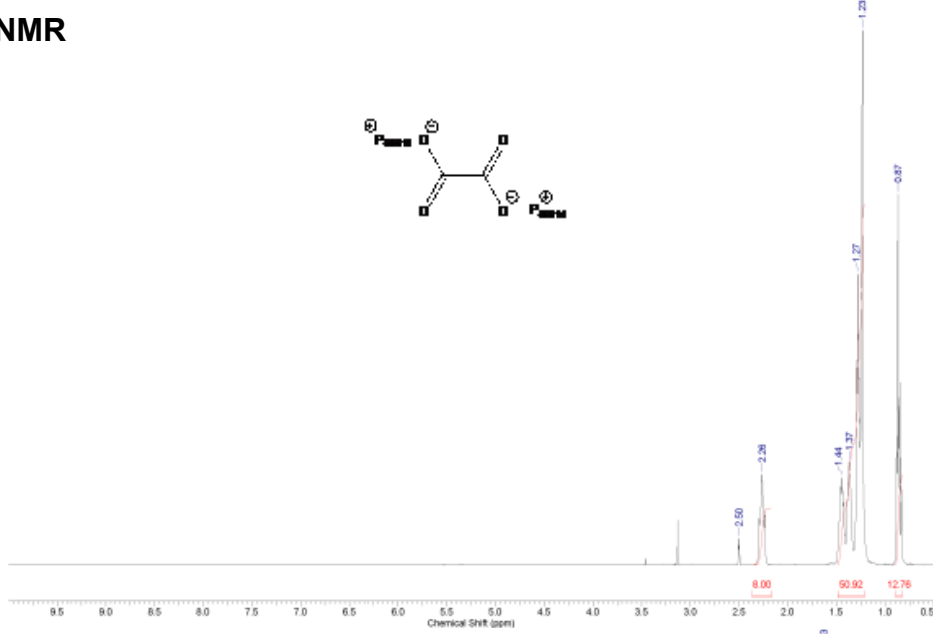


**Synthesis and characterization of the thermodynamic
and electrochemical properties of tetra-alkyl
phosphonium oxalate ionic liquids**

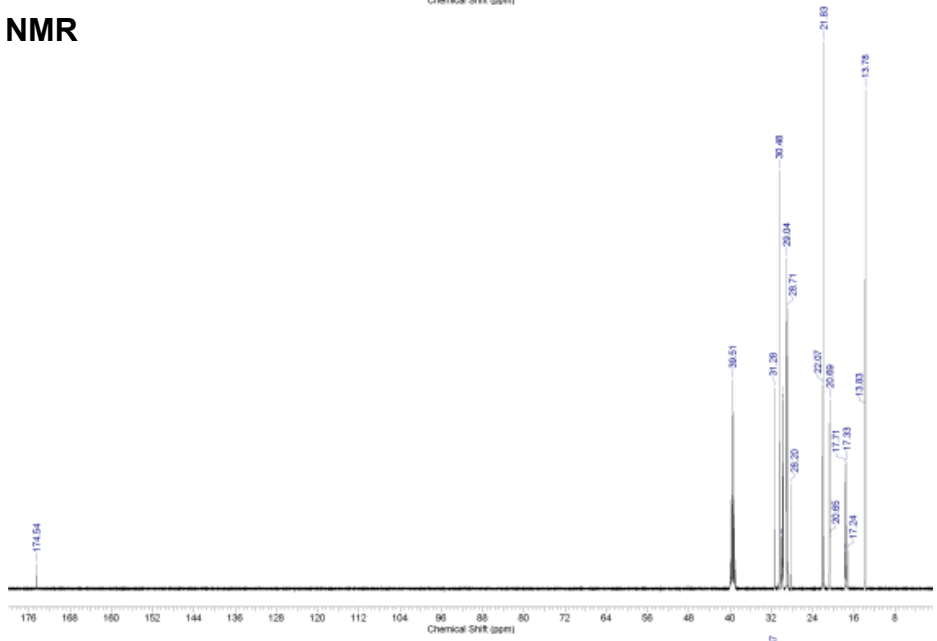
Mauricio Quiroz-Guzman, Daniel P. Fagnant Jr, Xiao-Yan
Chen, Chaojun Shi, Joan F. Brennecke, George S. Goff and
Wolfgang Runde

Supporting Information

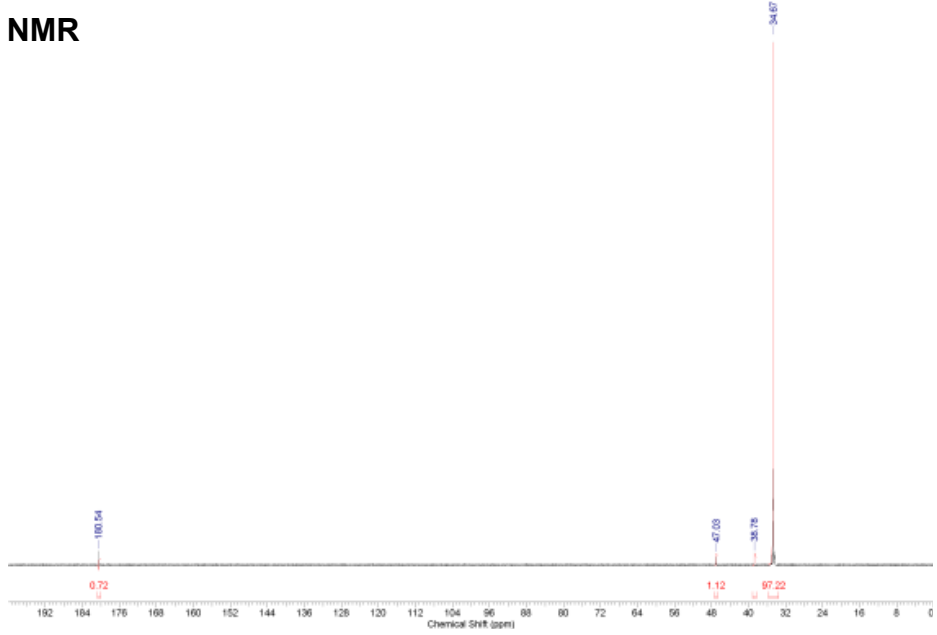
¹H NMR



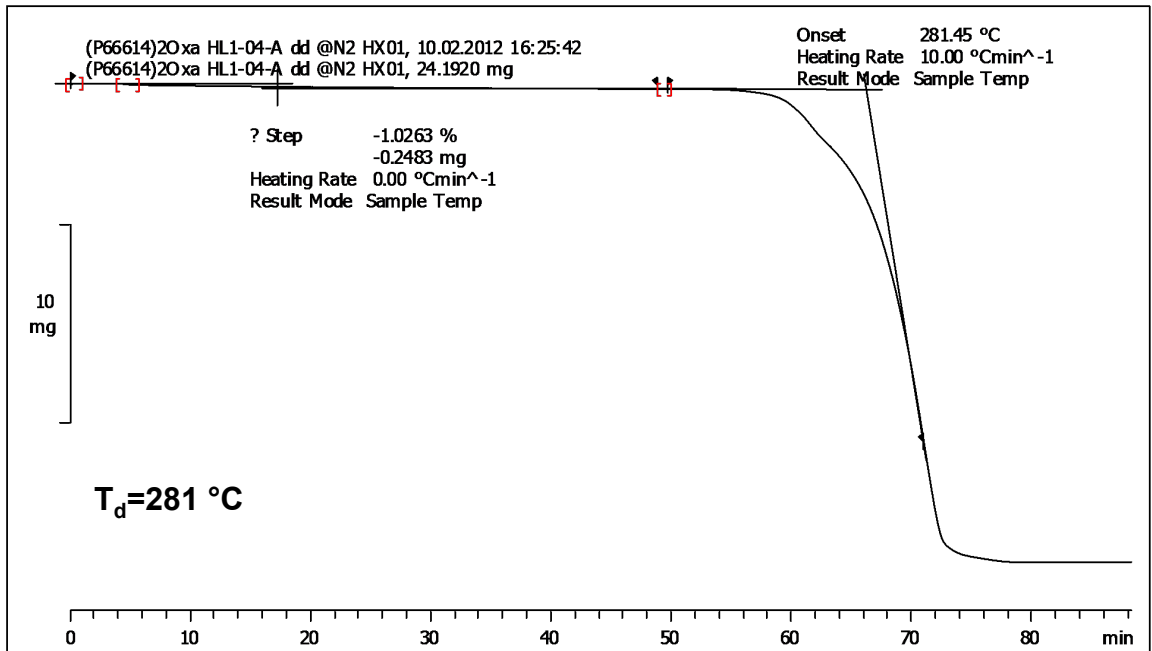
¹³C NMR



³¹P NMR



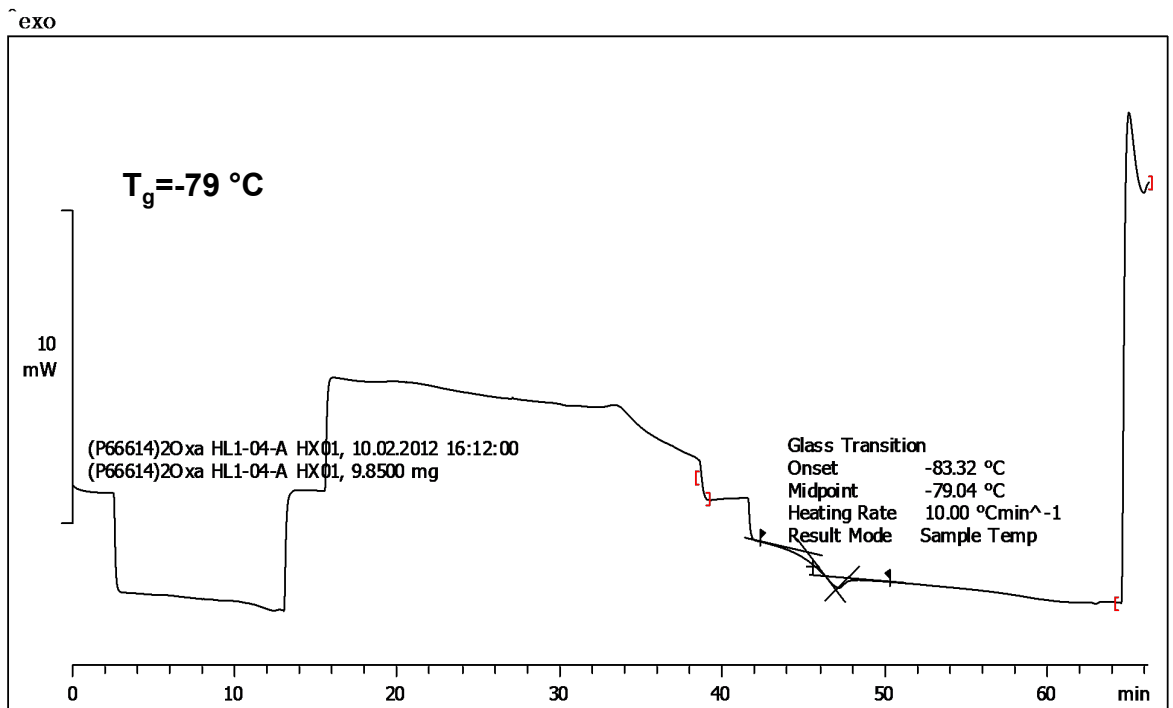
TGA



Lab: METTLER

STAR[®] SW 9.10

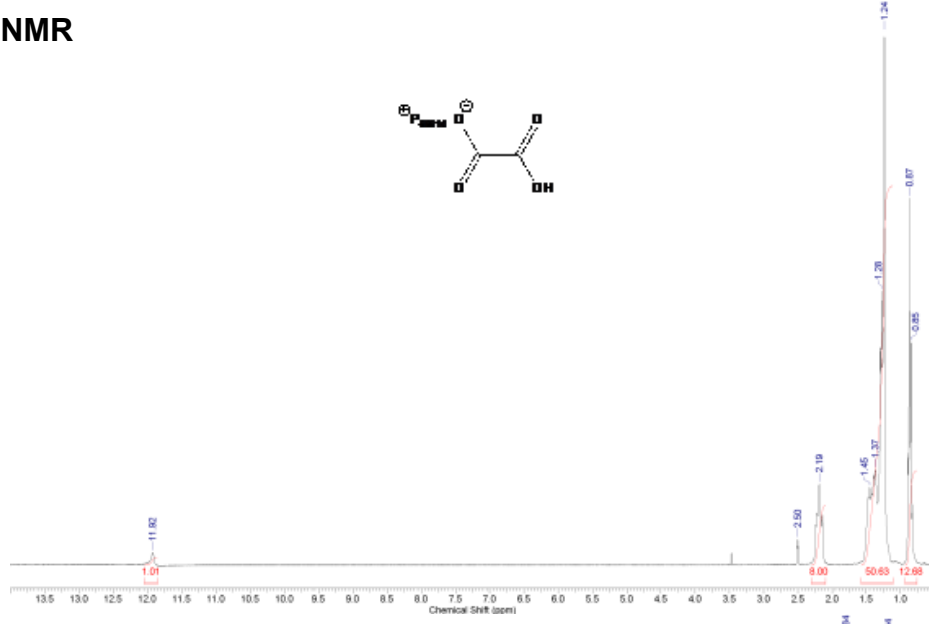
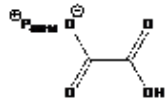
DSC



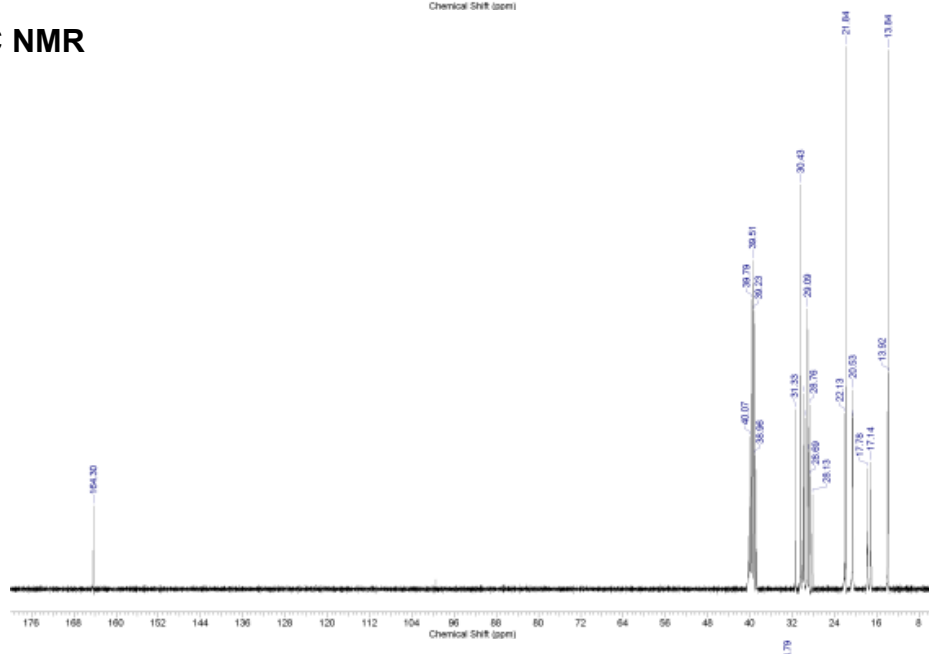
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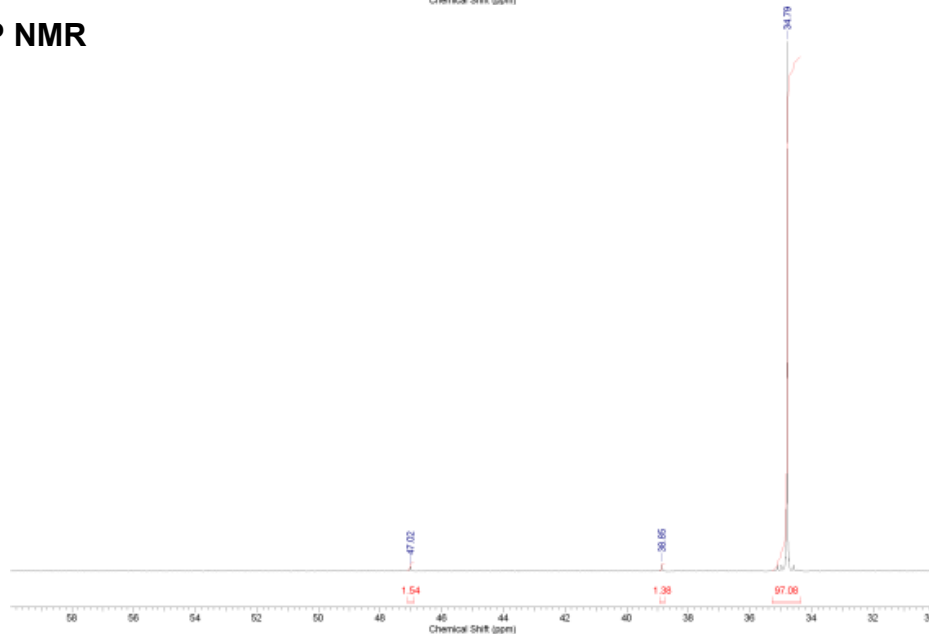
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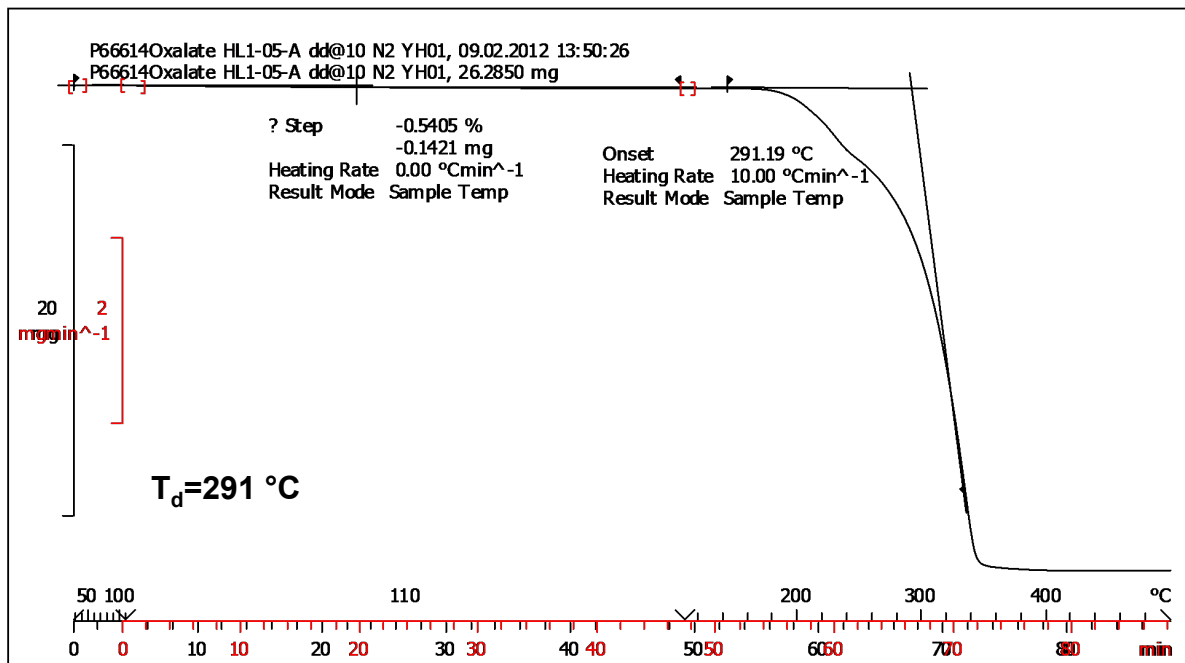
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³¹P NMR



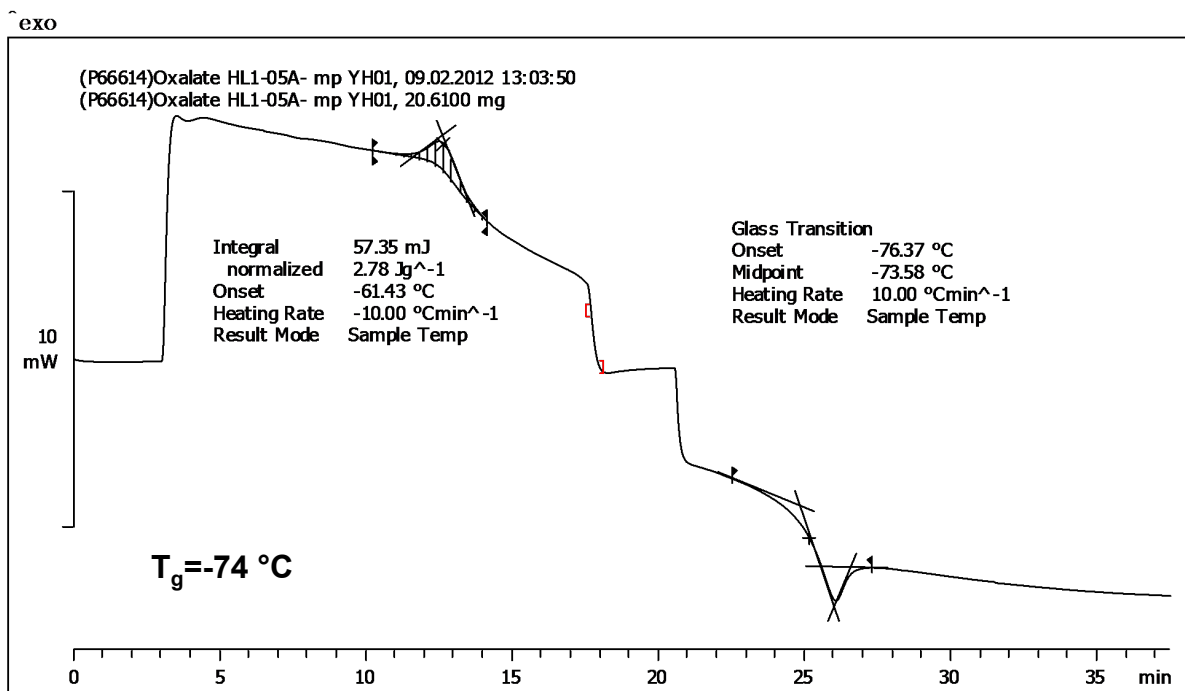
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Lab: METTLER

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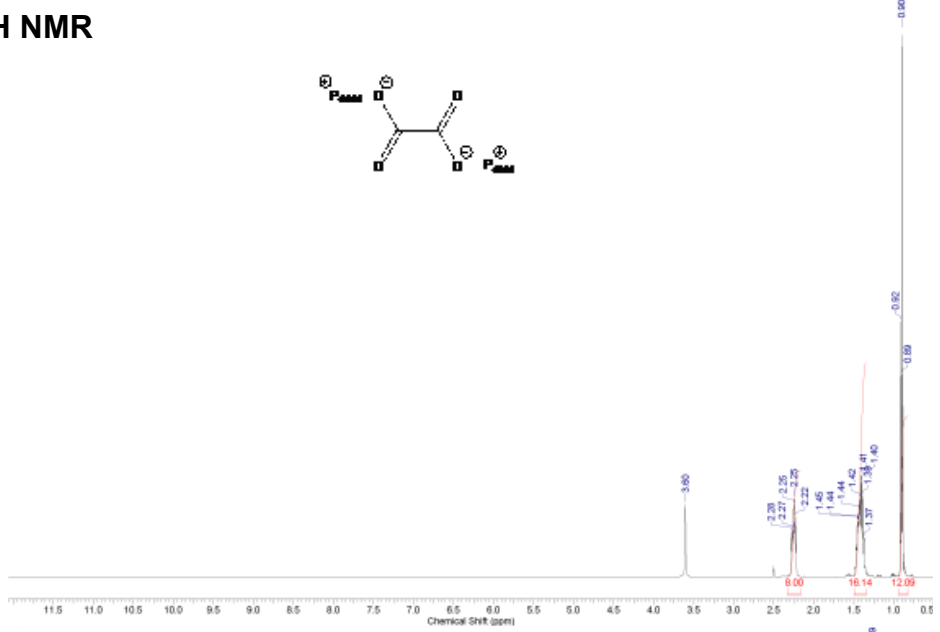
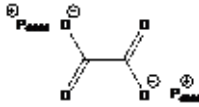
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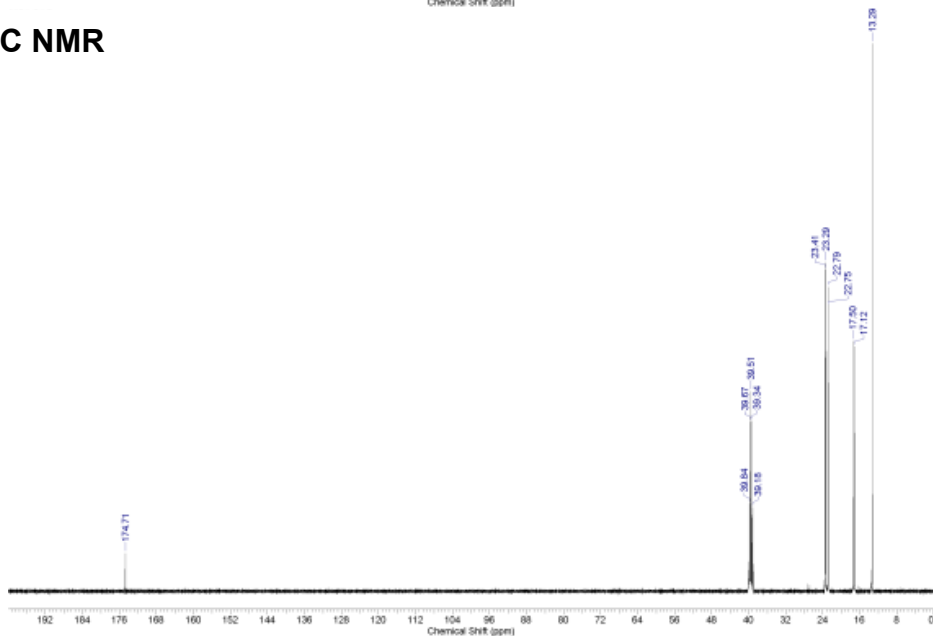
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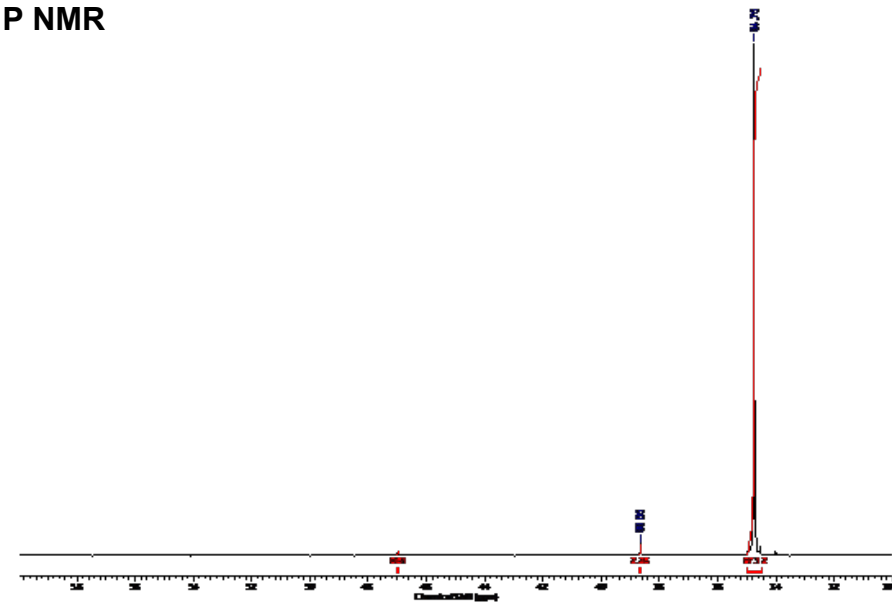
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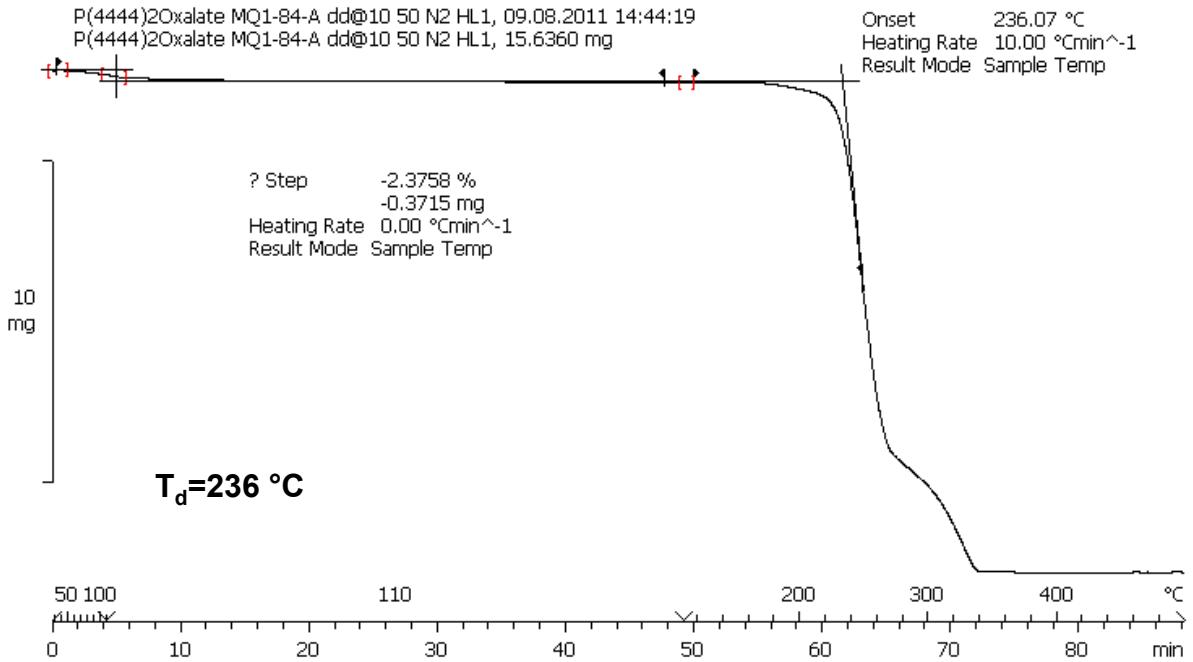
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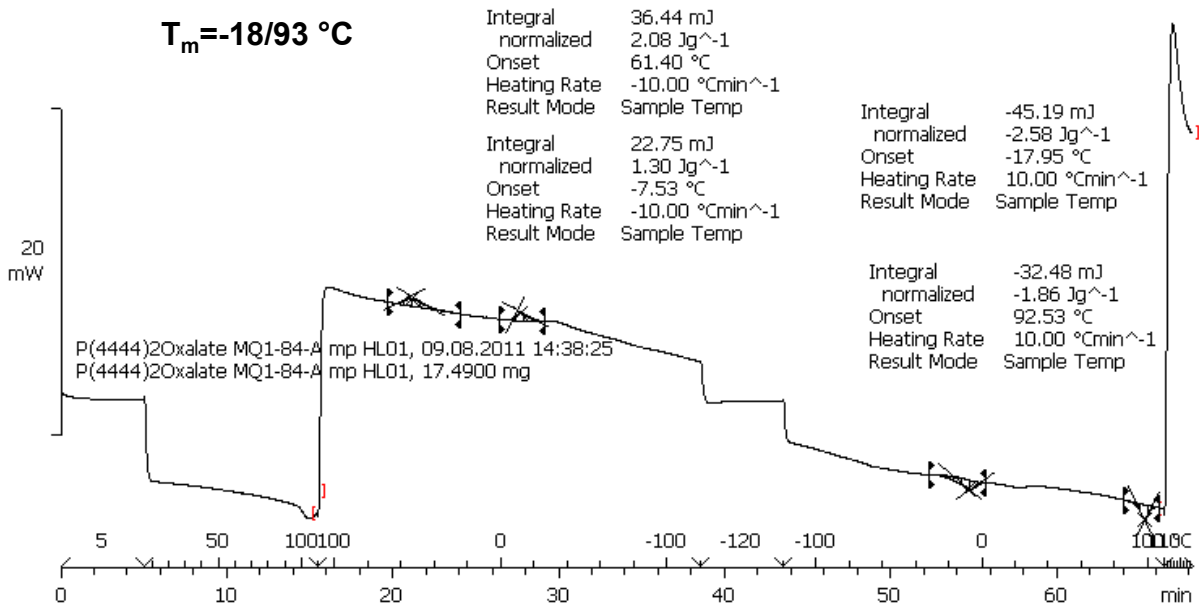
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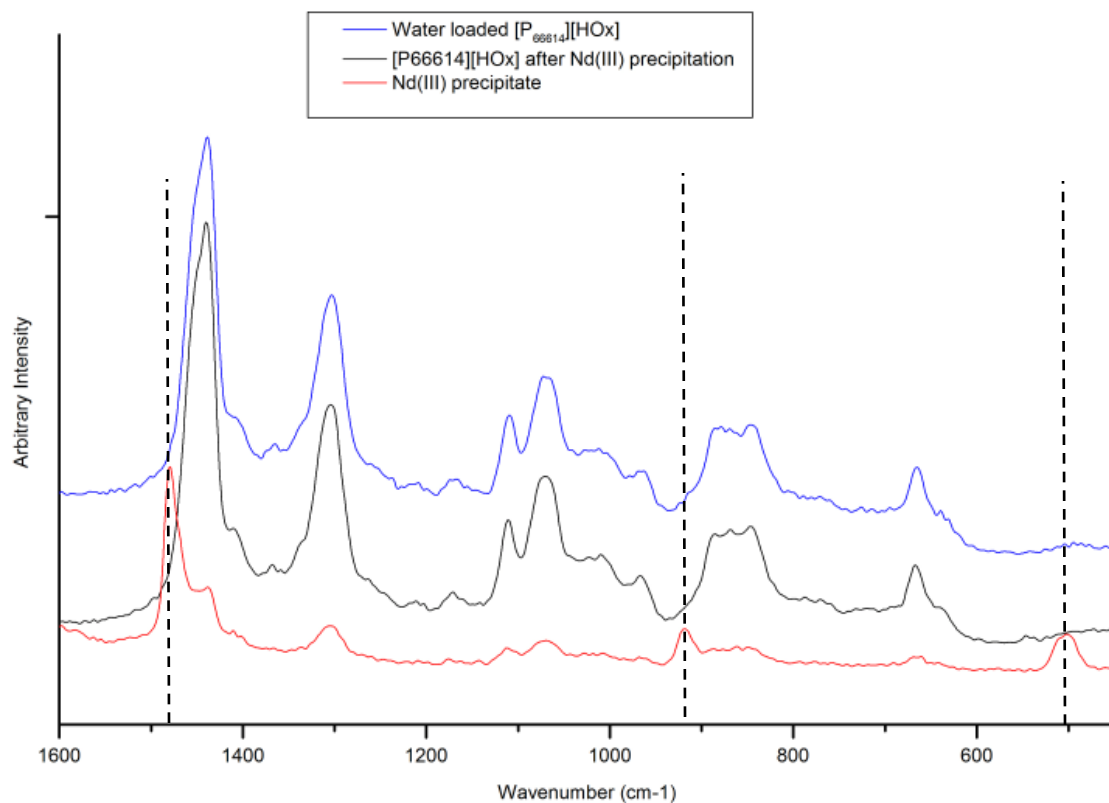
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DSC

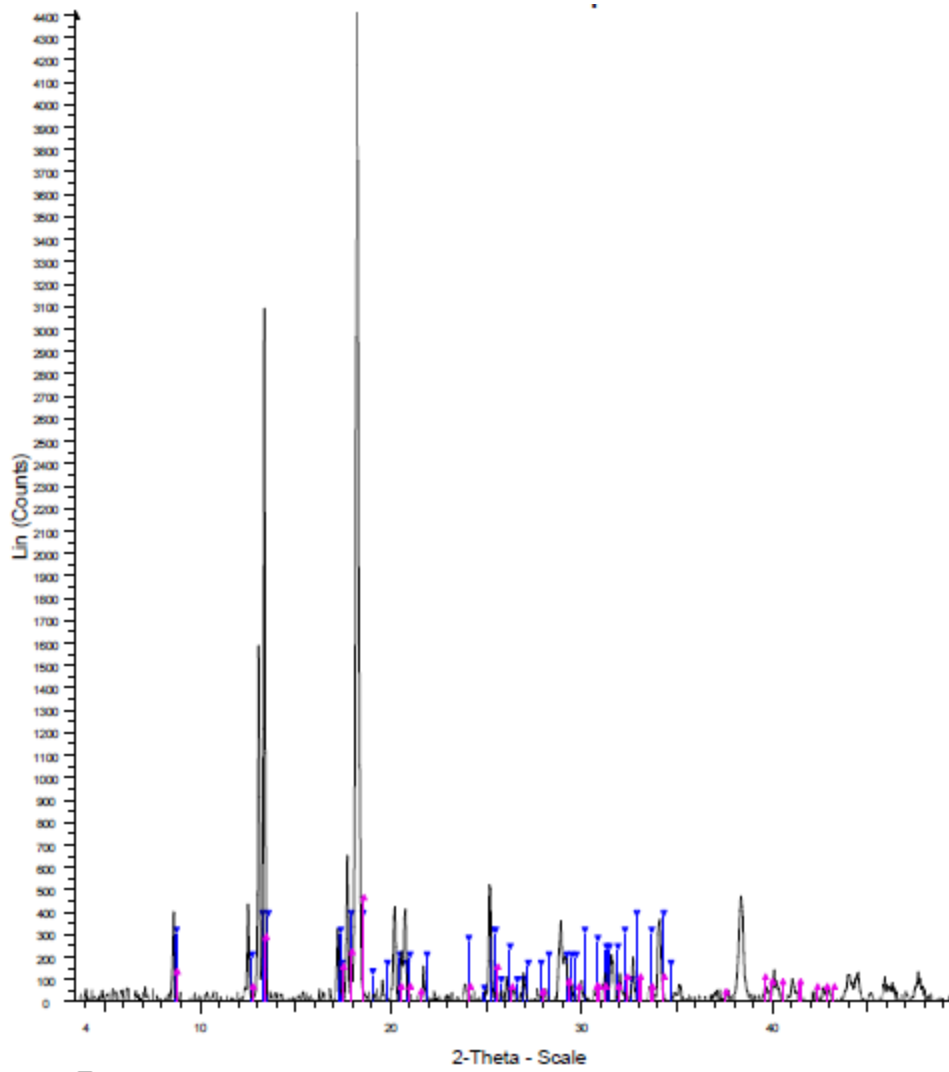


Raman



Raman characterization of water loaded [P₆₆₆₁₄][HOx] before and after addition of Nd₂O₃. Dotted lines illustrate differences in peak locations for Nd(III)-oxalate solid spectra.

PXRD



Black lines indicate the powder X-ray diffraction pattern of the solid blue precipitate. Blue and pink lines are neodymium oxalate hydrate reference patterns. The reference peaks are consistent with the precipitate, although they are shifted to slightly higher 2-Theta values, which could be due to irregularity in sample thickness or flatness. The primary peak that cannot be attributed to a neodymium oxalate complex occurs at 37 2-Theta. This peak may be attributed to the presence of the $[P_{66614}]^+$ cation, for which there is no reference pattern.