

# Analysis of polymers/additives in three types of cable materials

## Part 3 Evolved gas analysis (EGA)-MS of Pellets B and C

**[Background]** In the previous note (PYA3-031E), the evolved gas analysis of Pellet A, which is the raw material for cables used in home electric appliances, was described. In this note, EGA-MS analysis on two types of pellets, different from the one used in the previous note, is described.

**[Experimental]** Powdered samples of Pellets B and C were prepared by cryo-milling and were used for the analysis. A GC/MS system with a Multi-Shot Pyrolyzer directly interfaced to the GC injector was used. A deactivated metal tube was used to connect the GC injector to the MS detector. About 0.2 mg sample was put in an Eco-Cup and introduced into the furnace for evolved gas analysis (EGA)-MS.

**[Results]** From the averaged mass spectrum of each zone of the EGA thermogram (Fig. 1), acetic acid was detected in Zones B-1 and C-2 ( $m/z$  43, 45, 60), and peaks originated from the pyrolysis of polyethylene were observed in Zones B-2 and C-3. The peak of acetic acid observed at around 350 °C indicates that acetic acid is not contained as a free species in the polymer matrix but was eliminated from the cleavage of the side chain of the polymer. This result suggests that the polymer component of both Pellets B and C is ethylene vinyl acetate (EVA). For Pellet C, the averaged mass spectrum of Zone C-1 indicates the presence of wax and light stabilizer (Sumisorb 300) as an additive component. For further analysis, the results of thermal desorption and flash pyrolysis of these pellets will be reported in another notes (Pellet B: PYA1-124E, Pellet C: PYA1-125E).

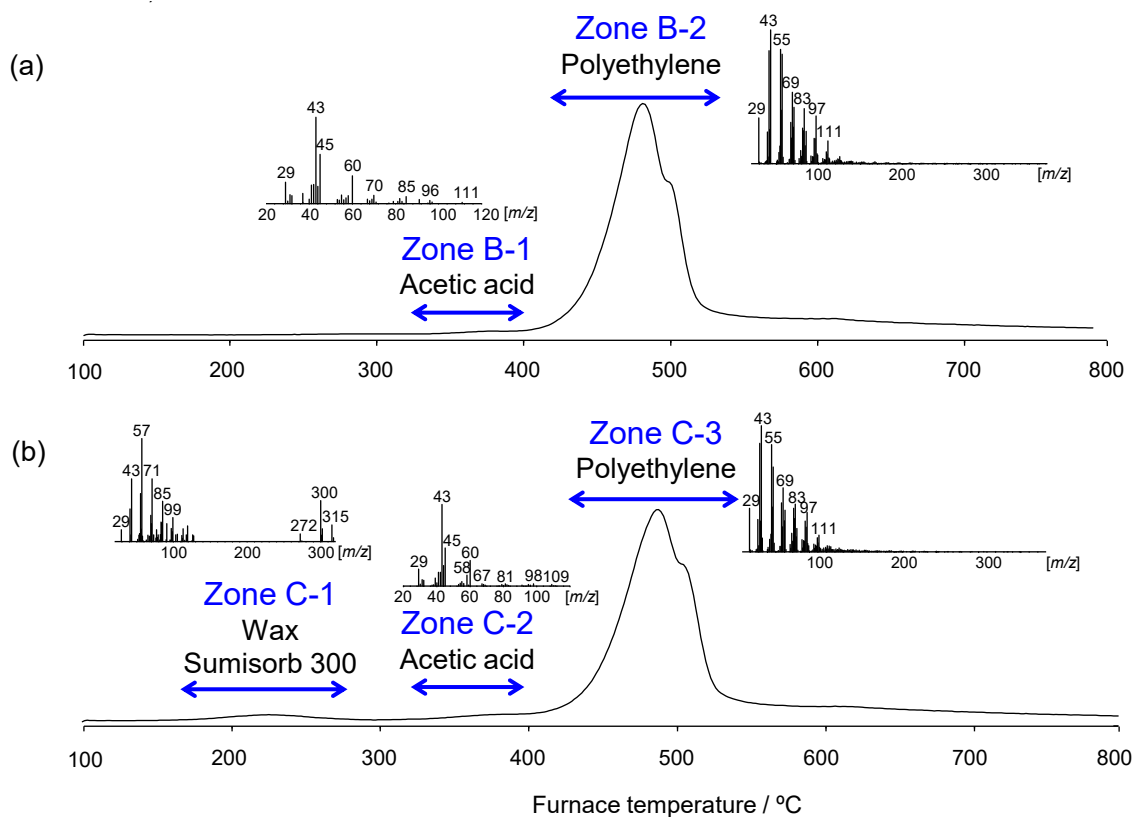


Fig. 1 EGA thermograms of Pellet B (a) and Pellet C (b) and averaged mass spectrum of each Zone

Furnace temp.: 100 – 800 °C (20 °C/min), EGA tube: UADTM-2.5N (L=2.5 m, i.d.=0.15 mm), Tube flow rate: 1 mL/min (He), Split ratio: 1/50, GC oven temp.: 300 °C, MS scan range:  $m/z$  29 – 1000, MS scan rate: ca. 0.2 scan/s, Sample amount: ca. 0.2 mg

**Keywords :** Cable, Pellet, EGA-MS, Evolved gas analysis

**Products used :** Multi-functional pyrolyzer, Auto-Shot Sampler, UADTM-2.5N, Eco-Cup LF. Phthalate free quartz wool, F-Search, Vent-free GC/MS adapter

**Applications :** General polymer analysis, Additive analysis, Quality assurance, Electronics, Materials analysis

**Related technical notes :** PYA3-031E (Part1), PYA1-123E (Part2), PYA1-124E (Part4), PYA1-125E (Part5)

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