Studies on Curing Process of Epoxy Resins by Py-GC
- Cured with 1-Benzyl-2-Methyl Imidazole (1B2MZ) -

[Background] Curing process of epoxy resins has been often studied by IR, FT-IR, or NMR by looking at the spectral changes of chemical species formed during the course of curing process. DSC has also been used to study the curing reactions by evaluating the heat of reaction. On the other hand, high resolution Py-GC is another technique that can be applied for studying systems with insoluble species and various additives.

[Experimental] A pyrolyzer with a vertical micro-furnace was directly attached to a GC equipped with a high resolution capillary column (0.2mm id, 24m long) coated with methyl phenylsilicone. Samples of a diglycidyl ether of bis-phenol A (DGEBA, Mn≈340) prepolymer with various amounts of 1B2MZ were cured at 180˚C for 3 hours and were analyzed by Py-GC at 590˚C.

[Results]. Figure 1 shows typical pyrograms of DGEBA cured with various amounts of 1B2MZ at 180˚C for 3 hrs. Relationships between intensities of observed peaks and the amounts of catalysts added are shown in Figure 2. It was found that the yields of the pyrolyzates with epoxide groups decreased with increase of the degree of cure, while those of various phenols, characteristic of prepolymer skeleton increased. The results observed corresponded well to the those deduced from Tg measurements by DSC.

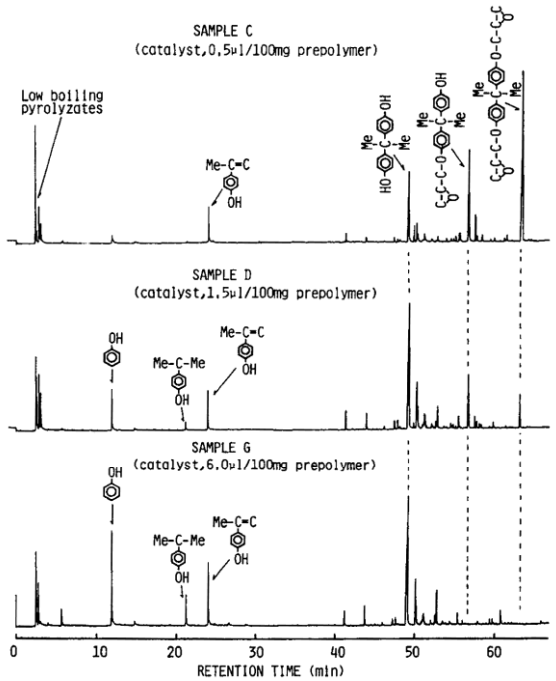

Figure 1. High-resolution pyrograms of epoxy resins cured with various amounts of imidazole catalyst at 180˚C for 3h.

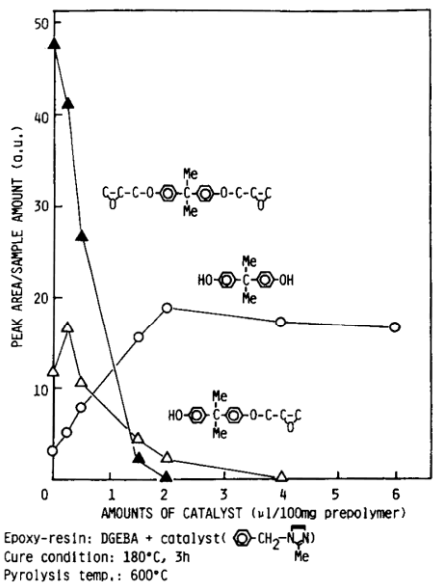

Figure 2. Changes of characteristic products from epoxy resins as a function of catalyst amount.

*Contents excerpted from H. Nakagawa, S. Wakatsuka, S. Tsuge, T. Koyama, *Polymer. J.* No. 1, pp 9-16 1992

Keyword : Py-GC, Epoxy Resin, Curing Process

Applications : General polymer analysis

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