Analysis of Polybutylene Terephthalate (PBT) by Reactive Pyrolysis

When analyzing condensation polymers such as polybutylene terephthalate (PBT) by Py-GC technique, reactive pyrolysis in the presence of tetramethyl ammonium hydroxide (TMAH) gives methylated derivative of the constituent monomers. Fig. 1 shows a pyrogram obtained by flash pyrolysis of PBT, and Fig 2 shows a pyrogram obtained by reactive pyrolysis in the presence of TMAH. Flash pyrolysis technique gave products arising from decomposition and decarboxylation of ester group, but no monomer. On the other hand, reactive pyrolysis gave methylated derivatives of PBT constituent monomers, dimethyl derivatives of terephthalic acid and mono and dimethyl derivatives of 1,4-butanediol.

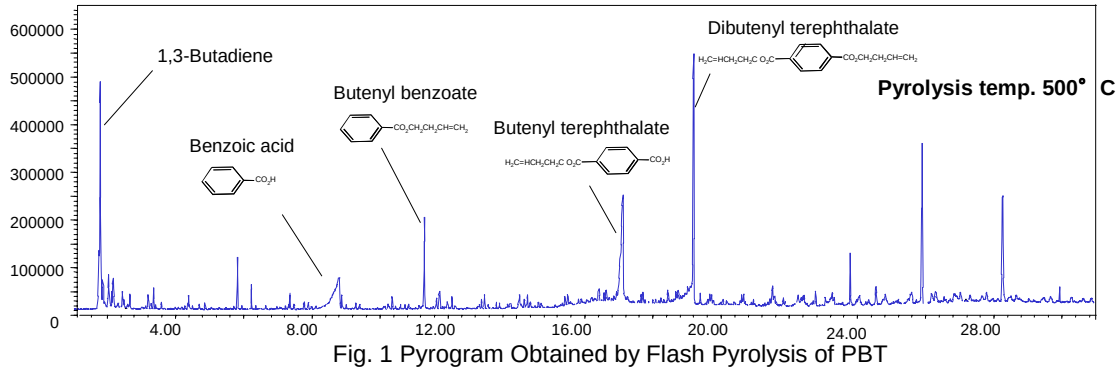

Fig. 1 Pyrogram Obtained by Flash Pyrolysis of PBT

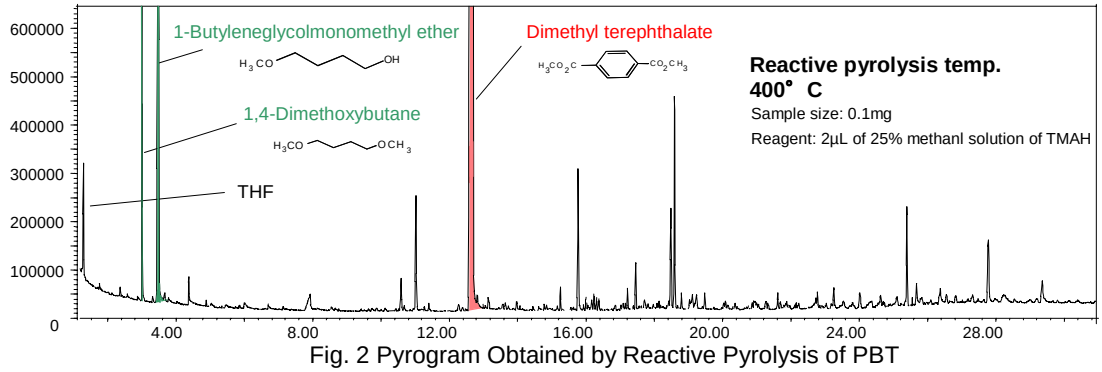

Fig. 2 Pyrogram Obtained by Reactive Pyrolysis of PBT

Carrier gas: He, Injection port pressure: 103kPa, Split ratio: 1/60, Separation column: Ultra ALLOY^{+}-5 (5% diphenyldimethylpolysiloxane)
Length: 30m, Id: 0.25mm, Film thickness: 0.25µm, GC oven temp: 40~300ºC (20ºC /min), GC injection port tem: 320ºC
Material excerpted from "5. A few recent applications of Py-GC", Kiura, Wakabayashi (Mitsubishi Rayon), 2nd Pyrolysis Gas Chromatography Seminar (hosted by Frontier Lab Ltd.)

Keyword: Polybutylene terephthalate, PBT, Reactive Pyrolysis, Tetramethyl ammonium hydroxide, TMAH

Applications: General Polymer Analysis

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