

Comparison of Mass Spectrometry Sample Preparation Methods

	Pyrolysis GC/MS (double-shot or single-shot method)	Thermal desorption/thermal decomposition DART-MS
Ionization principle	◆Components thermally desorbed or pyrolyzed in the furnace are separated in the column and ionized by EI, CI, etc. in the ionization chamber	◆Sample heated by ionRocket is vaporized by thermal desorption or pyrolysis, and ionized by excited He
Sample to be measured	◆Liquid, solid, powder ◆High polarity components are difficult to detect ◆By quadrupole MS, available at m/z 1000 or less	◆Liquid, solid, powder ◆High polarity components can be detected ◆Detectable up to m/z 2000 or higher
Sample preparation	◆No pretreatment required ◆Reactive pyrolysis GC/MS with Methylation reagent is also useful (esters)	◆No pretreatment required ◆Reactive pyrolysis GC/MS with methylating agents is also effective (esters), polymer information can be obtained without treatment
Qualitative Analysis	◆Identification of polymer species using pyrograms is possible ◆Library search is available by EI mass spectra, however, it is very difficult to identify peaks with no hits (Reaction products such as degradation products and coloration causing components cannot be identified or structurally analyzed)	◆No database such as pyrogram collection ◆For homopolymers, oligomeric components with repeating structures can be identified. ◆Blended polymers can be identified by KMD analysis ◆By combining with QTOF, etc., reaction products such as degradation products and coloration causing components can be identified or structurally analyzed by accurate mass measurement and MS/MS measurement.
Others	◆Investigation of separation conditions (column selection, temperature rise conditions, etc.) is required *Some components may be irreversibly adsorbed on the separation column. ◆Cold spots exist (injection port, column oven, ion source) ◆Measurement time: approx. 2 hours (double shot method)	◆No need to consider separation conditions ◆No cold spots ◆Measurement time: approx. 7 min (hold at room temperature for 1 min → 100°C/min → 600°C)
EGA-MS	◆Nylon 6,6 ⇒ Fragment ions are mainly detected by EI.	◆Nylon 6,6 ⇒ Molecular-related ions are mainly detected by DART-MS.

