

## Analysis of Additives in Polybutylene Terephthalate (PBT)

For electronic applications, polyolefin modifier is often added to Polybutylene terephthalate (PBT) resin to improve hydrolysis and thermal shock resistances. It is of importance to analyze additives in PBT resin in order to ascertain its performance. Here, a new analysis technique, which is a combination of Double-Shot and reactive pyrolysis, is described. In the first step, a pyrogram was obtained by reactive pyrolysis of PBT at 400°C in the presence of tetra-methyl ammonium hydroxide (TMAH) (Fig. 1). In the second step, a pyrogram was obtained by instant pyrolysis of residual polyolefin modifiers at 550°C (Fig. 2). A methyl derivative of terephthalic acid, a constituent monomer of PBT, was observed in the first step; and sets of 3 peaks for straight chain hydrocarbons of diolefins, olefins, and paraffin were observed in the second step. These results demonstrated that polyolefin additives in the PBT resin could be separated and identified using this technique.

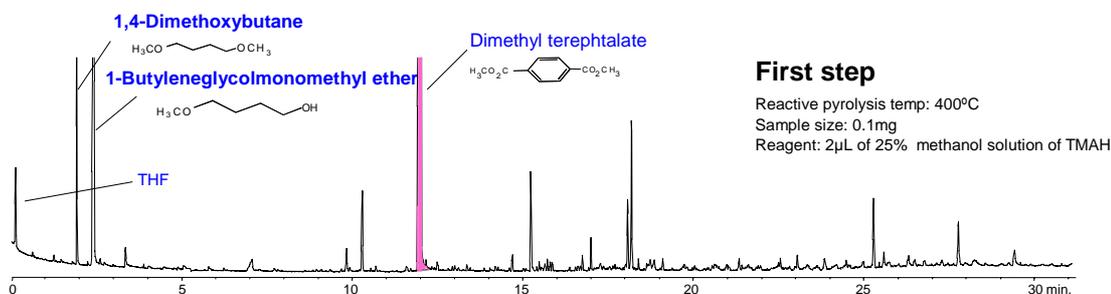


Fig. 1 Pyrogram Obtained by Reactive Pyrolysis of PBT

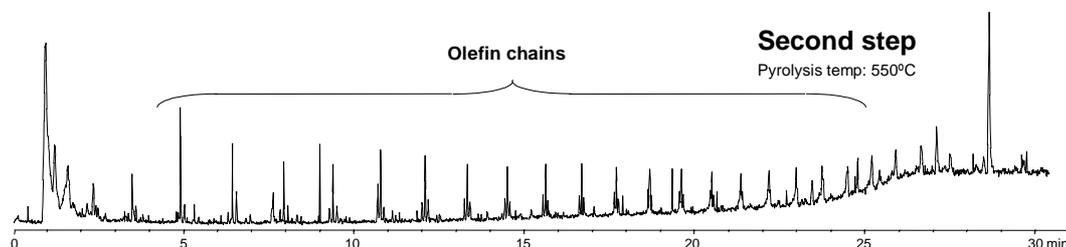


Fig. 2 Pyrogram of Residue (550°C)

Carrier gas: He, Injection port pressure: 103kPa, Split ratio: 1/60, Separation column: Ultra ALLOY<sup>+</sup>-5 (5% diphenyldimethylpolysiloxane)  
Length: 30m, Id: 0.25mm, Film thickness: 0.25µm, GC oven temp: 40–300°C(20°C/min), GC injection port temp: 320°C

Material excerpted from "5. A few recent applications of Py-GC", Kiura, Wakabayashi (Mitsubishi Rayon),  
2nd Pyrolysis Gas Chromatography (hosted by Frontier Lab Ltd.)

**Keyword: Polybutylene terephthalate, PBT, Additive, Modifier**

**Applications: General Polymer Analysis**

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