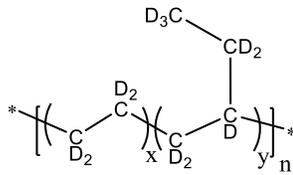


Sample Name: Deuterated POLY(ETHYLENE-CO-BUTYLENE)

Sample #: P18910A-dEB

Structure:



Composition:

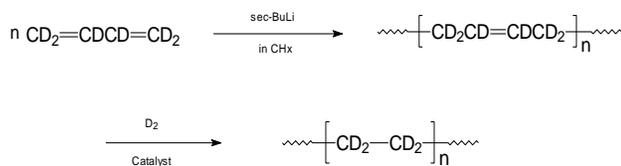
$M_n \times 10^3$ (g/mol)	M_w/M_n
137.0	1.06

Thermal properties:

Glass transition temperature, T_g
36 °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 (C=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.

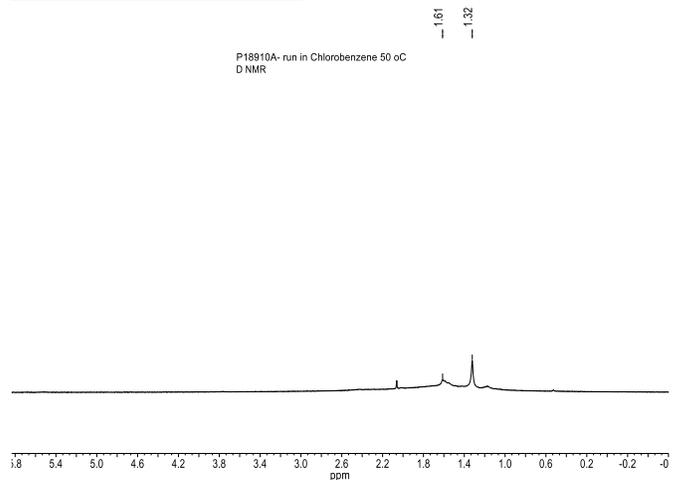
Thermal analysis was performed on TA Instruments Q100 differential scanning calorimeter (DSC) under a nitrogen atmosphere at a scan rate 10 °C/min.

Solubility:

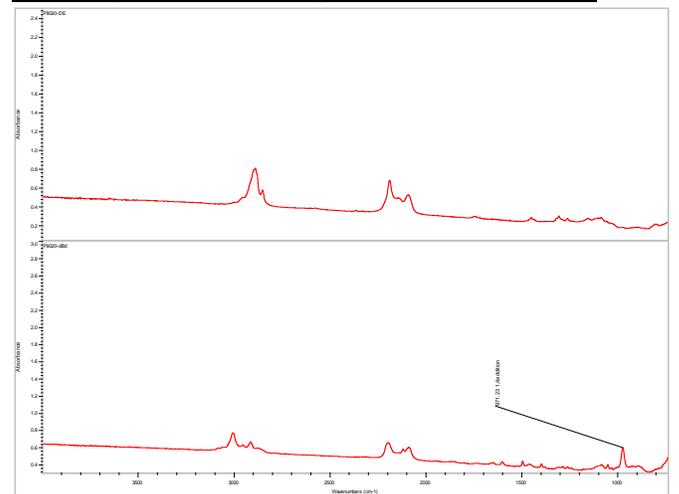
Polyethylene-d₄ is soluble in hot toluene and xylene. The obtained solution has light ivory color; this coloration is due to the presence of trace amount (we expect <5–6

ppm) of the Wilkinson catalyst used in synthesis (and which is hard to remove from the final product).

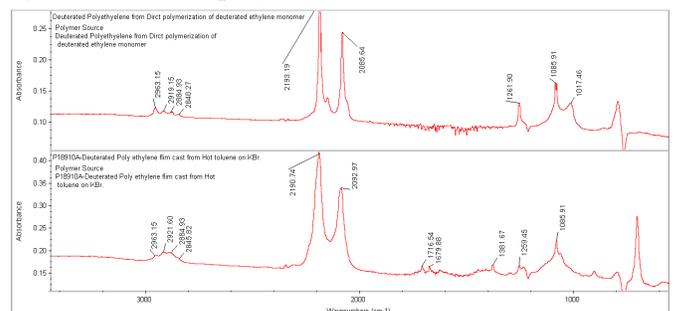
D (2H) NMR spectrum:



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



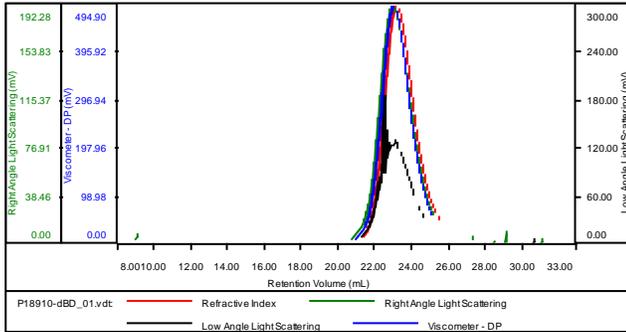
FT-IR spectra of the deuterated polyethylene-d₄ products obtained by direct polymerization of ethylene-d₄ monomer using coordination catalyst system [top] and by deuteration of poly(1,4-butadiene-d₆) [bottom]:



SEC chromatogram of dPBd precursor:

Sample ID: P18910-dBd

Concentration (mg/mL)	18,2314
Sample dn/dc (mL/g)	0.1250
Method File	PS80K-0923-2014-0000.vcm
Column Set	3x PL 1113-6300
Solvent	THF



Sample	MW Number Average (Da)	MW Weight Average (Da)	MW at Peak (Da)	Polydispersity	Intrinsic Viscosity (dL/g)
P18910-dBD_01.vdt	136,374	144,980	133,375	1.063	1.1512

DSC thermograms of the P18910A-dE product:

1st cooling (upper) and 2nd heating (lower) scans, both performed at a rate 10 °C/min.:

Sample: P18910-A_dE
Size: 10.3000 mg

File: P18910-A_dE.001

