COMPREHENSIVE TWO-DIMENSIONAL LIQUID CHROMATOGRAPHY FOR THE SEPARATION OF PROTONATED AND DEUTERATED POLYSTYRENE

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ABSTRACT

Deuterated compounds have generally been considered to have similar chemical and physically properties as compared to their protonated counterparts. These materials have been extensively studied using various techniques such as small-angle neutron scattering, neutron reflectivity and enhanced Raman Scattering [1][2][3].

Deuterated and protonated polymers have been separated using the following chromatographic techniques Thin layer Chromatography (TLC) [4], Normal phase liquid chromatography (NPLC) [5], Reverse phase liquid chromatography (RPLC) [6]. To our knowledge liquid chromatography at critical conditions (LCCC) has never been used to separate polymers according to degree of deuteration.

In this study, blends of deuterated and protonated polystyrene of different molar masses were separated using LCCC. Critical conditions for both the protonated and deuterated polystyrene were established. Separation was further improved by allowing the one component to elute in size exclusion chromatographic (SEC) behaviour while the other eluted in liquid adsorption chromatographic (LAC) behaviour. This separation was used to carry out comprehensive two-dimensional chromatography of the blends. The first dimension separated the blends according to isotopic effects while the second dimension separated the blends according to molar mass.

References:

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