

## Brominated Flame Retardant in PET

### Application Note

Plastics, Environment

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Brominated flame retardants, including tetrabromo bisphenol A (TBBPA), polybrominated diphenyl ethers (PBDE) and polybrominated biphenyls (PBB) are frequently found in the plastics used to make electronic components. There is now concern about the accumulation of these brominated compounds in the environment and their effects on organisms. Consequently, these materials are now highly regulated especially in the European Union under RoHS and WEEE compliance.

Determination of these compounds can be facilitated by using thermal sampling techniques to liberate the flame retardant from the polymer matrix. In this example, a small piece of polyethylene terephthalate (PET) known to contain brominated flame retardant, was heated directly to the GC/MS for rapid determination of brominated compounds.

Figure 1 shows the chromatogram produced by heating a piece of the plastic to 300°C for 15 seconds, using the coil of the Pyroprobe Autosampler. If mass 486 is displayed (for tetrabromo diphenyl ether), a peak is seen at about 23 minutes. In Figure 2, the area between 20 and 25 minutes is expanded, making the peak more evident. The mass spectrum of the peak is shown above it. The groupings of peaks in the mass spectrum are typical for brominated compounds, reflecting the principal isomers of bromine. In this case, the spectrum indicates fragments with one, two, three and four bromines.

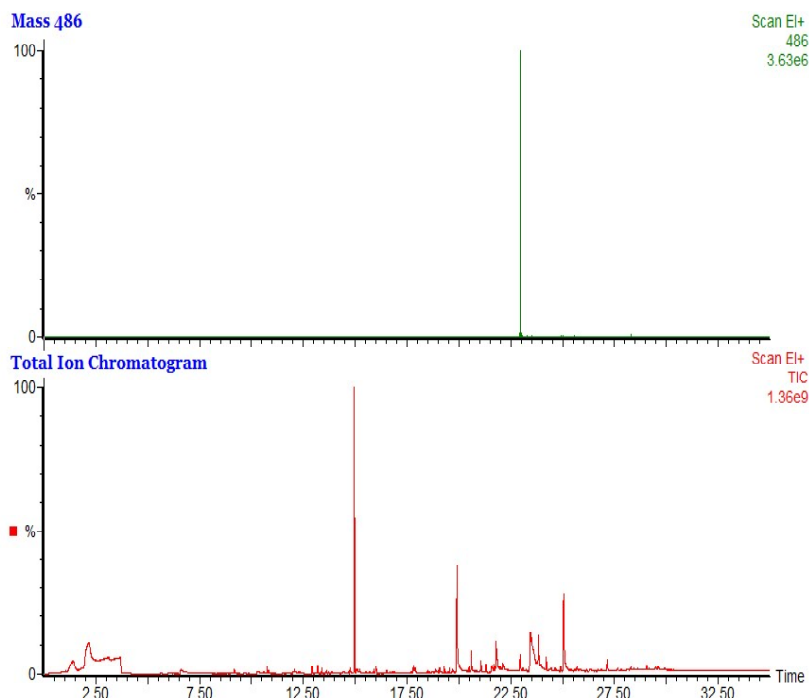


Figure 1. TIC (bottom) and mass 486 (top) for desorption of polymer.

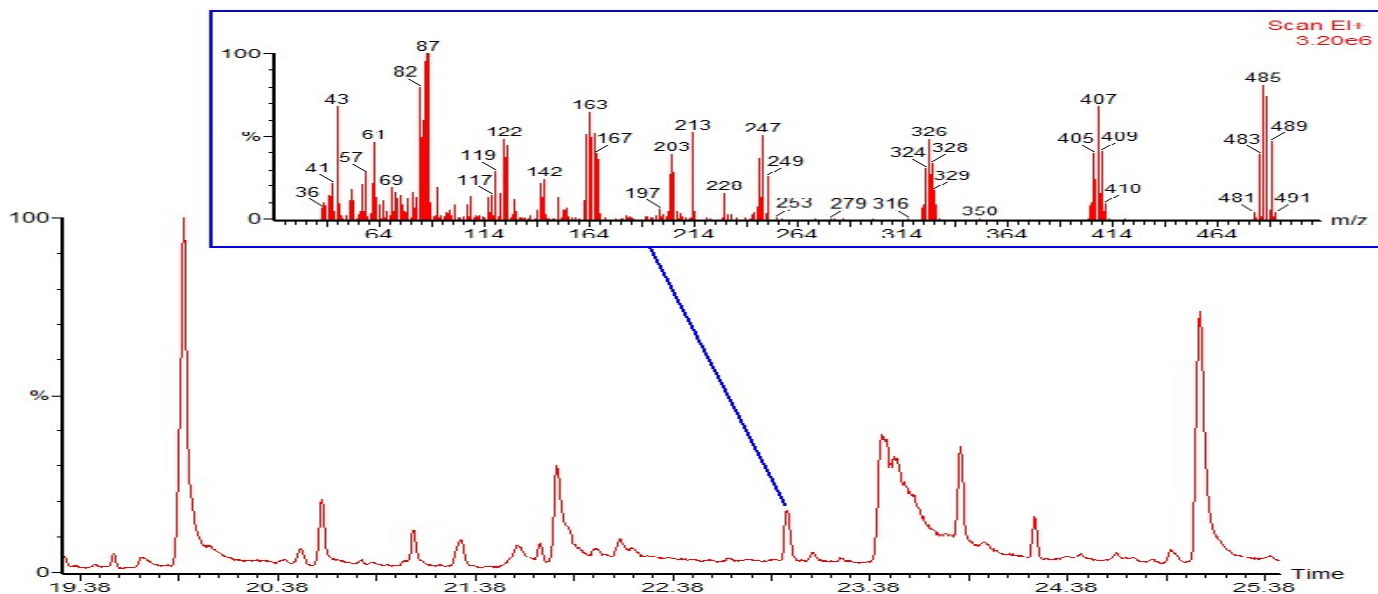


Figure 2. Mass spectrum of peak at 23 minutes.

### Instrument Conditions

#### Pyroprobe Autosampler

Pyrolysis: 400°C 15 seconds  
 Valve Oven: 300°C  
 Transfer Line: 325°C

#### GC/MS

Column: 5% phenyl (30m x 0.25mm)  
 Carrier: Helium, 50:1 split  
 Injector: 350°C  
 Oven: 40°C for 2 minutes  
 10°C/min to 300°C  
 Mass Range: 35-550