

Determination of Isophthalic Acid Comonomer Content in PET by Raman Spectroscopy

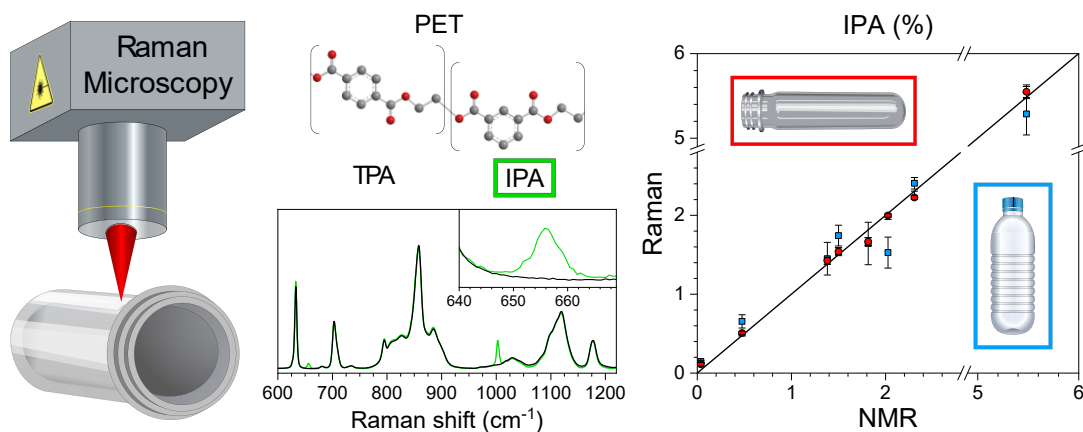
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Poly(ethylene terephthalate) (PET) is one of the leading polymers in the packaging industry. It is often copolymerized with isophthalic acid (IPA) to lower its crystallinity by slowing crystallization kinetics and hindering orientation-induced crystallization.¹ However, IPA content can be withheld for industrial secrecy and it is unknown in mechanically recycled PET due to variations in feedstock. Established quantification techniques require either proprietary models or an initial solubilization step, limiting the accessibility and speed of the analysis.

In this work, we develop simple Raman spectroscopy methods to quantify the IPA content of solid-state PET samples in the range most used for bottle production without any pretreatment.² The calibration curves allow precise quantification of IPA content for amorphous samples ($R^2 = 0.997$), and good estimates for semicrystalline samples ($R^2 = 0.952$) and commercial products exhibiting common spectroscopic challenges. This work leverages the speed and accessibility of Raman spectroscopy for solid-state IPA quantification, making it a practical alternative to established techniques.



1. R. Tomisawa, M. Okazaki, T. Ikaga, K. Kim, et al. "Fiber structure development of poly(ethylene terephthalate-co-isophthalate) copolymer". *Polymer*. 2022. 245: 124708.
2. O. Roy, C. Pellerin, "Determination of Isophthalic Acid Comonomer Content in Poly(Ethylene Terephthalate) (PET) Using Raman Spectroscopy". *Applied Spectroscopy Practica*. 2025. 3(4): 1-7.