

Determination of Brominated Flame Retardants In Recycled Plastic Toys Using Thermal Desorption GC/MS

Authors : Athena Nguyen, Rojin Belganeh

Abstract : In recycling plastics industries, waste plastics are converted into monomers and other useful molecules by chemical reactions. Thermal energy generated by incineration is recovered when waste plastics melt. During the process, Flame retardants containing products get in, and brominated flame retardants (BFRs) are often used to reduce the flammability of products. Some of the originally formulated brominated flame retardants additives are restricted by the RoHS Directive, such as PBDE and PBB. The determination of BFRs other than those restricted by the RoHS directive is required. Frontier Lab developed a pyrolyzer based on the vertical micro-furnace design. The multi-mode pyrolyzer with different modes of operations, including evolve gas analysis (EGA), flash pyrolysis, thermal desorption, heart cutting, allows users to choose among the techniques for their analysis purposes. The method requires very little sample preparation. The first step is to perform an EGA using temperature programs. This technique provides information about the thermal temperature behaviors of the sample. The EGA thermogram is then used to determine the next steps in the analysis process. In this presentation, with an Optimal thermal temperature zone identified based on EGA thermogram, thermal desorption GC/MS is a chosen technique for the determination of brominated flame retardants in recycled plastic toys. Five types of general-purpose brominated flame retardants other than those restricted by the RoHS Directive are determined by the standard addition method.

Keywords : gas chromatography/mass spectrometry, pyrolysis, pyrolyzer, thermal desorption-GC/MS

Conference Title : ICFRP 2022 : International Conference on Flame-Retardant Polymers

Conference Location : Miami, United States

Conference Dates : March 11-12, 2022