

[Determination of phenylphosphonic acid zinc salt in poly\(lactic acid\) using thermally assisted methylation pyrolysis–gas chromatography/mass spectrometry](#)

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Abstract:

Biomass-based polymers such as poly(lactic acid) (PLA) have attracted much attention, because they are renewable, biocompatible, and nontoxic to the environment and have been used in various fields such as biomedical, agricultural, and food packaging industries. However, one of the common drawbacks of PLA-based materials is their low glass transition temperature in the amorphous state, while adding phenylphosphonic acid zinc salt (PPA-Zn) as a nucleating agent was found to be a promising method to improve the physical property of PLA. On the other hand, degradation of PLA-based materials in the environment may cause the pollution from the metal of a nucleating agent in PLA and quantification of nucleating agents in polymers is of interest. Polar phosphonic acid, a ligand in PPA-Zn, is not favorable for the analysis by gas chromatography/mass spectrometry (GC/MS). Such compounds containing polar groups are known to be effectively analyzed by GC/MS in combination with thermally assisted methylation reaction. In this study, we report on determination of PPA-Zn in PLA by coupling thermally assisted methylation with pyrolysis–GC/MS.

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Frontier Labs Products used:

Multi-Shot Pyrolyzer (EGA/PY-3030D), Auto-Shot Sampler (AS-1020E), Ultra ALLOY⁺-5