion chromatograms are reported.

**[Test sample]** A compounded rubber, which had been kneaded and vulcanized, containing approximately 1% of an unknown antidegradant, was analyzed to illustrate the capabilities of the library.

**[Results]** Fig.1(a) shows the chromatogram of the vulcanized rubber sample obtained using TD-GC/MS and the MS spectra of peaks (A)–(C). Based on their RI and the similarities of the mass spectra obtained using the MS library, three major peaks are identified, see Fig.1(b). Furthermore, the chromatogram in the expanded additive library in Fig.1(b) can be used to identify the antidegradant candidate associated with these 3 peaks as *p*-(*p*-Toluene sulfonylamido) diphenylamine. The additive MS library which contains data about the major peaks in the chromatograms as well as those of the original antidegradants is useful for identifying antidegradants in rubber.

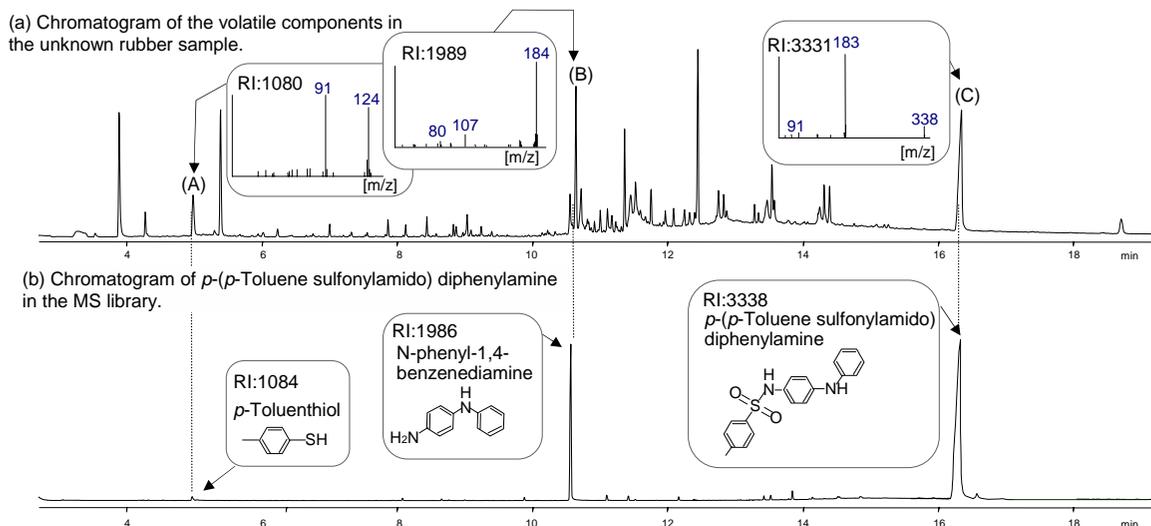


Fig. 1 Chromatograms obtained by TD-GC/MS technique  
 Furnace temp.: 340°C (1 min), GC oven temp.: 40 - 320°C (20°C/min, 10 min)  
 Column: Ultra ALLOY-5 (MS/HT) (30 m, 0.25 mm, film thickness 0.25 µm), sample amount: 1.0 mg

Ref : K. Matsui, et al., 12th Polymer Analysis & Characterization Japan 2007 I-16

Keywords : Rubber, Antidegradants, Thermal desorption

Applications : General polymer analysis, Rubber and associated industries

Related technical notes : PYA1-054E

Please direct your inquiries to us by Fax or via our web site at :

<http://www.frontier-lab.com/>

R&D and manufactured by :

**Frontier Laboratories Ltd.**

1-8-14 Saikon, Koriyama

Fukushima-ken 963-8862 JAPAN

Phone: (81)24-935-5100 Fax: (81)24-935-5102

® : Registered trademark of Frontier Laboratories Ltd.

Dealer