



Analysis of Diethylene Glycol (DEG) in Polyethylene Terephthalate (PET)

PET contains a small amount of residual dimerized DEG which is produced by dehydration of ethylene glycol (EG) during polymerization process. It is essential to determine the amount of DEG for the quality and process management, because the property of PET is greatly influenced by the amount of residual DEG. Conventionally, hydrazinolysis has been used for this analysis, however; problems with this method are: (1) time consuming sample pretreatment is required, and (2) the process is complicated. On the other hand, the reactive pyrolysis using tetramethyl ammonium hydroxide [TMAH: $(\text{CH}_3)_4\text{NOH}$] (See PYA2-001E) is a quick and easier analytical technique requiring no pretreatment. A pyrogram obtained by reactive pyrolysis of PET is shown in Fig. 1. Peaks originated from EG, the main component, and terephthalate are observed, in addition to smaller peaks originated from DEG (underscored). Fig. 2 shows DEG/EG ratios determined both by the reactive pyrolysis and hydrazinolysis. It is evident that both of these methods give almost the same results. These results demonstrate that the reactive pyrolysis is an easy and convenient technique, replacing conventional methods.

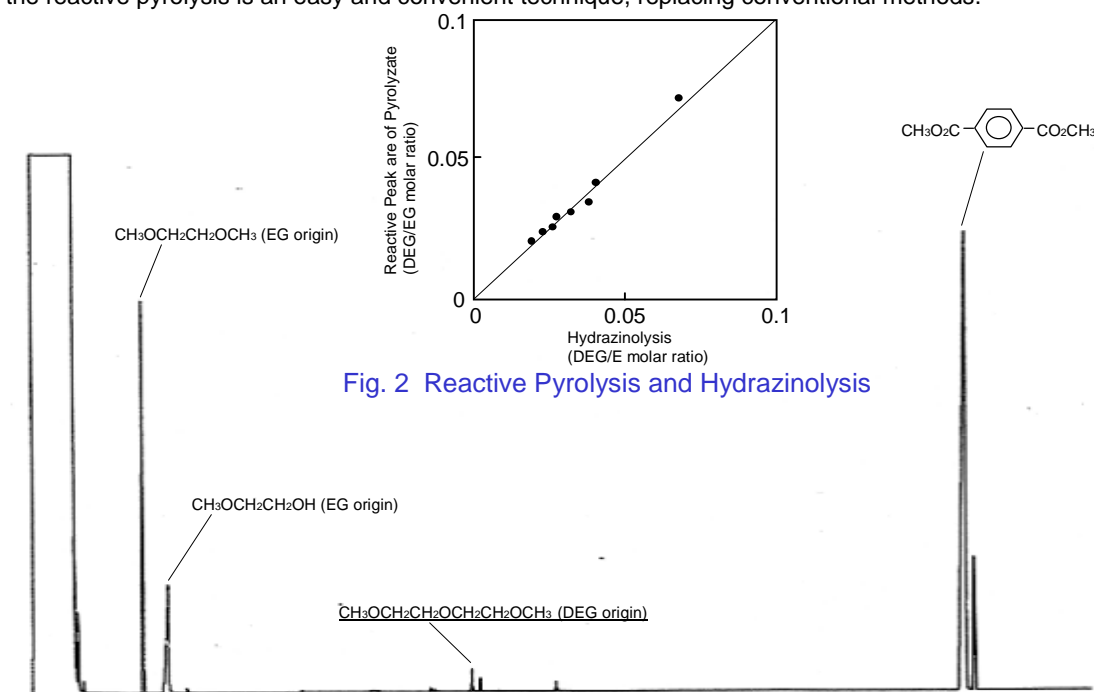


Fig. 2 Reactive Pyrolysis and Hydrazinolysis

Fig. 1 Pyrogram of PET by Reactive Pyrolysis

Pyrolyzer : PY-2020D (Frontier Laboratories Ltd.), Pyrolysis temp.: 400°C

"Some Recent Applications of Py-GC" by Kiura, Wakabayashi of Mitsubishi Rayon, 2nd Pyrolysis GC Seminar in 1998 (hosted by Frontier Lab Ltd.)

Keyword : Diethylene glycol/PET, Reactive Pyrolysis, TMAH, Hydrazinolysis

Application : General Polymer Analysis, Fiber Industry, Quality Management, Process Management

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