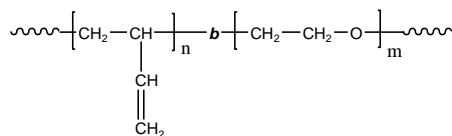


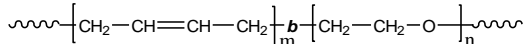
**Sample Name:** Poly(butadiene-b-ethylene oxide)  
*Poly butadiene rich in 1,2 or 1,4 microstructure*

**Sample #:** P5826-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 <sup>3</sup> Bd-b-EO	Mw/Mn (PDI)	% 1,2 addition Butadiene
2.4-b-0.6	1.10	89%

**Synthesis Procedure:**

Poly[butadiene(1,4 addition 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<sub>4</sub>** 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.

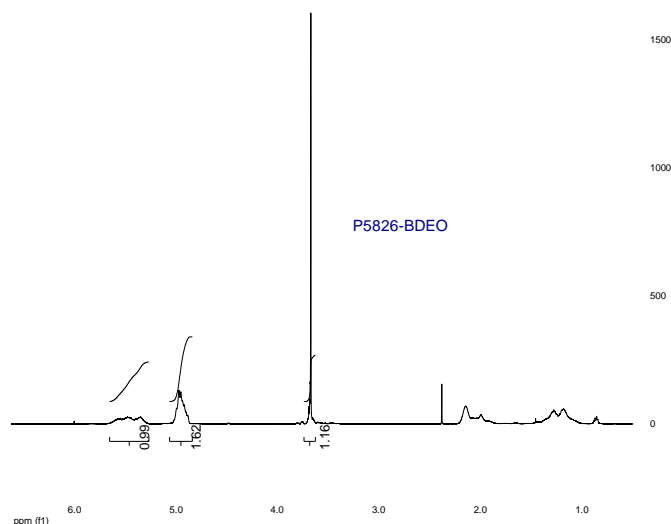
**Characterization:**

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 <sup>1</sup>H-NMR spectroscopy by comparing the peak area of 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 <sup>1</sup>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:**

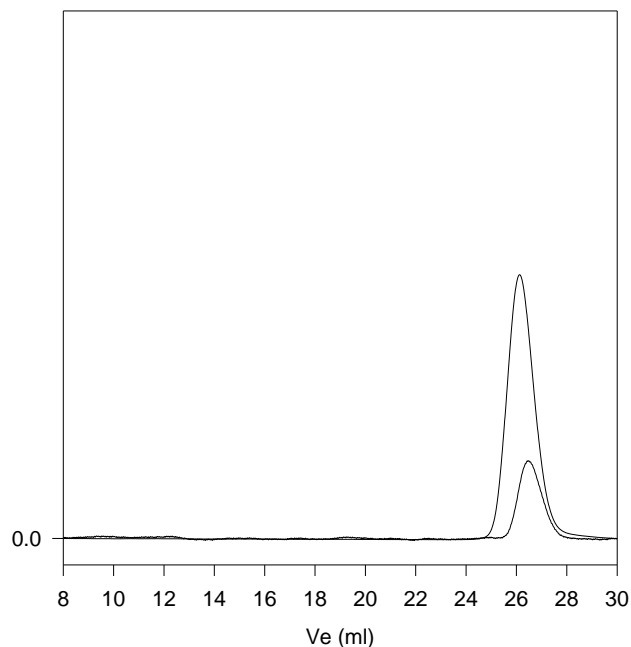
Poly(butadiene-b-ethylene oxide) is soluble in THF, CHCl<sub>3</sub>, and toluene. The polymer has variable solubility in hexane, methanol, ethanol and water depending on its composition.

<sup>1</sup>H NMR spectrum of the sample



SEC profile of the block copolymer

**P5826-BdEO**



Size Exclusion Chromatogram of Poly(butadiene-b-ethylene oxide)

- Polybutadiene: M<sub>n</sub>=2400, M<sub>w</sub>=2600, M<sub>w</sub>/M<sub>n</sub>=1.09
  - PBd-b-PEO: M<sub>n</sub> PBd(2400)-PEO(600), M<sub>w</sub>/M<sub>n</sub>=1.10
- The Mn of PEO is calculated from NMR results,  
The 1,2-addition of PBd block is 89%.

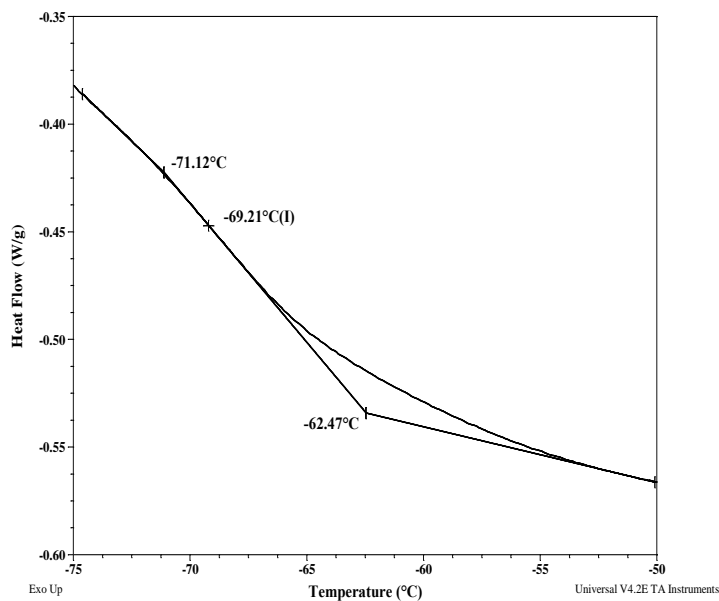
## Thermal analysis of the sample P5826-BdEO

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		
$T_g$ : Not distinct	$T_m$ : -	$T_c$ : -
For PEO block		
$T_g$ : -69°C	$T_m$ : 45°C	$T_c$ : 23°C

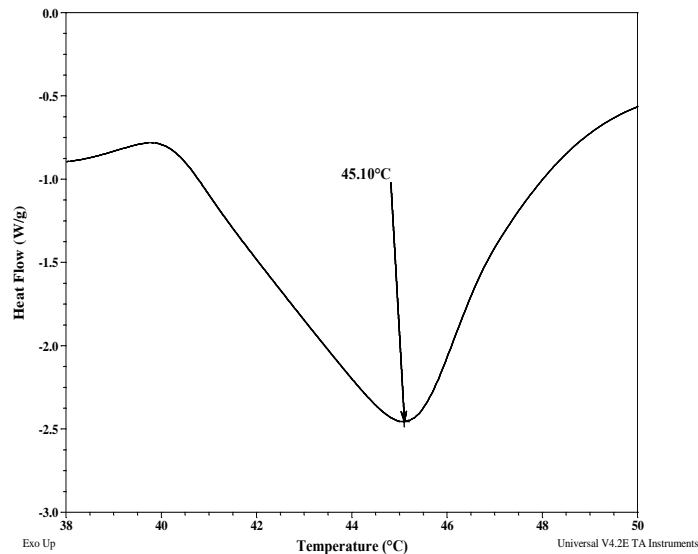
### Thermogram for PEO block:



### 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

