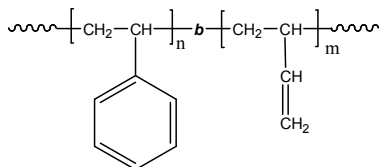


## Sample Name: Poly(styrene-b-1,2-butadiene)

**Sample #:** P644-SBd

### **Structure:**



### **Composition:**

$M_n \times 10^3$ S-b-Bd	PDI
107.0-b-720.0	1.06
$T_g$ for PBd block: $-11^\circ\text{C}$	$T_g$ for PS block: $103^\circ\text{C}$
Final Polymer contain about 20% homopolystyrene fractions	

### **Synthesis Procedure:**

Poly(styrene-b-butadiene) rich in 1,2 addition polybutadiene is prepared by living anionic polymerization with sequence addition of styrene followed by butadiene (Bd) in THF or a mixture of THF and cyclohexane.

### **Characterization:**

An aliquot of the anionic polystyrene block was terminated before addition of butadiene and analyzed by size exclusion chromatography (SEC) to obtain the molecular weight and polydispersity index (PDI).

The final block copolymer composition was calculated from  $^1\text{H-NMR}$  spectroscopy by comparing the peak area of the polybutadiene protons (double bond 4.9 - 5.6 ppm) with the aromatic protons of polystyrene at 6.3-7.2 ppm.

**Note:** The  $^1\text{H-NMR}$  of 1,2-polybutadiene is composed of 1 proton signal at 5.4 ppm and 2 proton signals at 5.0 ppm. Copolymer PDI is determined by SEC.

### **Thermal analysis:**

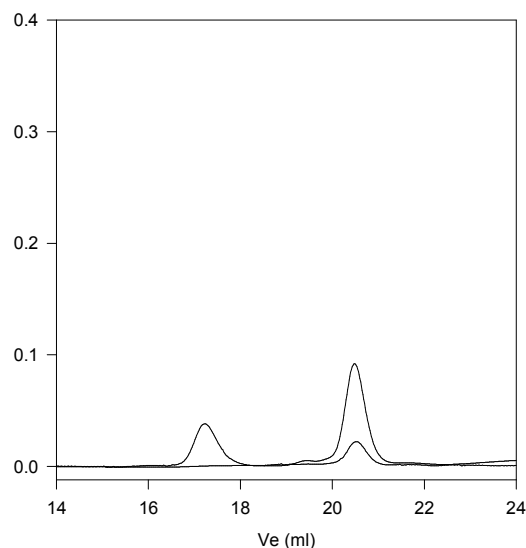
Thermal analysis of the samples was carried out on a TA Q100 differential scanning calorimeter at a heating rate of  $10^\circ\text{C}/\text{min}$ . The midpoint of the slope change of the heat flow plot of the second heating scan was considered as the glass transition temperature ( $T_g$ ).

### **Solubility:**

Poly(styrene-b-butadiene) is soluble in toluene, cyclohexane, benzene, THF, dioxane and  $\text{CHCl}_3$ . This polymer readily precipitates from methanol, ethanol, and water.

### **SEC of the block copolymer:**

**P644-SBd**



Size exclusion chromatography of polystyrene-b-polybutadiene (1,2 addition)

— Polystyrene,  $M_n=107000$ ,  $M_w=115500$ ,  $PI=1.05$   
— Block Copolymer PS(10700)-b-PBd(720000),  $PI=1.06$   
Molecular Composition of diblock from  $^1\text{H-NMR}$