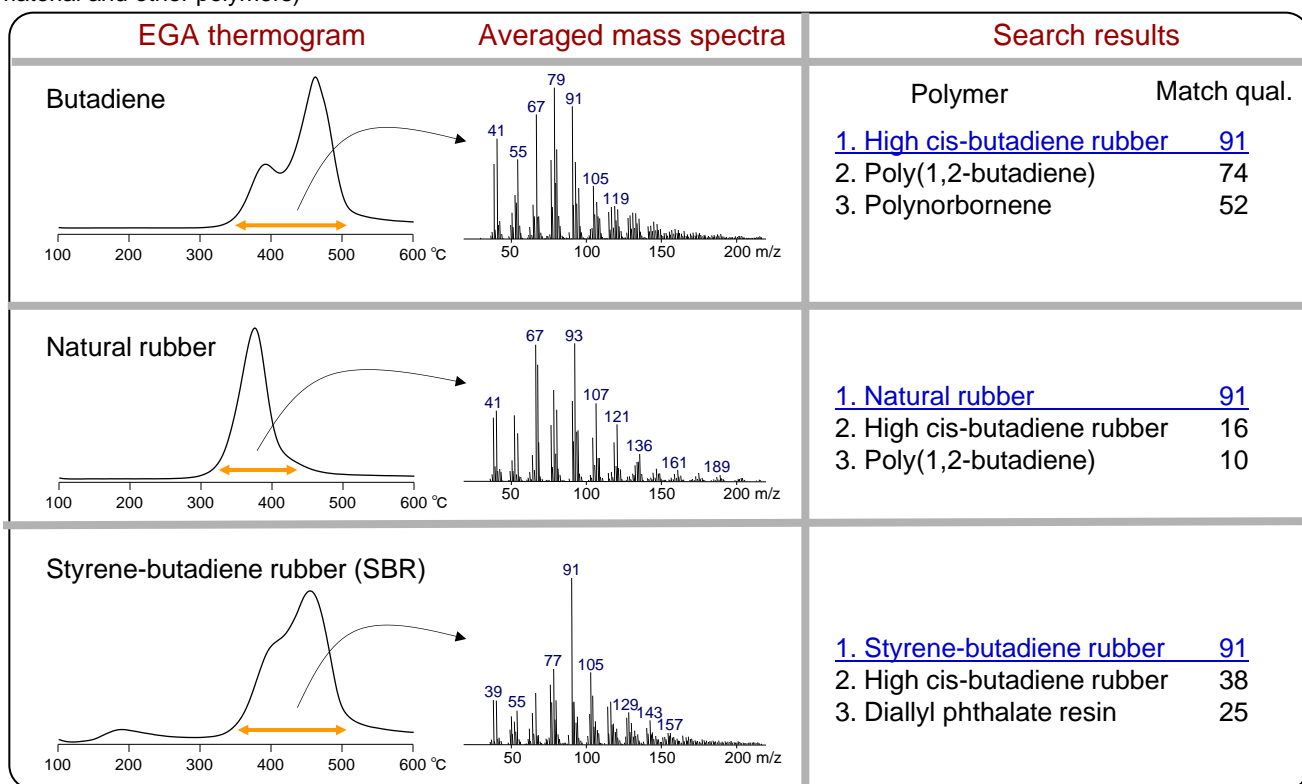


## Viability of Evolved Gas Analysis with F-Search and an MS Library for Qualitative Analysis of Rubber Products

**[Background]** In the area of forensic investigation and the food analysis, minute amounts of unknown samples often need to be differentiated in a short period of time; therefore, a simple qualitative analysis technique is of interest. Evolved gas analysis with a mass spectrometer (EGA-MS<sup>1</sup>) using the multi-shot pyrolyzer allows simple thermal analysis of polymers in which evolved gases eluted from a heated sample are monitored. The major component of an unknown polymer can often be identified from the mass spectra in the EGA library. In this technical note, three common rubber types are analyzed by EGA-MS and the viability of the technique is demonstrated.

**[Experimental]** Three commonly used rubber products were analyzed. For the qualitative analysis, F-Search along with the EGA-MS library<sup>2)</sup> were used, and the match quality of mass spectra and EGA thermogram profiles were compared.

**[Results]** The results obtained by EGA-MS of rubber samples and the search results using F-Search are shown in Fig. 1. There are apparent differences among the three EGA thermograms with major peaks arising from the decomposition of the polymer backbone. When the EGA averaged mass spectra were searched using F-Search and the EGA library, each rubber sample was unambiguously identified as the first candidate. Also, the EGA thermogram profiles agreed well with the library search results. (Note: The EGA-MS library contains both averaged mass spectra and EGA thermograms of standard rubber material and other polymers)



**Fig. 1 Results of EGA-MS analysis of rubber samples and search results using F-Search**

Pyrolyzer furnace temp.: 100-600°C (20°C/min), GC oven temp.: 300°C, EGA tube: UADTM-2.5N (L=2.5 m, i.d.=0.15 mm), Column flow rate: 1 ml/min He, split ratio: 1/50, sample: ca. 100 µg

**Keywords :** Rubber, Differentiation, Discrimination, Evolved gas analysis, EGA, F-Search

**Products used :** Multi-functional pyrolyzer, Vent-free GC/MS adapter, F-Search, Deactivated metal capillary tube

**Applications :** Forensic discrimination, Food industry, Rubber industry

**Related technical notes :** \*1) PYT-004E, \*2) PYA3-006E, PYA1-067E, PYA3-012E, PYA3-013E

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/>