



Analysis of Stereoregularity of Polymethyl Methacrylate (PMMA)

NMR is generally used to analyze stereoregularity of polymers, however; it can hardly be applied to cross linked polymers that are insoluble in solvents. On the other hand, pyrolysis gas chromatography (Py-GC) can be applied to polymer samples in any form. Shown below are analysis examples of stereoregularity of cross linked PMMA. Fig. 1 shows a pyrogram of PMMA and blowup of the MMA tetramer region. Total of four characteristic peaks are observed in the tetramer region. These arise from two tetramers A and B (shown in Fig. 2) in which the position of double bond differs. Each of these tetramers gives two diastereomers, therefore giving two separate peaks. The stereoregularity obtained by relative strength of these meso and racemic species were in a good agreement with that obtained by NMR analysis (Fig. 3). Therefore, the Py-GC technique is found to be an extremely powerful tool in analysis of stereoregularity of cross linked polymers, otherwise unattainable by NMR analysis.

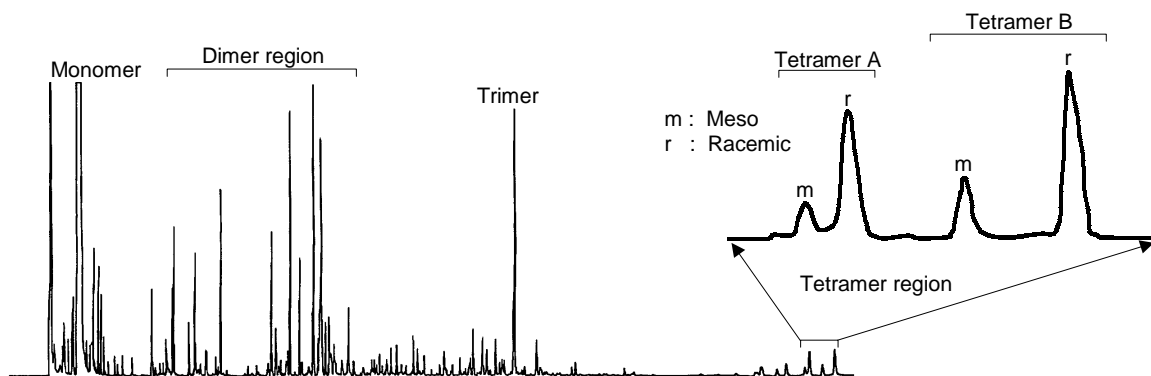


Fig. 1 Pyrogram of PMMA

Pyrolysis temp: 500°C, Column: 5% diphenylpolysiloxane, Length: 30m, 0.32mm id, Film thickness: 0.25µm

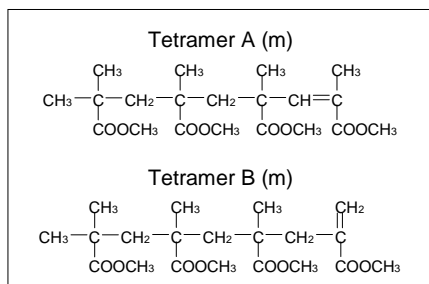


Fig. 2 Two Tetramers of Meso Species

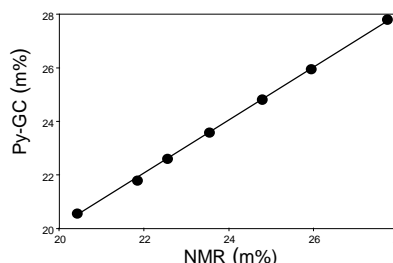


Fig. 3 Analysis Results of Meso Species by Py-GC and NMR

Excerpt from "Few Recent Applications of Py-GC" by Kiura, Wakabayashi of Mitsubishi Rayon, 2nd Pyrolysis Gas Chromatography Seminar (hosted by Frontier Lab Ltd.)

Keyword : Polymethylmethacrylate, PMMA, Stereoregularity, NMR

Application : Fiber industry, Chemical industry, General polymer analysis

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