

Analysis of Polyethylene Terephthalate (PET) by Reactive Pyrolysis

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

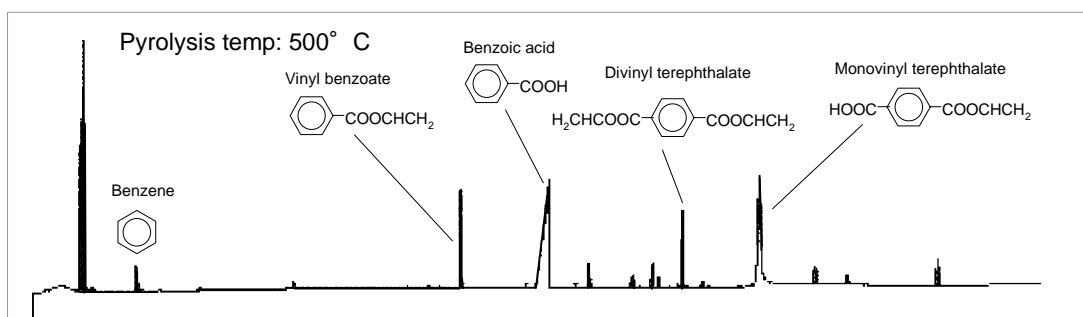


Fig. 1 Pyrogram Obtained by Flash Pyrolysis of PET

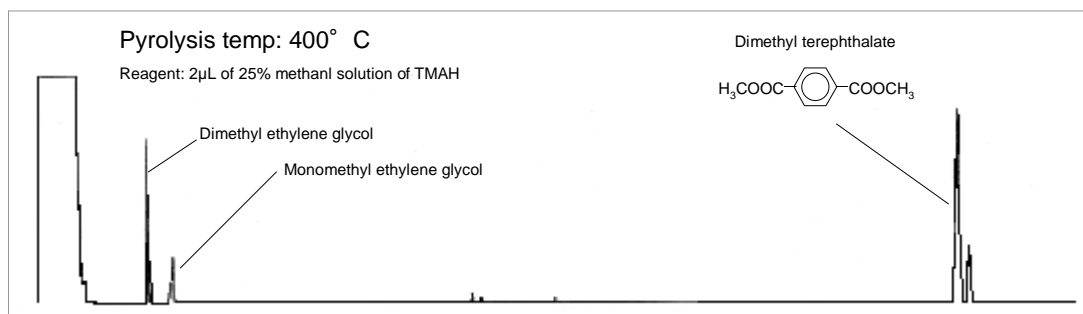


Fig. 2 Pyrogram Obtained by Reactive Pyrolysis of PET

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: 40–300°C (20°C /min), GC injection port tem: 320°C

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: Reactive Pyrolysis, Polyethylene Terephthalate, PET, TMAH

Applications: General Polymer Analysis

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