

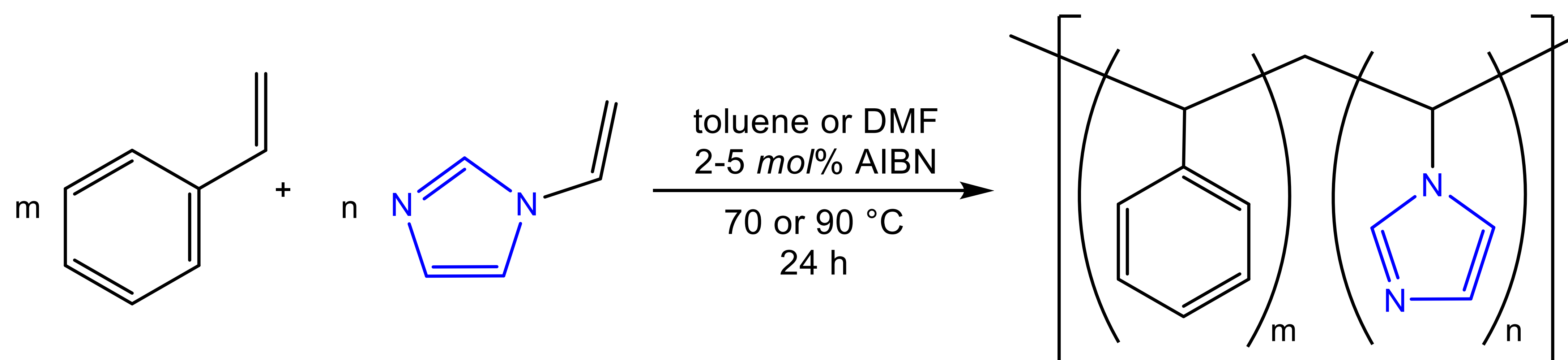
# Polymerization of styrene and *N*-vinylimidazole

Klara Saller and Manuela List\*

JKU, Institute for Chemical Technology of Organic Materials, Altenbergerstraße 69, 4040 Linz, Austria

## Introduction

Polystyrene (PS) has a wide range of applications because of its hardness, transparency and easy processability. Introducing *N*-vinylimidazole (VIm) as comonomer increases hydrophilicity and causes pH-sensitivity. Most publications about PS-PVIm-copolymers so far focused on metal complexes used in catalysis and only few dealt with the characterization of unmodified copolymers [1].



**Figure 1:** Reaction scheme of the polymerization including reaction parameters.

## Experimental

PS- and PVIm-homopolymers as well as copolymers with original ratios of styrene/VIm 9:1, 1:1, and 1:9 were synthesized by radical polymerization. Reaction scheme and parameters are given in Figure 1.

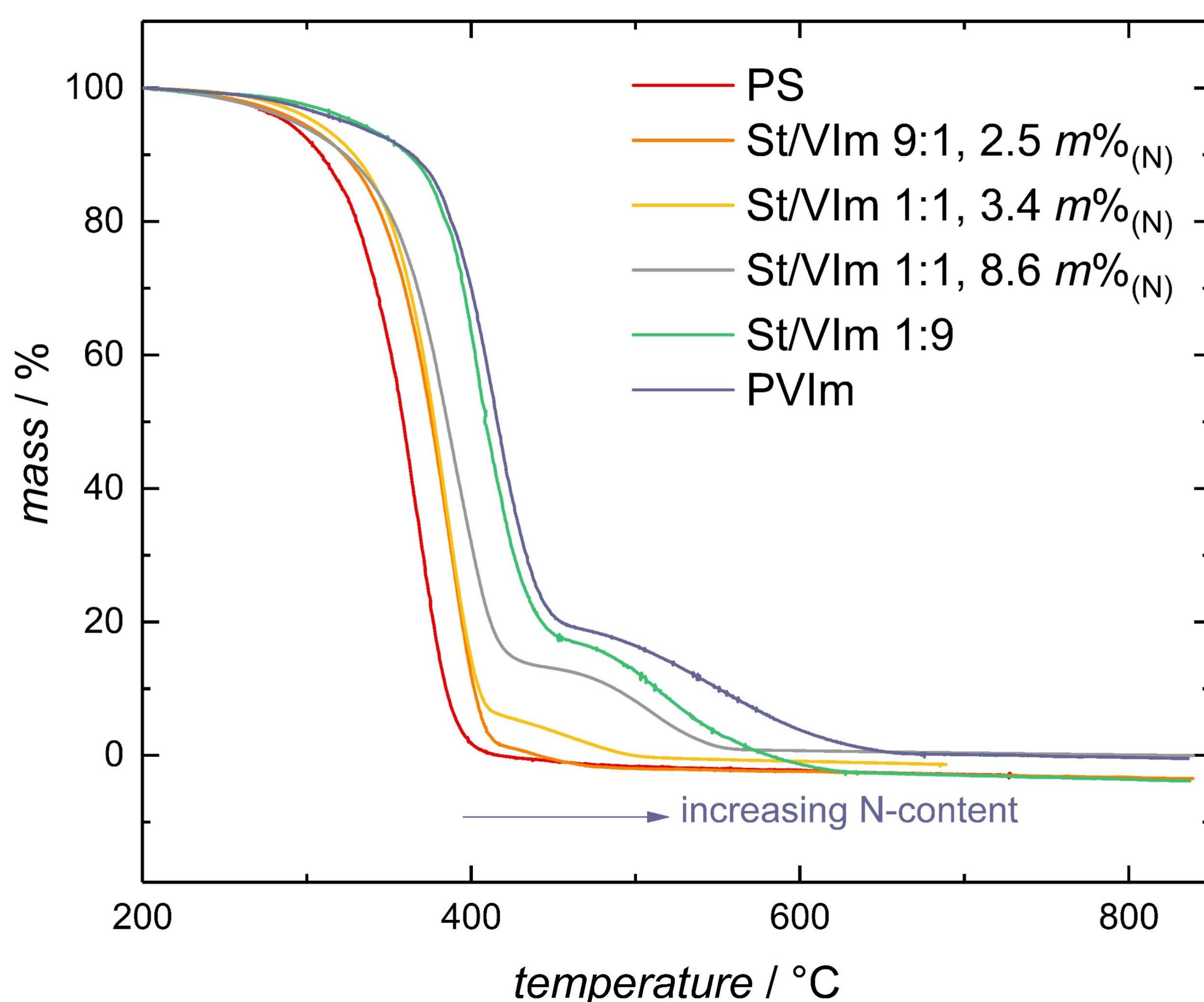
Purification was generally done by dissolution and following precipitation. The combinations THF/H<sub>2</sub>O for PS, and MeOH/THF for PVIm were used. Since only copolymers were soluble in acetone, these were extracted prior to purification with MeOH/H<sub>2</sub>O.

## Results

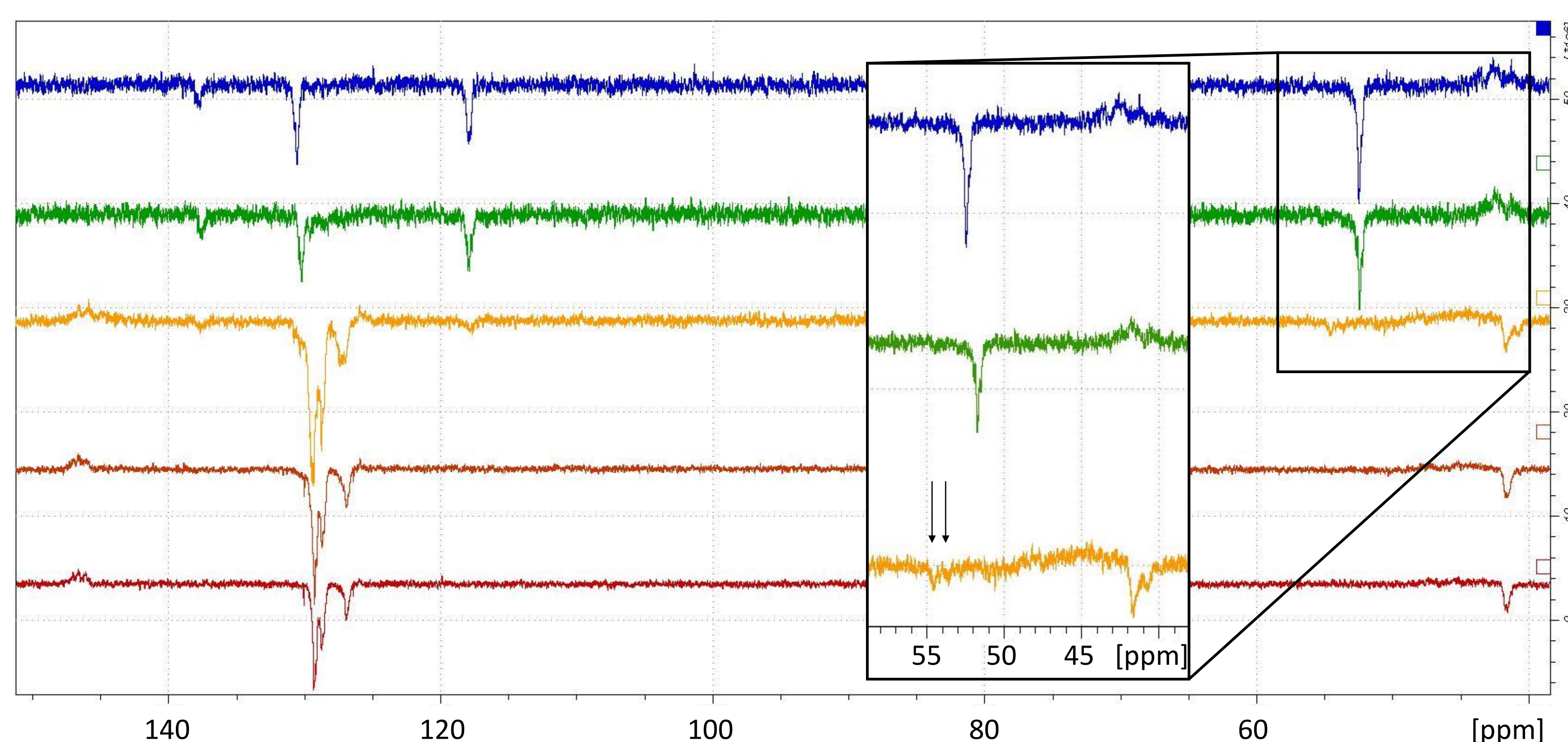
Copolymerization could be verified by solubility, MALDI-ToF mass spectrometry, and <sup>13</sup>C-NMR (Fig. 2). The latter shows a peak splitting caused by different surroundings of the tertiary C-atom in the copolymers compared to PVIm.

The extent of the copolymerization was determined by CHNS-analysis. Nitrogen contents of 1:1 copolymers only reached up to 63 % of theoretical values.

DSC thermograms give *T<sub>g</sub>* of about 80 °C for PS and copolymers up to 8 *m%*<sub>(N)</sub> and ca. 160 °C for PVIm. Thermal decomposition under oxygen atmosphere showed a dependence on the N-content (Fig. 3).



**Figure 3:** TGA under oxygen atmosphere.



**Figure 2:** <sup>13</sup>C-NMR of homo- and copolymers in DMF-d<sub>7</sub>.

\*corresponding author: [manuela.list@jku.at](mailto:manuela.list@jku.at)

[1] Sutton, R.C.; Thai, L., Hewitt, C.L., Voycheck, C.L., Tan, J.S. in: *Macromolecules* 21 (1988), p. 2432-2439.