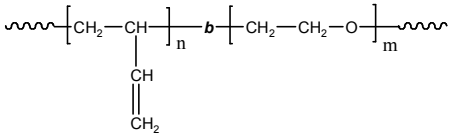
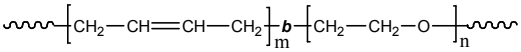
Sample Name: Poly(butadiene-b-ethylene oxide)
Poly butadiene rich in 1,2 or 1,4 microstructure

Sample #: P4755-BdEO
(poly butadiene block rich in 1,2 microstructure)

Structure of 1,2-rich microstructure:



Structure of 1,4-rich microstructure:



Composition:

Mn x 10^3 Bd-b-EO	Mw/Mn (PDI)	% 1,2 addition Butadiene
6.0-b-12.0	1.10	>73 %

Synthesis Procedure:

Poly(butadiene(1,4 addtion or 1,2 addition)-b-ethylene oxide) can be prepared by the different routes as reported in the literature (ref: Macromolecules 1996, 29, 6994). The direct synthesis of diblock copolymer using lithium counter ion in the presence of **Phosphazene Base *t*-**BuP_4 is interesting as reported in *Macromolecules,* **32** (8), 2783 -2785, 1999. These polymers can also be successfully synthesized using the different end functionalized polymers as investigated in our lab. These methodologies are proprietary.

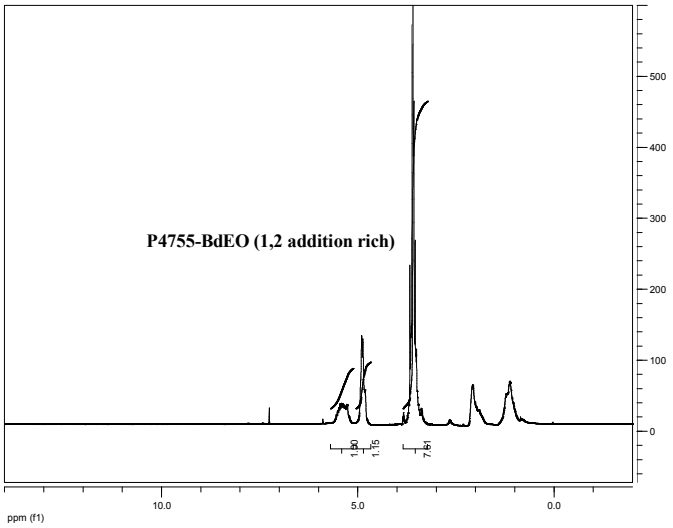
Characterization:

OH terminated polybutadiene polymer was analyzed by size exclusion chromatography (SEC) to obtain the molecular weight and polydispersity index (PDI). The final block copolymer composition was calculated from ^{1}H-NMR spectroscopy by comparing the peak area of the vinylic butadiene protons between about 5.0-5.4 ppm with the ethylene oxide protons at 3.6 ppm. Block copolymer PDI is determined by SEC. Note: The ^{1}H-NMR of 1,2-polybutadiene is composed of 1 proton signal at 5.4 ppm and 2 proton signals at 5.0 ppm. Signals due to vinylic 1,4-polybutadiene are also present at 5.4 ppm.

Solubility:

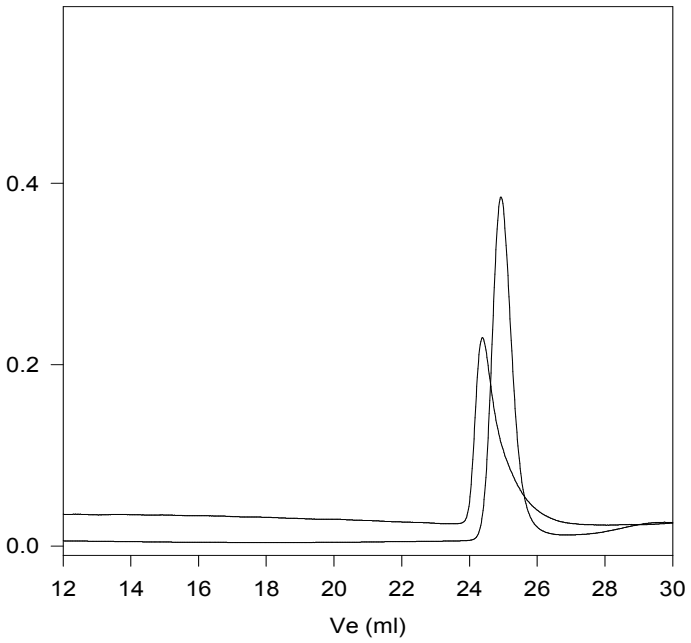
Poly(butadiene-b-ethylene oxide) is soluble in THF, $CHCl_3$, and toluene. The polymer has variable solubility in hexane, methanol, ethanol and water depending on its composition.

^{1}H NMR spectrum of the sample



SEC profile of the block copolymer

P4755-BdEO (PBd block rich in 1,2 addition)



Size exclusion chromatography of poly(butadiene-b-ethylene oxide):

—— 1,2 rich polybutadiene M_n=6000, M_w=6300, PI=1.05

—— Block Copolymer PBd(6000)-b-PEO(12000), PI=1.10
Composition from ^{H}NMR.

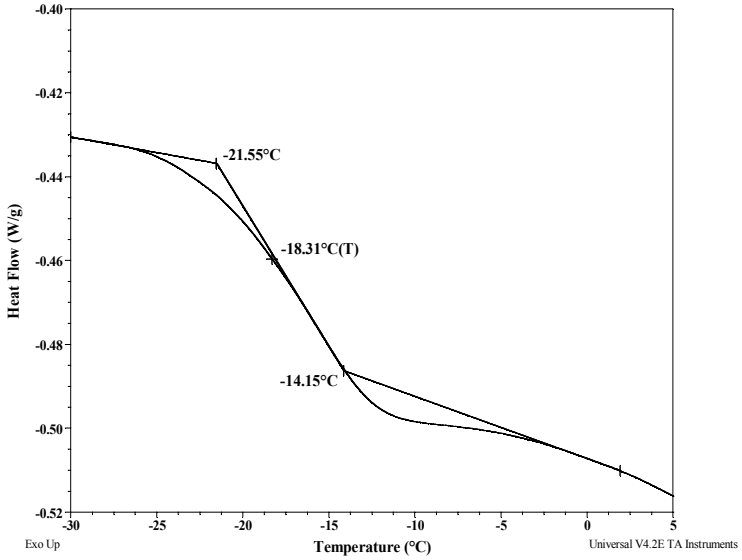
Thermal analysis of the sample P4755-BdEO

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).

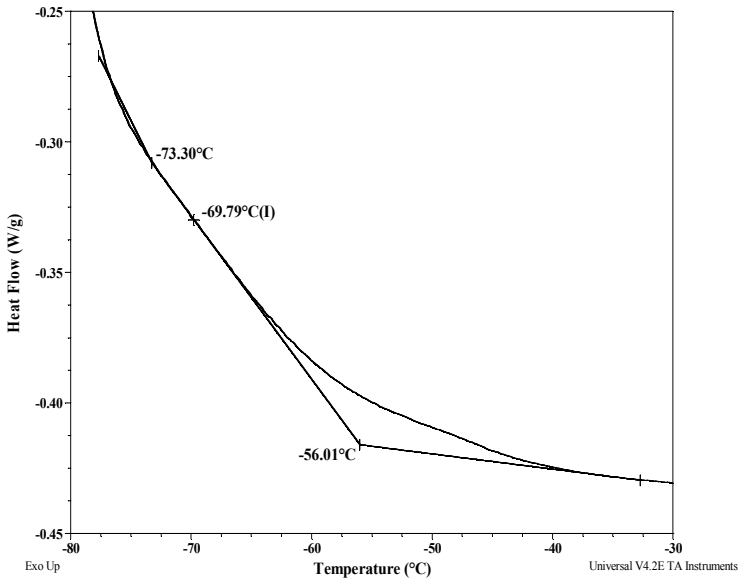
Thermal analysis results at a glance

For Bd block		
T_g: -18°C	T_m: -	T_c: -
For PEO block		
T_g: -67°C	T_m: 64°C	T_c: 43°C

Thermogram for PBd block:



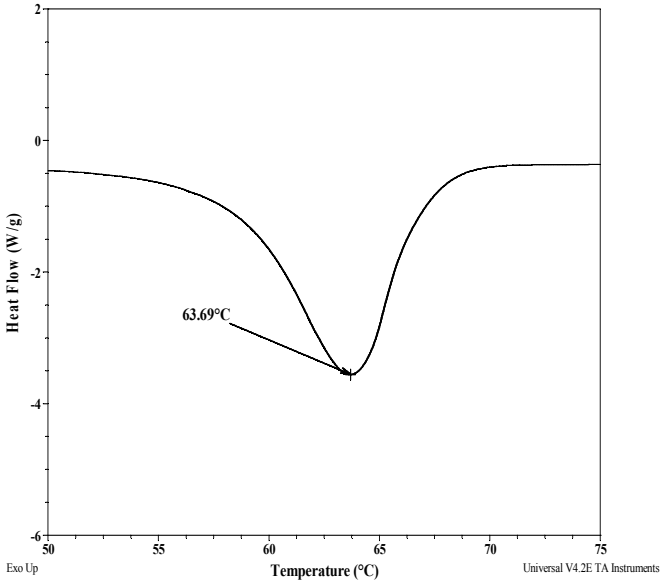
Thermogram for PEO block:



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.

Melting curve for PEO block:



Crystallization curve For PEO block