

Using polymer-based MS libraries to characterize an unknown polymeric material: case study – What additives and polymer(s) are present in a plastic toy?

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Polymeric materials are characterized using an array of analytical tools; the most widely accepted are GC/MS and LC/MS. Interfacing a pyrolyzer and a GC/MS gives the laboratory a powerful tool for material characterization. Modern pyrolyzers can be configured to perform pyrolysis (PY), thermal desorption (TD), evolved gas analysis (EGA) and reactive pyrolysis (RxPY). Each provides spectral information about some aspect of the sample. Interpretation and integration of the pyrograms, total ion chromatograms and EGA thermograms often requires professional intuition and a level of experience not found in most laboratories.

The effective expertise of the laboratory can be elevated by using MS libraries and search algorithms specifically designed for polymeric material. These sophisticated software programs simplify the interpretation of the MS data thereby improving the overall quality of the characterization.

This case study illustrates the value of analyzing unknown polymeric materials using multiple methods. Milligram quantities of a simple plastic toy are analyzed by EGA, PY and TD. The MS data from each analysis are “searched” using the appropriate library: EGA, ADDITIVE, PYROLYZATES AND POLYMER. The search results from all four libraries enable the analyst to identify the base polymer and the additives.