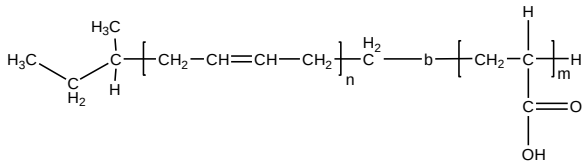
Sample Name: **Poly(Butadiene -b- acrylic acid)**

Sample #: **P41815A-BdAA (rich in 1, 4 addition)**

Structure:



Composition:

Mn x 10^3 PBd-b-PAA	PDI
4.5-b-4.5	1.07

Synthesis Procedure:

Poly(1,4-butadiene -b- acrylic acid) is prepared by living anionic polymerization with sequence addition of butadiene followed by t-butyl acrylate and hydrolysis of the t-butyl group. The solvents for the polymerization selected to get the polybutadiene with microstructure rich in 1,4 addition or 1,2 addition.

Characterization:

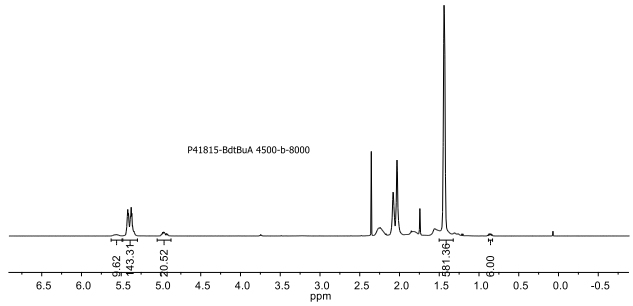
An aliquot of the anionic poly(butadiene) block was terminated before addition of t-butyl acrylate and analyzed by size exclusion chromatography (SEC) to obtain the molecular weight and polydispersity index (PDI). The final block copolymer composition was calculated from ^{1}H-NMR spectroscopy by comparing the peak area of the vinylic butadiene protons between about 5.0-5.4 ppm with the t-butyl acrylate protons at 1.43 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 present at 5.4 ppm.

Hydrolysis of the ester was followed by FTIR for the disappearance of ter-butyl ester at 1362cm-1.

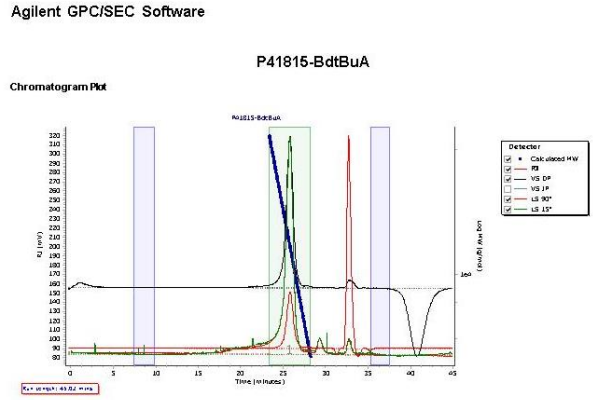
Purification of the polymer:

After the Hydrolysis the solvent was removed under vacuum and the obtained polymer was dissolved in THF and neutralized with NaHCO3 to get pH around 6. The product was filtered and the filtrate was treated for 2days with Mixed bed exchange resin, IONA NM - 60 H+/OH- form (16-50 mesh). The product was filtered and the clear solution was passed through a column packed with basic Al2O3. The Filtrate was concentrated under vacuum and dried at room temperature.

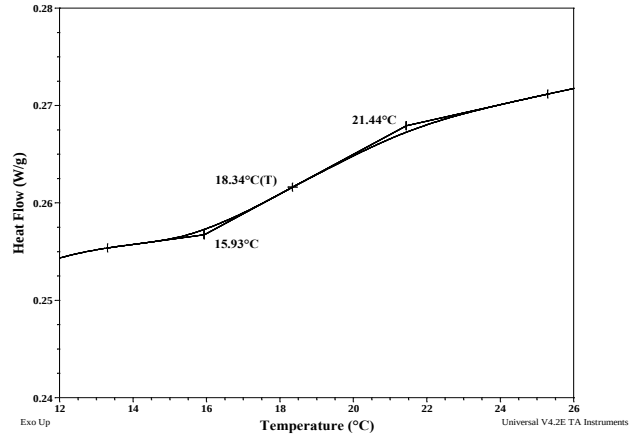
^{1}H-NMR Spectrum of the block copolymer: BdtBuA



SEC elugram of the Polymer:



Molecular Weight Averages

Peak	Mp (g/mol)	Mn (g/mol)	Mw (g/mol)	Mz (g/mol)	Mz+1 (g/mol)	Mv (g/mol)	PD
Peak 1	12967	12569	13413	14313	15444	14136	1.067

DSC thermogram for the sample: