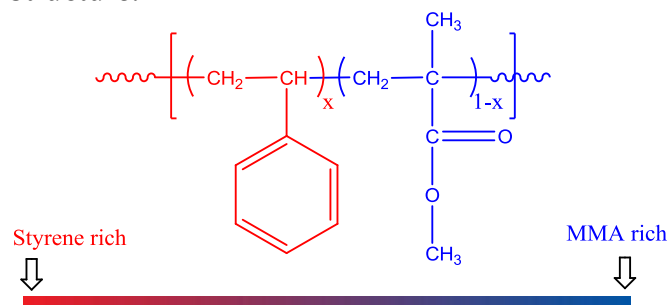


Sample Name:

Gradient Random Copolymer Poly(styrene-co-methyl methacrylate)

Sample #: P9160-SMMAgra

Structure:



Composition:

Mn x 10 ³ (Styrene wt%)	PDI
68.0 (32.0%)	4.2
40% St → 10% St	Overall 32.0% St

Synthesis Procedure:

Random Copolymer is prepared by ATRP of styrene, and methyl methacrylate with several times feeding monomer to adjust the gradient composition.

Characterization:

The polymer was analyzed by size exclusion chromatography (SEC) to obtain the molecular weight and polydispersity index (PDI). The copolymer composition was calculated from ¹H-NMR spectroscopy by comparing the peak area the aromatic protons of 6.66-7.05 ppm with the protons of ester of MMA at about 3.5-3.6 ppm. The gradient composition was checked by pick out samples during the polymerization.

Thermal analysis:

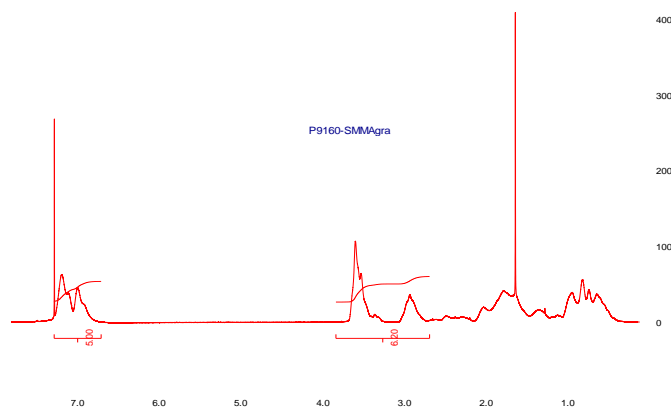
Thermal analysis of the samples was carried out on a TA Q100 differential scanning calorimeter at a heating rate of 10°C/min. The midpoint of the slope change of the heat flow plot of the second heating scan was considered as the glass transition temperature (T_g).

The glass transition temperature for the polymer was found to be 112°C.

Solubility:

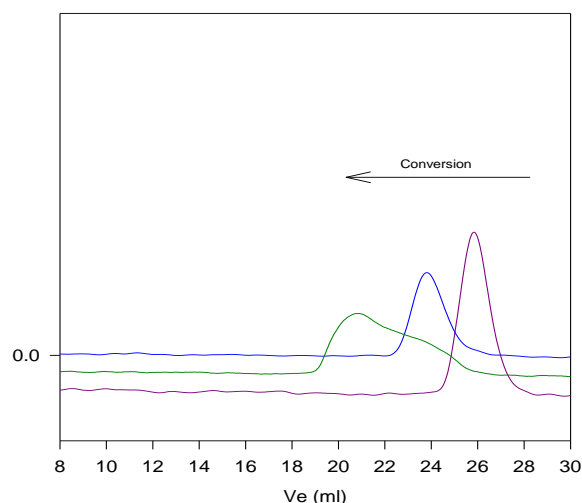
Random Copolymer Poly(styrene-co-MMA) is soluble in CHCl₃, THF, DMF at this composition and precipitated out from methanol.

Proton NMR of copolymer:



SEC of the random copolymer:

P9160-SMMAgra



Size Exclusion Chromatogram of gradient copolymer:

Pick-out sample 1: M_n = 5,800, M_w/M_n = 1.27, PS% ~40%

Pick-out sample 2: M_n = 23,300, M_w/M_n = 1.34, PS% ~35%

Final Product: M_n = 68,000, M_w/M_n = 4.2, PS% 32.0 wt%

DSC thermogram for the polymer:

