

Identification of an Unknown Antidegradant in a Rubber Sample using the 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' additive library (ADD-MS) contains spectral data for typical 32 commercially available antidegradants and was used for the identification described in this note.

[Library structure] The ADD-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 capability 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 ADD-MS library, three major peaks are identified, see Fig.1(b). Furthermore, the chromatogram in the ADD-MS 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 ADD-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.

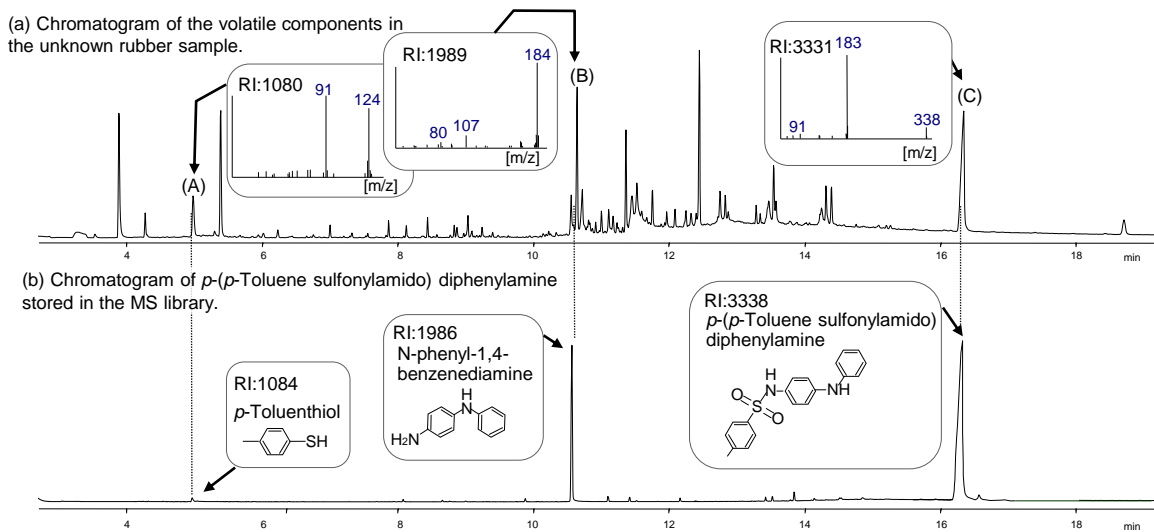


Fig. 1 Chromatograms obtained by TD-GC/MS technique
 Furnace temp.: 340°C (1 min), GC oven temp.: 40 - 320°C (20°C/min, 10 min)
 Column: Ultra ALLOY-5 (MS/HT) (30 m, 0.25 mm, film thickness 0.25 µm), sample amount: 1.0 mg

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

Keywords : Rubber, Antidegradants, Thermal desorption

Products used : Multi-functional pyrolyzer, Auto-Shot Sampler, Vent-free GC/MS adapter, F-Search, UA-5 (MS/HT)

Applications : General polymer analysis, Rubber and associated industries

Related technical notes : PYA1-054E

Please forward your inquiries via our web page or send us a fax message.

R&D and manufactured by :
Frontier Laboratories Ltd.

Phone: (81)24-935-5100 Fax: (81)24-935-5102
<http://www.frontier-lab.com/>