Sample Name: Poly(1,2-butadiene-b-ε-caprolactone)
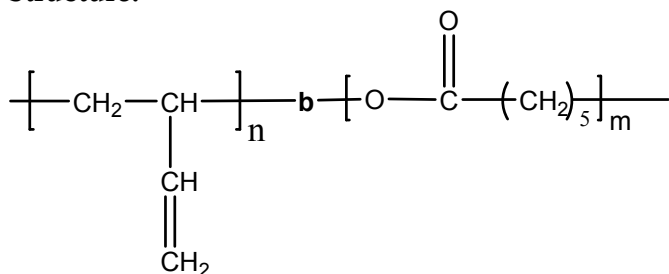
Sample #: P10444-BdCL

Structure:

Composition:

Mn × 10³ Bd-b-CL	Mw/Mn (PDI)
1.0-b-2.2	1.09
PBd microstructure 1,2 addition: 65%	

Synthesis Procedure:

Poly(1,2-butadiene-b-ε-caprolactone) is prepared by living anionic polymerization addition of butadiene followed coordination polymerization of ε-caprolactone.
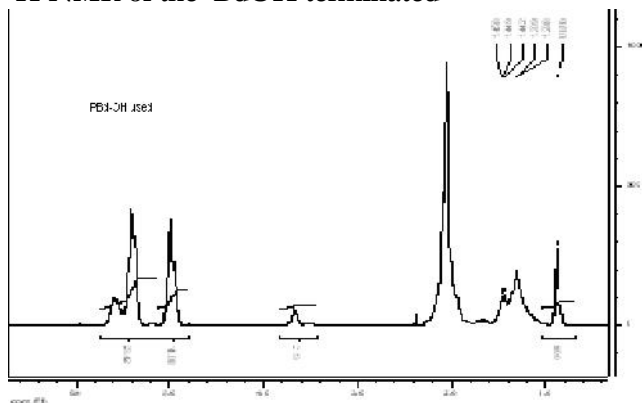
Characterization:

An aliquot of the anionic poly(butadiene) block was terminated before addition of ε-caprolactone and analyzed by size exclusion chromatography (SEC) to obtain the molecular weight and polydispersity index (PDI). The final block copolymer composition was calculated from ¹H-NMR spectroscopy by comparing the peak area of the vinylic butadiene protons at about 5.4 ppm with the ε-caprolactone protons at about 4.1ppm. Block copolymer PDI is determined by SEC.
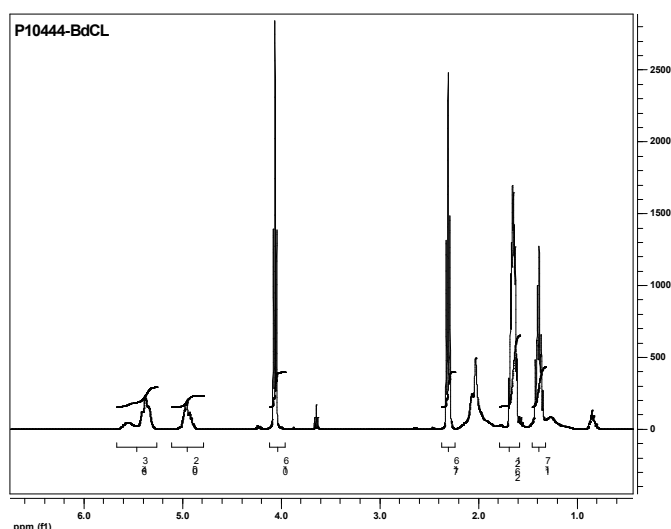
Solubility:

The polymer is soluble in tetrahydrofuran (THF) and chloroform (CHCl₃).
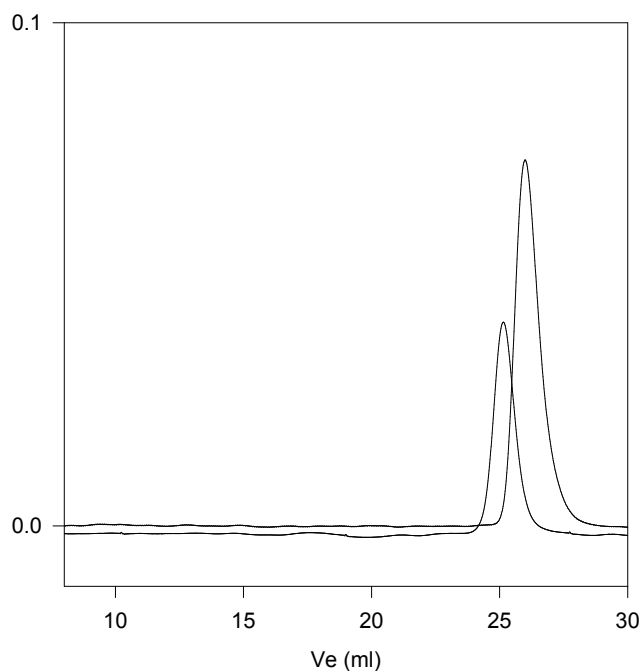
¹H NMR of the BdOH terminated

¹H NMR of the diblock copolymer:

SEC of the block copolymer:

P10444-BdCL

—— SEC profile of Poly(Butadine $_{1,4 \text{ addition}}$-b-ε-caprolactone):

—— Polybutadiene, M_n=1000, M_w=1100, PI=1.10

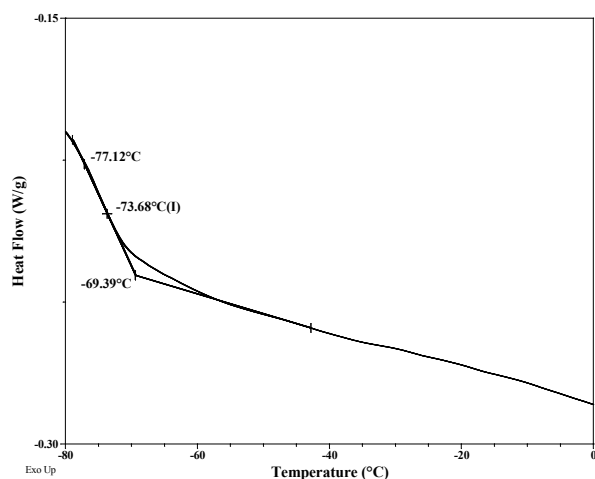—— Block Copolymer PBd(1000)-b-PεCL(2200), PI=1.09

Thermal analysis of the sample# P10444-BdCL

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).

Melting and crystallization curve for the sample

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.

Thermogram for CL block:

Thermal analysis results at a glance:

Sample	T_m (°C)	T_c (°C)	T_g (°C)
Bd block	-	-	Not distinct
CL block	47	25	-74

Thermogram for ε-caprolactone block: