Temperature Profiles and Pyrolyzer Heating Systems

Heating system of pyrolyzer is categorized into pulse system (filament and curie point types, etc.) and continuous heating system (heating furnace type). Fig. 1 shows temperature profiles of pyrolyzers with two different heating systems. In pulse system the sample is heated and is held at 200~300ºC for a few minutes prior to pyrolysis; therefore, the sample exposes to high temperatures before pyrolysis. Fig. 2 shows a pyrogram obtained at 600ºC for three kinds of epoxy resins having experienced different thermal histories. Because epoxy resins are thermoset resins, cross-linkage occurs as they are heated. This is shown in pyrograms **b** and **c**. The amount of components having epoxy structure is found to be reduced compared to that of unheated sample (pyrogram **a**). Therefore, in pyrolyzers with pulse heating system, pyrograms are likely to give dissimilar patterns depending on how long the sample is held at the temperature prior to pyrolysis. On the other hand, in pyrolyzers with continuous heating system, the sample held at room temperature is dropped instantly, by free-fall, to the pyrolysis furnace. This type of pyrolyzers give pyrograms with good reproducibility in pyrolysis of epoxy resins, known to be greatly influenced by its thermal history.

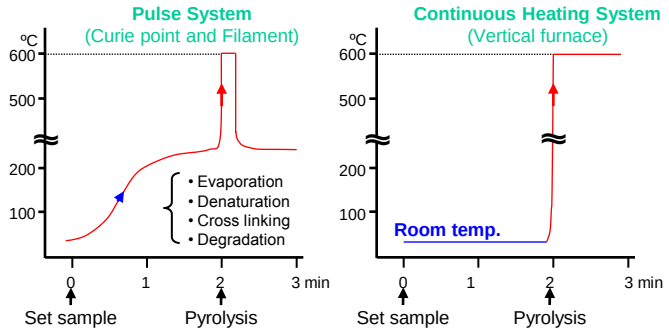

Fig. 1 Temperature Profiles of Pulse and Continuous Heating Pyrolyzer

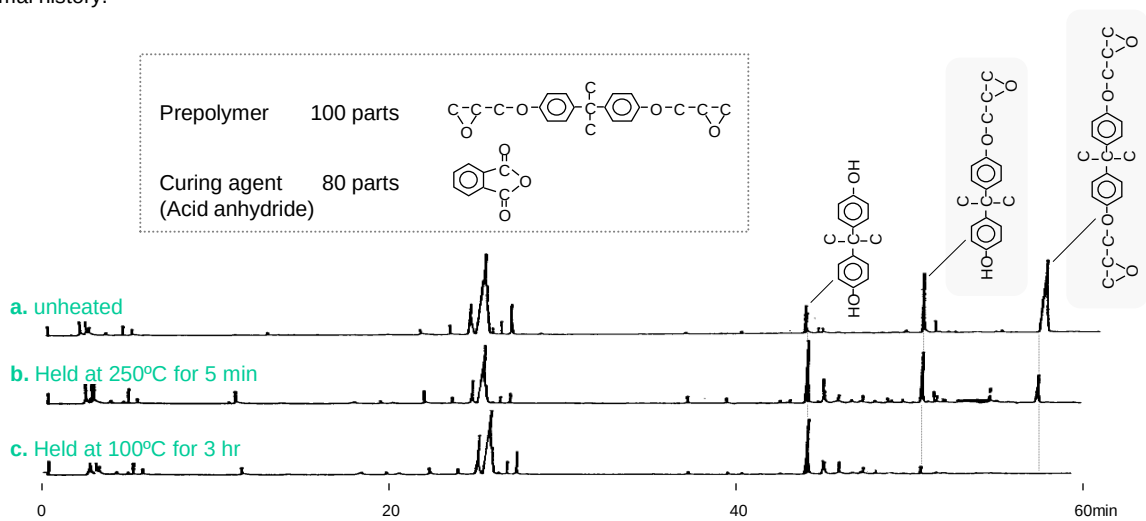

Fig. 2 Effects of Thermal History of Epoxy Resins in Program
Pyrolysis temp.: 600ºC, Sample : 0.15mg

Excerpt from "State of the Art in Pyrolysis GC" (S. Tsuge, H. Otani), *Pyrolysis Gas Chromatography Seminar* (Yokogawa Analytical Systems, Frontier Lab Ltd.)

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