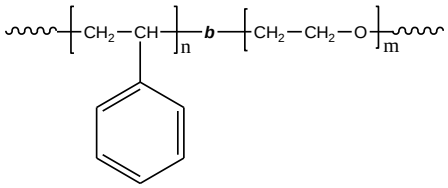
Sample Name: Poly(styrene-b-ethylene oxide)

Sample #: P11111-SEO

Structure:



Composition:

Mn x 10^3 S-b-EO	PDI
1.7-b-7.5	1.10

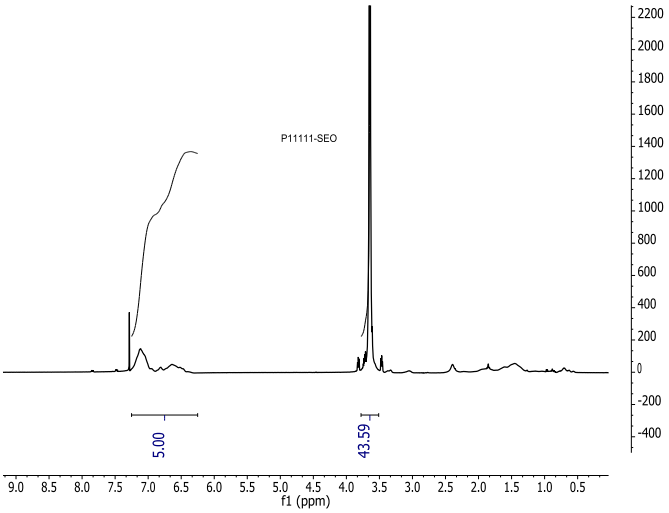
Synthesis procedure:
Poly(styrene-b-ethylene oxide) diblock copolymer is prepared by living anionic polymerization.

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.

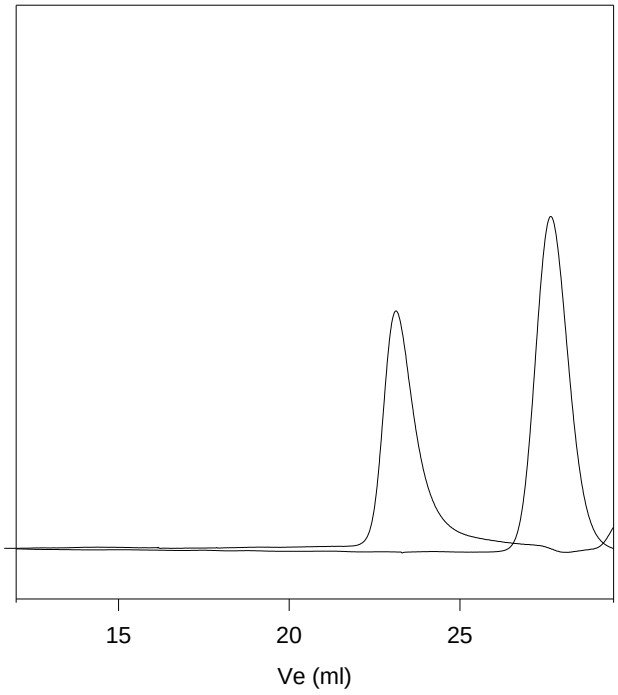
Solubility:
The polymer is soluble in THF (at 35 °C), $CHCl_3$, benzene, toluene, dioxane. Low molecular weight SEO with high contents of the polyethylene oxide block can also be solubilized in methanol and water.

Purification of the Polymer:
Since these polymers are synthesized using cumyl potassium as catalyst or potassium salt of OH terminated Polystyrene. The obtained polymer was soxhleted in methanol for 48h to ensure the removal of traces amount of poly ethylene oxide. The product was recovered and stirred in cyclohexane at 40oC to remove any homo polystyrene fraction. The fraction of homo polystyrene in the block copolymer was found to be a negligible amount. Polymer solution was eluted from a column packed with neutral Al_2O_3. Polymer was precipitated from cold hexane. Polymer was dried at 60 oC under vacuum.

^{1}H NMR spectrum of the sample



SEC profile of the block copolymer
P11111-SEO



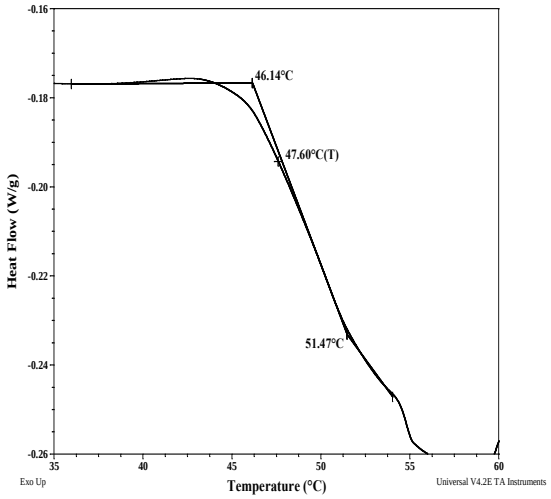
Size exclusion chromatography of poly(styrene-b-ethylene oxide)

Poly(styrene), M_n=1700, M_w=1900, PI=1.12
Block Copolymer PSt(1700)-b-PEO(7500), PI=1.10
The composition determined from HNMR.

Thermal analysis of the sample# P11111-SEO

Thermal analysis of the samples was carried out on a TA Q100 differential scanning calorimeter at a heating rate of 10^{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).

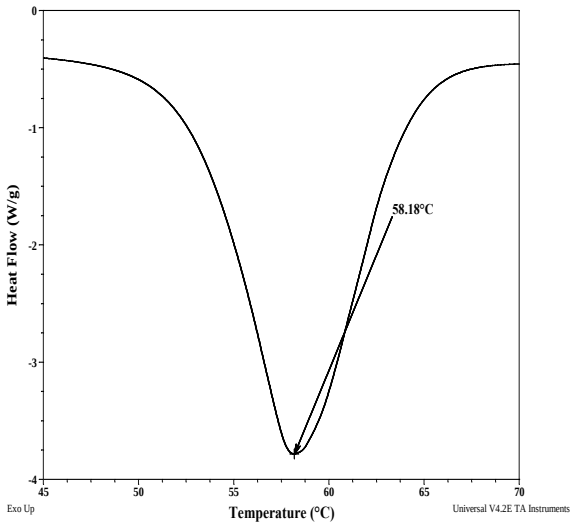
DSC of PSOH used :



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 PEO block:



Thermal analysis results at a glance

For PS block T_g: Not distinct		
For PEO block		
T_g: Not distinct	T_m: 58 ^{o}C	T_c: 19 ^{o}C

Crystallization curve for PEO block: