

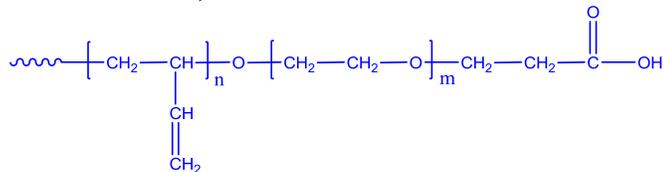
Sample Name: Carboxy Terminated Poly(butadiene-b-ethylene oxide)

Poly butadiene rich in 1,2 or 1,4 microstructure

Sample #: P9060-BdEOCOOH

(poly butadiene block rich in 1,2 microstructure)

Structure of 1,2-rich microstructure:



Composition:

Mn x 10 ³ Bd-b-EO	Mw/Mn (PDI)	% 1,2 addition Butadiene
2.5-b-0.6	1.09	85

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, 1994). The direct synthesis of diblock copolymer using lithium counter ion in the presence of **Phosphazene Base t-BuP₄** 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.

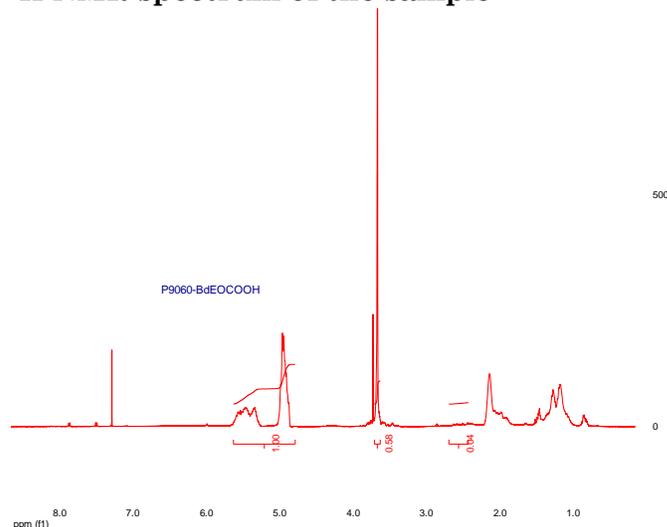
Characterization:

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 ¹H-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 ¹H-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:

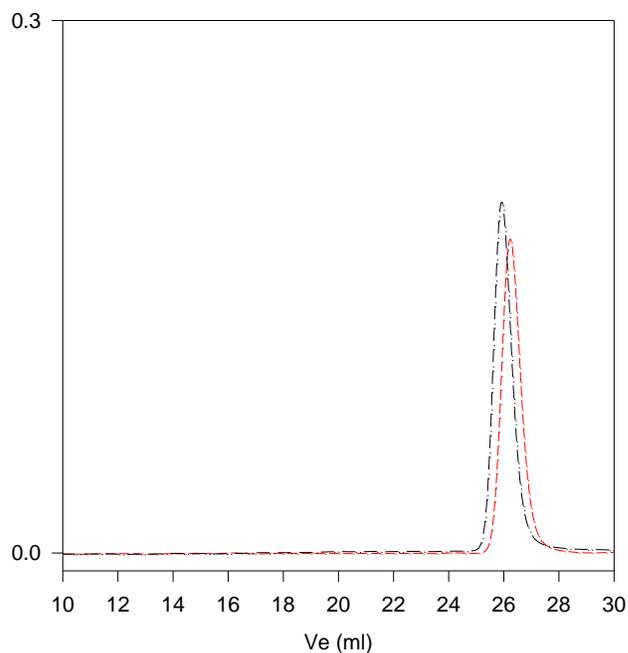
Poly(butadiene-b-ethylene oxide) is soluble in THF, CHCl₃, and toluene. The polymer has variable solubility in hexane, methanol, ethanol and water depending on its composition.

¹H NMR spectrum of the sample



SEC profile of the block copolymer

P9060-BdEOCOOH



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

- Polybutadiene: M_n=2500, M_w=2700, M_w/M_n=1.09
 - - - PBd-b-PEO: M_n PBd(2500)-PEO(600), M_w/M_n=1.09
- The M_n of PEO is calculated from NMR results,
The 1,2-addition of PBd block is 85%.

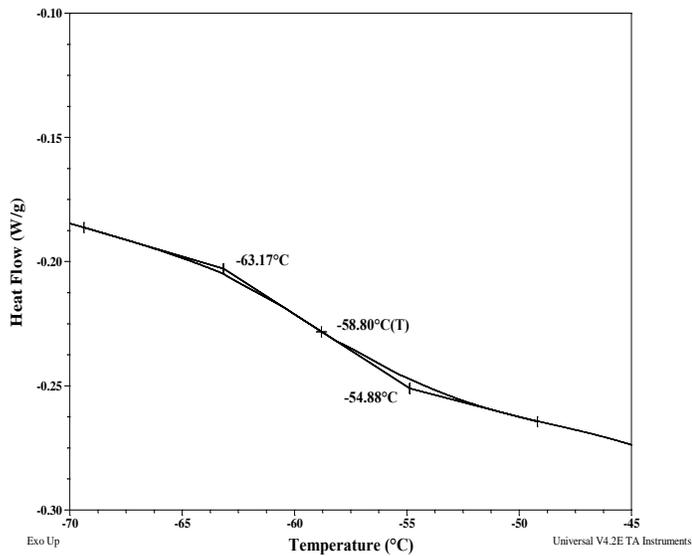
Thermal analysis for sample#9060-BdEOCOOH

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

Sample	T_m (°C)	T_c (°C)	T_g (°C)
Bd block	-	-	-39
EO block	-	-	-59

Glass transition for EO block:



Glass transition for Bd block:

