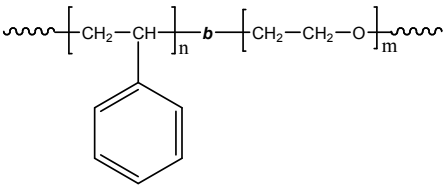
Sample Name: Poly(styrene-b-ethylene oxide)

Sample #: P11446-SEO

Structure:



Composition:

Mn x 10^3 S-b-EO	PDI
3.5-b-5.5	1.15

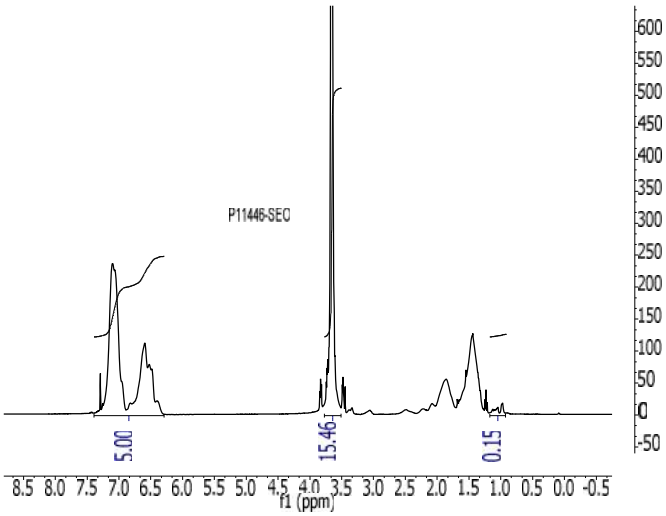
Synthesis Procedure:
Poly(styrene-b-ethylene oxide) diblock copolymer is prepared by living anionic polymerization.

Characterization:

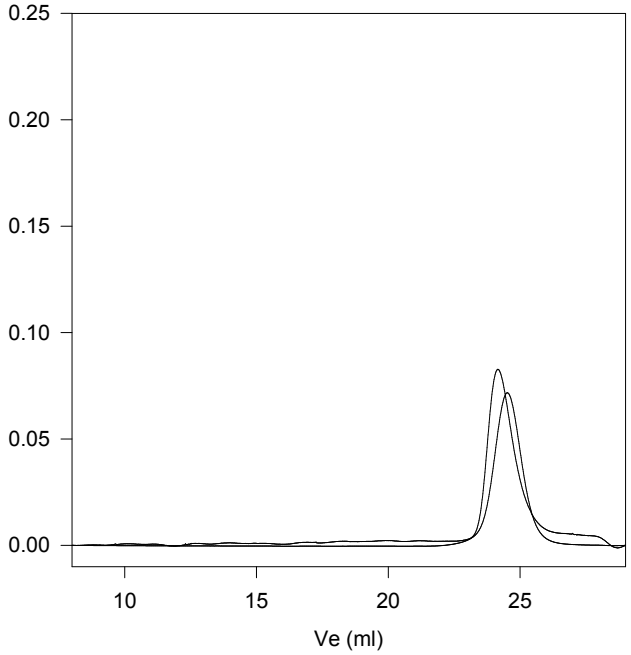
The molecular weight and polydispersity index (PDI) of the block copolymer are characterized by size exclusion chromatography (SEC). The composition of the block copolymer was calculated from ^{1}H-NMR by comparing the peak area of the phenyl polystyrene protons between 6.4 to 7.2 ppm and the ethylene oxide protons at 3.65 ppm. **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.

Purification of the Polymer: Since these polymers are synthesized using cumyl potassium as catalyst. Cumyl potassium was filtered to remove potassium methaoxide as side product. Even after filtration the cumyl potassium contain traces amount of Ch3OK as by product this also act as initiator during the polymerization of ethylene oxide. The obtained polymer was soxhlet in methanol for 48h to ensure the removal of traces amount of poly ethylene oxide. The product was recovered and stirrer in cyclohexane at 40 oc to remove any homo polystyrene fraction. The fraction of homo polystyrene in the block copolymer was found negligible amount. Polymer was dried at 60 oC under vacuum.

^{1}H NMR spectrum of the sample



P11446-SEO



Size exclusion chromatography of poly(styrene-b-ethylene oxide)

Poly(styrene), M_n=3,500, M_w=3,900, PI=1.12

Block Copolymer PSt(3,500)-b-PEO(5,500), PI=1.15

Thermal analysis of the sample# P11446-SEO

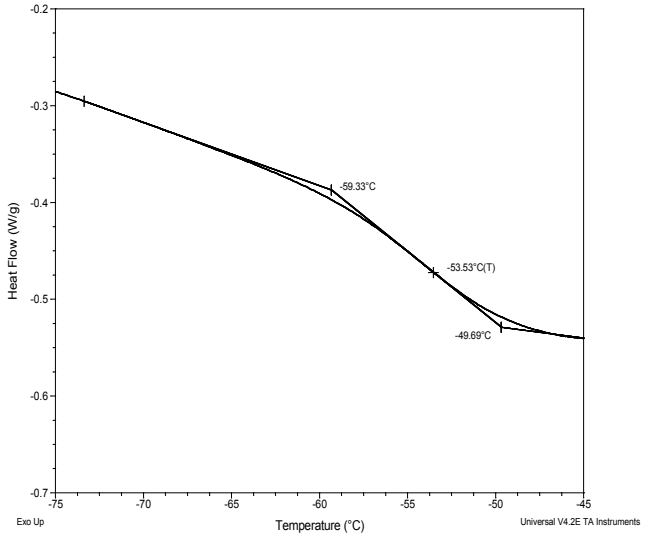
Thermal analysis of the samples was carried out on a TA Q100 differential scanning calorimeter at a heating rate of 20^{o}C/min.The midpoint of the slope change of the heat flow plot of the second heating scan was considered as the glass transition temperature (T_g).

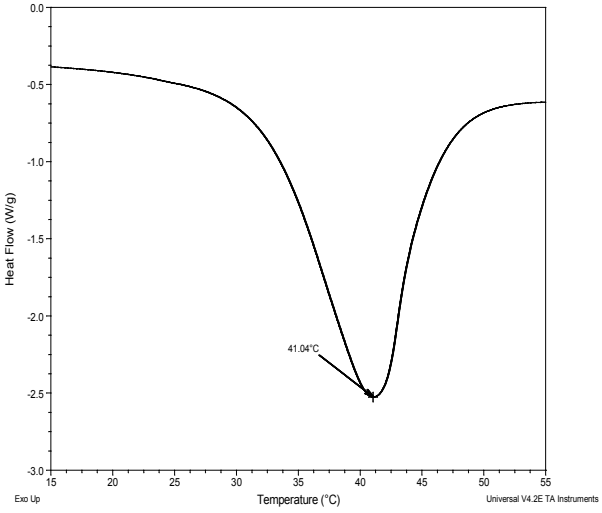
Thermal analysis results at a glance

For PS block T_g: Untraceable		
For PEO block		
T_g: -54^{o}C	T_m: 41^{o}C	T_c: Not observed

Thermogram for the sample

For PEO block:



Melting curve for the PEO block

The melting temperature (T_m) was taken as the maximum of the endothermic peak.