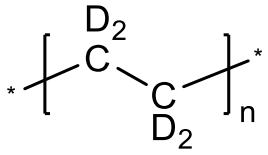
Sample Name: **Deuterated Poly(ethylene-d4)**

Sample #: **P42252A-dPE**

Structure:



Composition:

$M_n \times 10^3$ (g/mol)	M_w/M_n
48.0	1.01

Thermal properties:

Melting point, T_m	Crystallization point, T_{cr}
102 °C	86 °C

Synthesis procedure:

The polyethylene-d_4 was obtained by deuteration of poly(1,4-butadiene-d_6), which was synthesized by living anionic polymerization of butadiene-d_6 in non-polar solvent.

Characterization:

Deuterium NMR spectroscopy was used to confirm the structure of polybutadiene-d_6 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}).

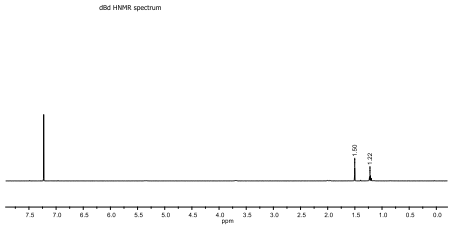
The molecular weight and polydispersity index were obtained by size exclusion chromatography (SEC) of poly(1,4-butadiene-d_6) precursor using THF as an eluent; and the molecular weight of polyethylene-d_4 was calculated accordingly.

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

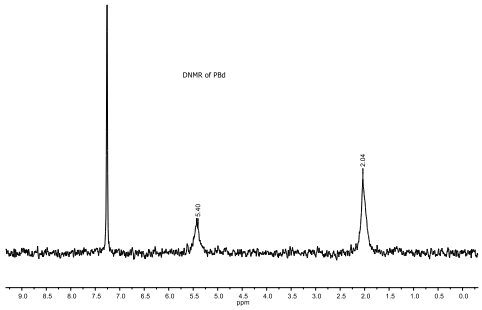
Solubility:

Polyethylene-d_4 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).

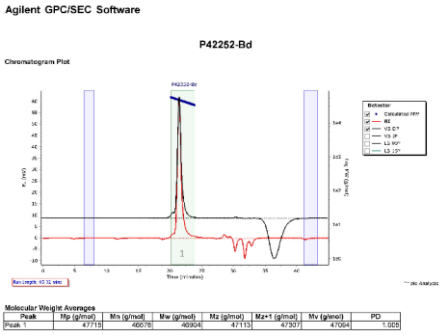
H NMR spectrum of dPBd precursor:



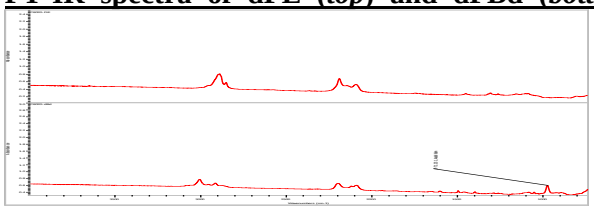
D NMR spectrum of PBd precursor:



SEC chromatogram of dPBd precursor:



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



DSC thermogram:

heating (*bottom*) and cooling (*top*) scans at 10 °C/min.