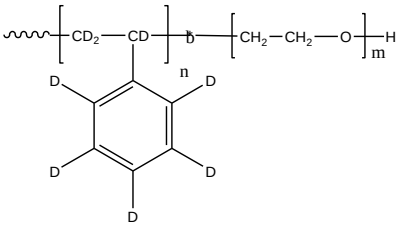
Sample Name: **Deuterated Polystyrene (d_8)- ethylene oxide (protonated)**

Sample #: **P8793B-dPSEO**

Structure:



Composition:

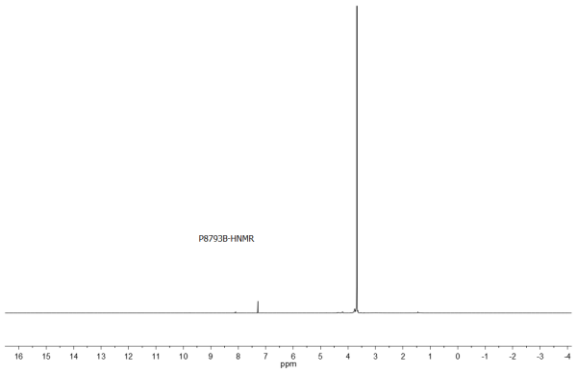
Mn x 10^3 dPS-b-EO	PDI
106.0-b-32.0	1.15

Synthesis Procedure:
Deuterated Poly(styrene-b-ethylene oxide) diblock copolymer is prepared by living anionic polymerization.

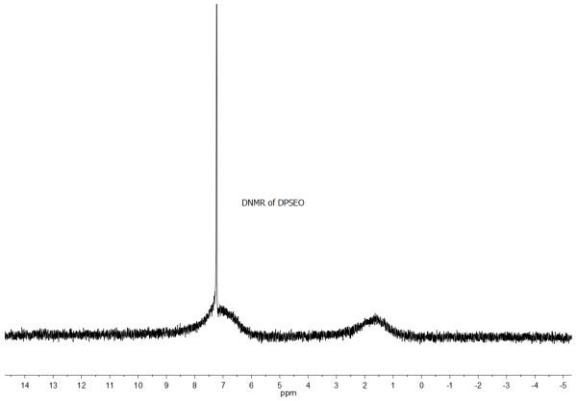
Characterization:
The molecular weight and polydispersity index (PDI) of the block copolymer are characterized by size exclusion chromatography (SEC). The composition of the block copolymer was calculated from ^{1}H-NMR by comparing the peak area of the phenyl polystyrene protons between 6.4 to 7.2 ppm (indicating about 1% protonated fraction) and the ethylene oxide protons at 3.65 ppm. This is given an approximate analysis. The yield of the polymer from the theoretical amount of deuterated styrene and protonated ethylene oxide monomer calculate also the compositions required.

Solubility:
The polymer is soluble in THF (at 35 °C), $CHCl_3$, benzene, toluene, dioxane. Low molecular weight SEO with high contents of the polyethylene oxide block can also be solubilized in methanol and water.

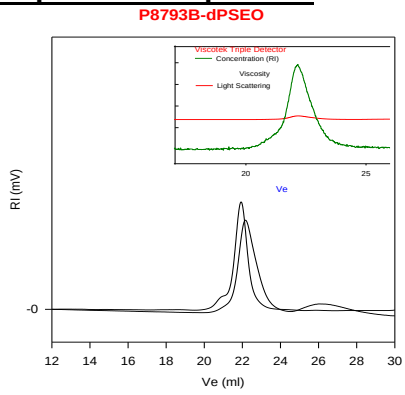
HNMR spectrum of the Polymer:



DNMR spectrum of the Polymer:



SEC profile of the product:



Size Exclusion Chromatography of polymer;
For deuterated Polystyrene block: M_n = 106,000, M_w =145,000, M_w/M_n = 1.08
For Block Copolymer: dPS-b-EO : 160,000-b-32,000 Mw/Mn 1.15
In box Light Scattering data from Triple detectors:
dn/dc in THF 0.120ml/g Solution Viscosity in THF at 35 oC: 0.38dl/g
Radius of Gyration: 12.66nm

References for further information:

1. S. K. Varshney, R. Fayt, Ph. Teyssie, and J.P. Hautekeer US Patent 5,264,527 (1993)

2. S. K. Varshney, Jian-Xin Zhang. US patent 7009,033 B3 2006.

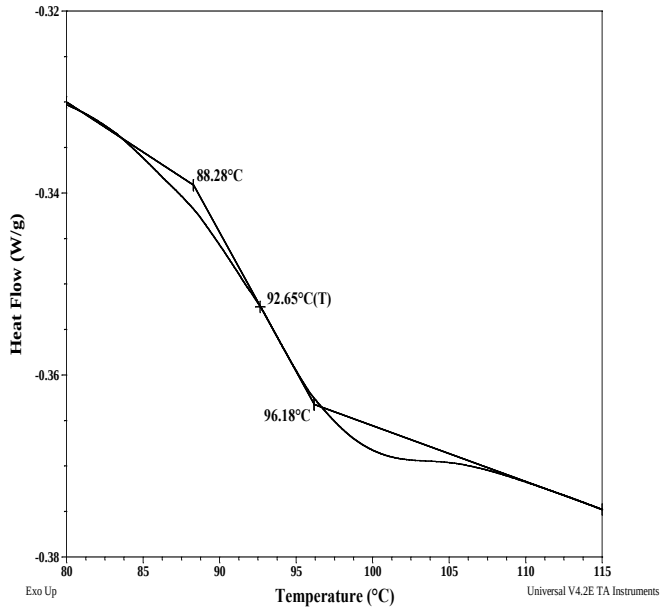
Thermal analysis of the sample# P8793B-dPSEO:

Thermal analysis of the samples was carried out on a TA Q100 differential scanning calorimeter at a heating rate of 10°C/min.The midpoint of the slope change of the heat flow plot of the second heating scan was considered as the glass transition temperature (T_g).

Thermal analysis results at a glance

For PS block T_g: 93°C		
For PEO block		
T_g: Not distinct	T_m: 52°C	T_c: 30°C

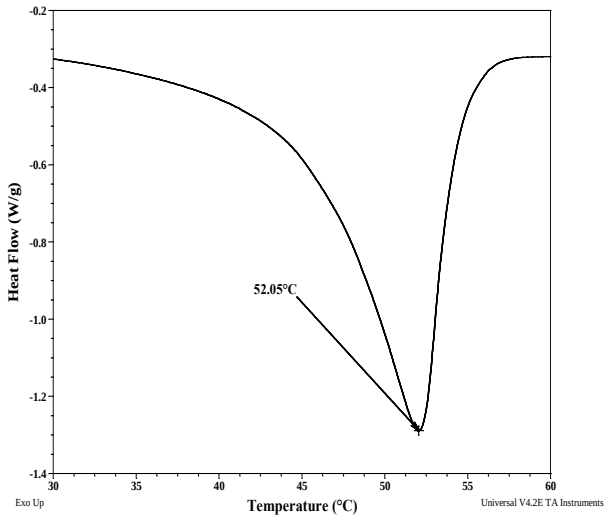
Thermogram for the dS block:



Melting and crystallization curve for the PEO block

The melting temperature (T_m) was taken as the maximum of the endothermic peak where as the crystallization temperature (T_c) was considered as the minimum of the exothermic peak.

Melting curve for dEO block:



Crystallization curve for dEO block: