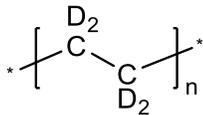


Sample Name: **Deuterated Polyethylene-d₄**

Sample #: **P43357-dPE**

Structure:



Composition:

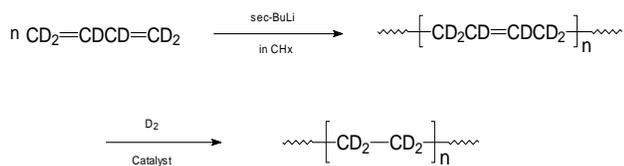
$M_n \times 10^3$ (g/mol)	M_w/M_n
282.0	1.03

Thermal properties:

Melting point, T_m	Crystallization point, T_{cr}
106 °C	79 °C

Synthesis procedure:

The polyethylene-d₄ was obtained by deuteration of poly(1,4-butadiene-d₆), which was synthesized by living anionic polymerization of butadiene-d₆ in non-polar solvent. The scheme of reaction is presented below:



Characterization:

Deuterium NMR spectroscopy was used to confirm the structure of polybutadiene-d₆ rich in 1,4-addition.

The complete deuteration of the product was confirmed by FT-IR spectroscopy analysis by disappearance of alkene double bond ($\text{C}=\text{C}$ at 971 cm^{-1}).

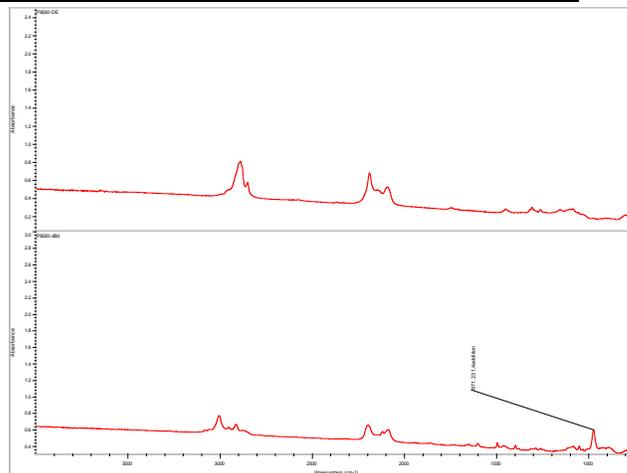
The molecular weight and polydispersity index were obtained by size exclusion chromatography (SEC) of poly(1,4-butadiene-d₆) precursor using THF as an eluent; and the molecular weight of polyethylene-d₄ was calculated accordingly.

Thermal analysis was performed on TA Instruments Q100 differential scanning calorimeter (DSC) under a nitrogen atmosphere at a scan rate $10 \text{ }^\circ\text{C}/\text{min}$.

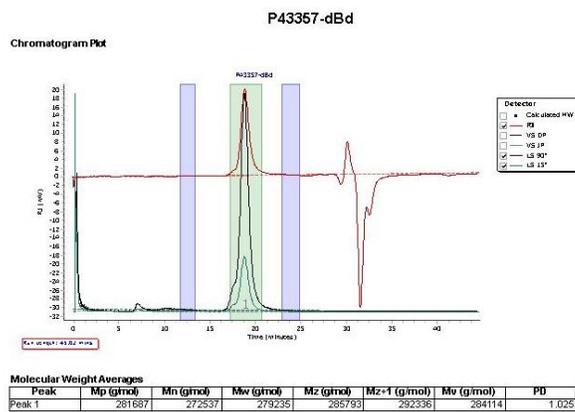
Solubility:

Polyethylene-d₄ is soluble in hot toluene and xylene. The obtained solution has light ivory color; this coloration is due to the presence of trace amount (we expect <5–6 ppm) of the Wilkinson catalyst used in synthesis (and which is hard to remove from the final product).

FT-IR spectra of dPE (top) and dPBd (bottom):



SEC chromatogram of dPBd precursor:



DSC thermograms of the dPE product:

1st cooling (upper) and 2nd heating (lower) scans, both performed at a rate $10 \text{ }^\circ\text{C}/\text{min}$.

