

Sample Name:

Poly(methyl methacrylate-*co*(*random*)-*n*-butyl methacrylate)-*block*-poly(2-hydroxyethyl methacrylate)

Sample #: P11175A-MMA*n*BuMA*r*an-*b*-HEMA

Structure:



Composition:

$M_n \times 10^3$ (g/mol)	27.5- <i>b</i> -33.0
M_w/M_n	1.15
Molar ratio MMA : nBuMA	40 : 60 (mol/mol)
Weight ratio MMA:nBuMA:HEMA	15 : 31 : 54 (wt%)
T_g (MMA <i>n</i> BuMA)	63 °C
T_g (HEMA)	112 °C

Synthesis Procedure:

Poly([methyl methacrylate-*co*-*n*-butyl methacrylate]-*b*-2-hydroxyethyl methacrylate) block copolymer was synthesized by living anionic polymerization. First, methyl methacrylate (MMA) and *n*-butyl methacrylate (*n*-BuMA) were co-polymerized; and then 2-[trimethylsilyloxy]ethyl methacrylate (hydroxyprotected HEMA monomer) was added. The obtained block copolymer was precipitated in acidic methanol solution to deprotect the hydroxyl group.

Solubility: The polymer is soluble in THF, DMF.

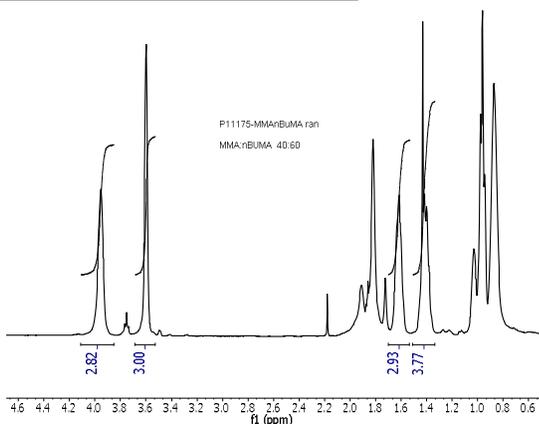
Characterization:

The polymer composition was determined by ^1H NMR. MMA:nBuMA molar ratio was calculated by comparing the integration of the $-\text{OCH}_2-$ protons of nBuMA (at $\delta = 3.9$ ppm) to the integration of methoxy group of MMA (at $\delta = 3.6$ ppm). Molecular weight of the second (HEMA) block was calculated by comparing the integration of $-\text{OCH}_2-$ protons of HEMATMS to the integration of methoxy group of MMA and using SEC data for the first (MMA*n*BuMA) block.

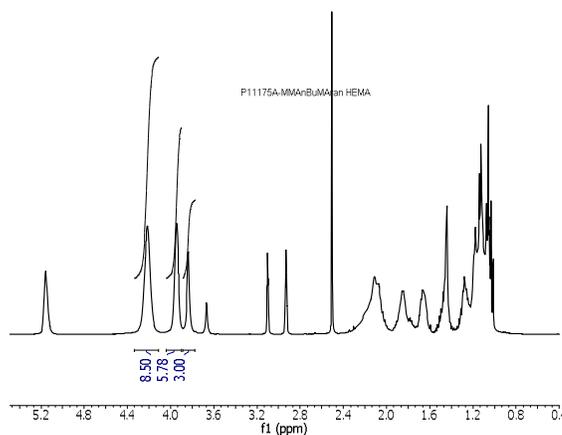
The average molecular weight and polydispersity index were determined by size exclusion chromatography (SEC). For SEC analysis, the MMA*n*BuMA-*b*-HEMA block copolymer can be treated with acetic anhydride in presence of pyridine to convert the hydroxy-groups to acetate groups.

Thermal analysis of the sample was done on a TA Q100 differential scanning calorimeter (DSC) at a heating rate of 10°C/min. The glass transition temperature (T_g) was determined as a midpoint of step change in heat flow curve for the second heating scan.

^1H NMR of MMA*n*BuMA*r*an [first block]:

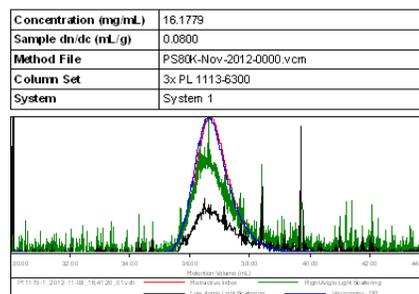


^1H NMR of MMA*n*BuMA*r*an-*b*-HEMA diblock copolymer:

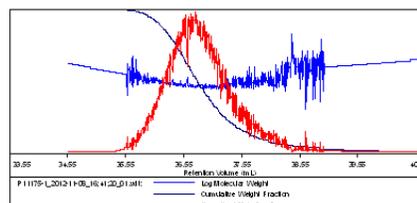


SEC of MMA*n*BuMA*r*an [first block]:

Sample ID: P11175-I-MMA*n*BuMA

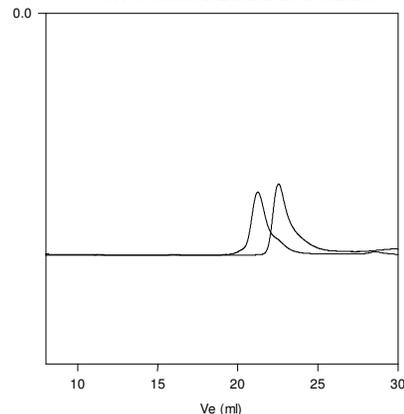


Sample	Mn (Da)	Mw (Da)	Mp (Da)	Mw/Mn	IV (dL/g)
P11175-I_2012-11-08_16.41;20_01.volt	27,673	29,963	24,241	1.083	0.1664



SEC of MMA*n*BuMA*r*an and MMA*n*BuMA*r*an-*b*-HEMATMS:

P11175A-MMA*n*BuMA*r*an-*b*-HEMA



Size exclusion chromatography of
1. MMA*n*BuMA ran block Mn 27,500 Mw/Mn 1.07
2. MMA*n*BuMA*r*an-*b*-HEMATMS: 27,600-51,300 MW/Mn : 1.15
After deprotection Mn 27,500-*b*-33,000 Mw/Mn 1.15