

Differentiation of adhesive tapes for packaging using Pyrolysis-GC/MS

[BACKGROUND] Differentiation of adhesive tapes by pyrolysis (Py)-GC/MS is often difficult because their pyrogram profiles are very similar, as shown in Fig. 1. However, there are still differences in small peaks, when paying an attention to them. This note focuses on differences in such small peaks and a new peak integration-summation MS spectral method was developed to differentiate the adhesive tapes. The newly developed method emphasizes the small differences in mass spectra.

[EXPERIMENTAL] Adhesive parts of randomly selected 8 different commercial adhesive tapes for packaging were used as samples, and their pyrograms were obtained by Py-GC/MS (Fig.1). From these results, an adhesive tape mass spectral library was constructed by generating the integration-summation mass spectra (Method-1). As a new attempt, major peaks due to the main constituents in the pyrograms were removed from each of the 8 pyrograms. Then, small peaks due to only tackifiers and impurities were used to construct a new adhesive tape mass spectral library (Method-2). This new Method-2, which emphasizes small differences in the pyrogram profiles, was used to identify and differentiate adhesive tapes by mass spectral library search.

[RESULTS] Using Method-1, library search resulted in difficult differentiation of adhesive tapes (Fig. 2). On the other hand, the new Method-2, which used only small peaks in a mass spectral library, allowed easier differentiation of a target adhesive (Tape A), as shown in Fig. 3. The Method-2 offers much easier differentiation of adhesive tapes than Method-1. As a result, in the analysis of adhesive tapes for packaging, the newly developed method was demonstrated to be a rapid and valid analytical method for differentiation of adhesive tapes.

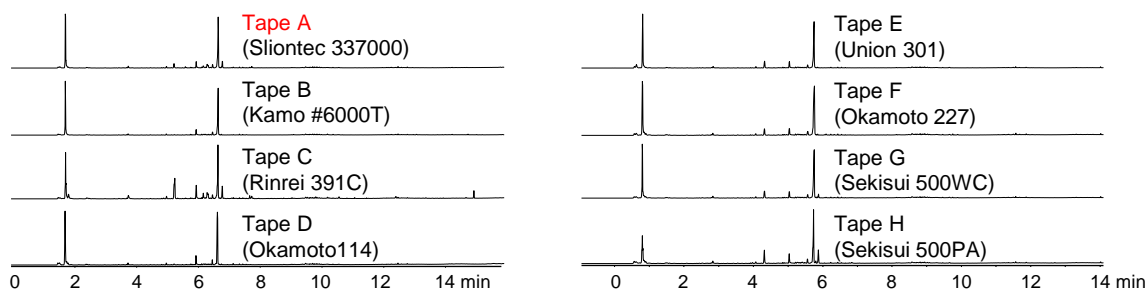


Fig.1 Pyrograms of 8 adhesive tapes (Pyrolysis temp: 550 °C).

Furnace temp.: 550 °C, GC oven temp.: 40 °C (2 min hold) - 320 °C (20 °C/min), Separation column: 5 % diphenyl polymethylsiloxane (UA5-30M-0.25F), L=30 m, id.=0.25 mm, df.=0.25 µm.

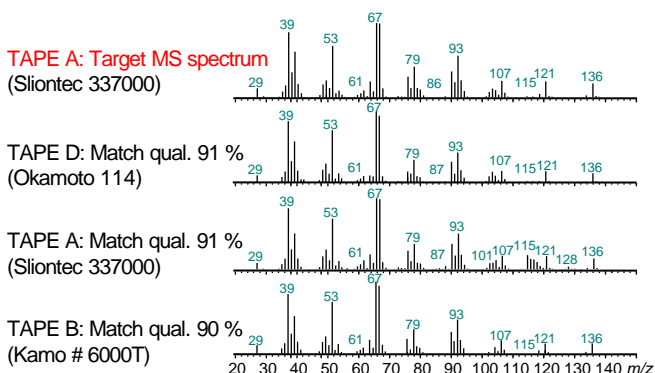


Fig.2 Mass spectral library search on adhesive **Tape A**, using integration-summation spectra obtained by Method-1.

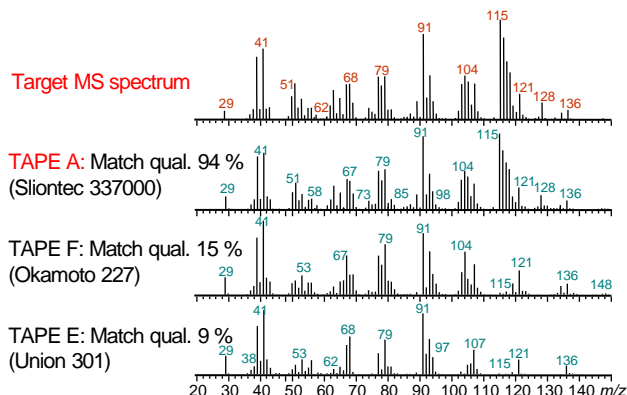


Fig.3 Mass spectral library search on adhesive **Tape A**, using integration-summation spectra obtained by Method-2.

Keywords : Differentiation, Adhesive tape, Packaging
Products used : Multi-Shot Pyrolyzer, UA⁺-5, F-Search
Applications : QA in adhesive industry, Polymer analysis
Related technical notes : [PYA1-072E](#), [PYA1-102E](#)

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