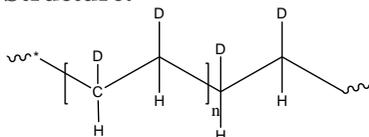


### Sample Name:

**Partially Deuterated poly ethylene Obtained from the deuteration of hydrogenated poly butadiene – rich in 1, 4 addition**

Sample #: **P40293-d2H2PE**

### Structure:



### Composition:

Mn x 10 <sup>3</sup>	PDI
73.0	1.03

### Thermal properties:

Melting point, T <sub>m</sub>	Crystallization point, T <sub>cr</sub>
102 °C	85 °C

### Synthesis Procedure:

Deuteration of Protonated poly butadiene was under pressure of Deuterium at 600Psi 70 oC for 5 days, Using Pd/CaCO<sub>3</sub> catalyst with traces amount of Wilkinson catalyst.

Polymer contain about 7 Carbons per 100 carbons Ethyl branches coming from 7% 1,2 addition of poly butadiene

### Characterization:

The molecular weight and polydispersity index (PDI) of the deuterated poly butadiene are obtained by size exclusion chromatography (SEC) in THF. SEC analysis was performed on a Varian liquid chromatograph equipped with refractive and UV light scattering detectors from Viscotek Co. Three SEC columns from Supelco (G6000-4000-2000 HXL) were used.

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

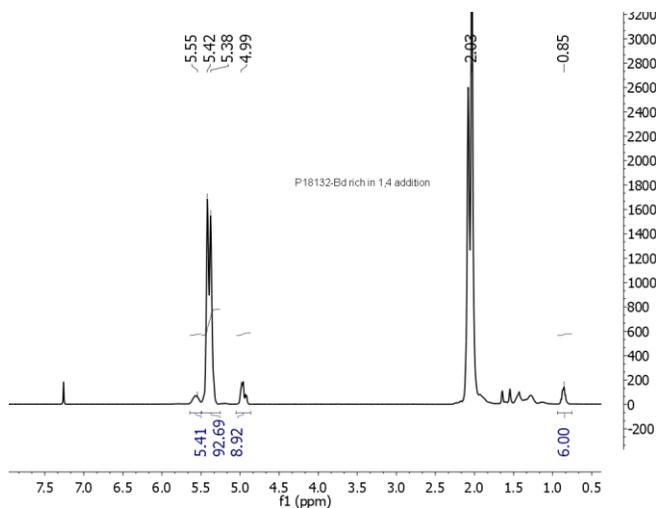
### Deuteration:

The deuteration reaction was analyzed by Fourier transform infrared spectroscopy. Polymer films were cast on KBr windows from toluene solutions for the polybutadiene and the hot toluene for deuterated polybutadiene respectively. 16 scans were taken at resolution of 2 cm<sup>-1</sup>. It was found that the peaks due to C=C double bonds at 971 cm<sup>-1</sup> disappeared completely after the deuteration.

### Solubility:

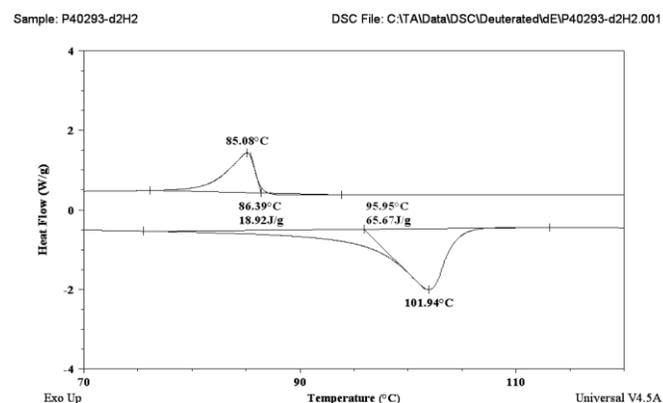
Poly ethylene (deuterated) is soluble in hot toluene and xylene. The solution is light ivory color; this coloration is because of the trace amount (finger prints) of the Wilkinson catalyst used. These can not remove from the polymer. We expect the catalyst presence is less than 5-6 ppm.

### <sup>1</sup>H-NMR spectrum of the product used in the deuteration:



### DSC thermogram:

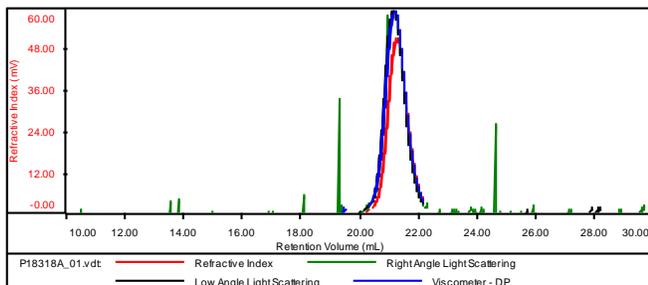
1<sup>st</sup> heating (*bottom*) and 2<sup>nd</sup> cooling (*top*) scans at 10 °C/min.



## SEC elugram of Homopolymer:

Sample ID: P18318A-Bd

Concentration (mg/mL)	1.5765
Sample dn/dc (mL/g)	0.1270
Method File	PS80K-NOV25-2013-0000.vcm
Column Set	3x PL 1113-6300
System	System 1



Sample	Mn	Mw	Mp	Mw/Mn	IV
P18318A_01.vdt	70,409	72,633	71,271	1.032	1.1523

