

In-Depth Analysis of Common Antioxidant Decomposition: A Comparative Study Using Two-Dimensional and One-Dimensional Gas Chromatography

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Abstract:

Plastics, pervasive in numerous consumer applications, contain a variety of additives intended to enhance their properties and performance. Among these additives, antioxidants are notably widespread, often contributing to product quality. However, alongside their benefits, these antioxidants can pose environmental and health risks, especially when they degrade. A comprehensive understanding of the degradation products of these additives is paramount, yet currently underexplored. This study delves into the product distribution of common antioxidants using a state-of-the-art two-dimensional gas chromatography system, equipped with a Time-of-Flight Mass Spectrometer (TOF-MS) and Flame Ionization Detector (FID). Our findings indicate that traditional one-dimensional gas chromatography falls short in providing detailed insights into complex compounds like antioxidants. This research underscores the analytical prowess of the two-dimensional approach, offering a clearer lens into the intricate compositions of antioxidants used in plastics, and illuminating potential implications for both the plastics industry and environmental stewardship.