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B-TA2042 - Thermal Stability of Polyethylene Glycol Studied by TG-MS

Introduction

Polyethylene glycol (PEG) and polyethylene oxide (PEO) are widely used in various industries due to their diverse properties and excellent solubility. In particular, their high biocompatibility makes them frequently used in the pharmaceutical, cosmetic, and food sectors. In this study, the thermal stability of PEG and PEO samples with different molecular weight distributions was investigated by TG-MS.

Measurements and results

PEG and PEO samples with average molecular weights of 400, 2,000, and 100,000 were heated from room temperature to 500°C at a rate of 20°C/min under an inert helium atmosphere. Electron ionization (EI) was used for mass spectrometry. TG curves are shown in Figure 1(a). The sample with a molecular weight of 400 began to lose weight around 200°C, while those with molecular weights of 2,000 and 100,000 began to lose weight above 350°C. Figure 1(b) shows the mass spectra of the three samples at the temperatures where the weight loss rate was maximized for each sample. The m/z 59 and 73 ions, which were relatively strongly detected in the samples with molecular weights of 2,000 and 100,000, are presumed to be fragment ions with structures as shown in Figure 1(b), reflecting differences in the molecular structures of the evolved gases.

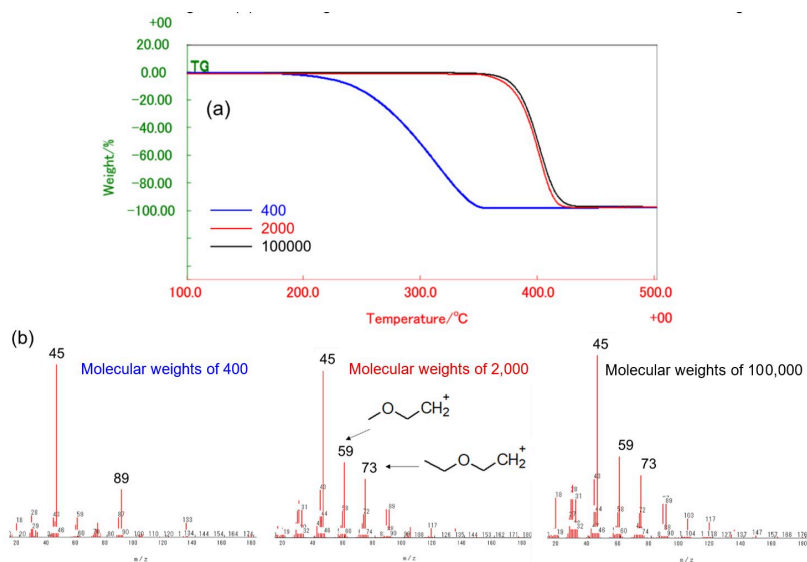


Figure 1: TG results and (b) mass spectra of PEG and PEO samples

Recommended equipment and software

- [STA8122 + MASS-IF, GC/MS](#)
 - Thermo plus EVO2 measurement and analysis software, 3D display/analysis software
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Related products



STA/GC-MS

A thermal analysis device capable of highly sensitive simultaneous measurement of chemical reaction information that is difficult to determine with thermal analysis alone.