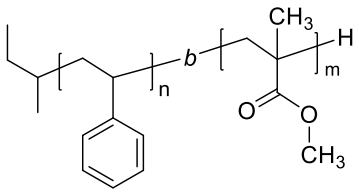
Sample Name:

Poly(styrene)-b-poly(methyl methacrylate), diblock copolymer

Sample ID #: **P42582-SMMA**

CAS registry number: 25034-86-0

Structure:



Composition:

$M_n \times 10^3$ (g/mol) [PS–*b*–PMMA]	M_w/M_n
19–*b*–47	1.01

Synthesis Procedure:

Poly(styrene–*b*–methyl methacrylate) was synthesized by living anionic polymerization in THF at -78°C using sec.BuLi initiator in the presence of LiCl. Polystyrene macroanions were end-capped with a unit of diphenyl ethylene (DPE) before adding methylmethacrylate (MMA) monomer. For more details, see ref. [1–4].

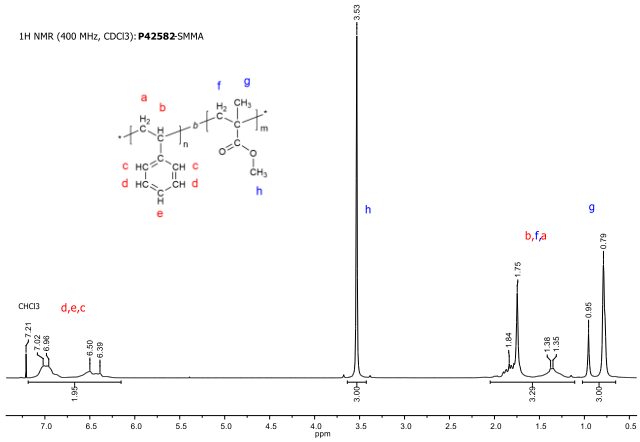
Characterization:

An aliquot of the anionic polystyrene block was terminated before addition of MMA and analyzed by size exclusion chromatography (SEC) to obtain the molecular weight of the first block. The final diblock copolymer composition was calculated by proton NMR spectroscopy by comparing the peak area of the poly(methyl methacrylate) protons -OCH_3 (3.6ppm) with aromatic protons of polystyrene (6.3–7.2 ppm), and using SEC data for the first block. Polydispersity index of the final product was determined by SEC.

References:

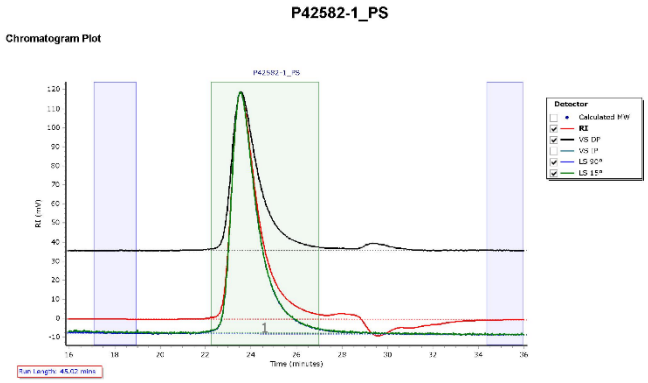
1. S. K. Varshney, R. Fayt, Ph. Teyssie, J.P. Hautekeer; US Patent 1993, 5, 264, 527.
2. Ph. Teyssie, Ph. Bayard, R. Jerome, S. K. Varshney, J. S. Wang; 35th IUPAC International Union of Pure and Applied Chemistry, International Symposium on Macromolecules, 1994, 67.
3. Ph. Teyssie, R. Fayt, J. P. Hautekeer, C. Jacobs, R. Jerome, L. Leemans, S. K. Varshney; Makromolekular Chemie, Macromol. Symp., 1990, 32, 61–73.
3. S. K. Varshney, J. P. Hautekeer, R. Fayt, R. Jerome, Ph.Teyssie; Macromolecules, 1990, 23, 2618–2622.

^{1}H NMR spectrum of the product in chloroform-d:



PS : PMMA ratio = 28 : 72 mol%; 29 : 71 wt%

SEC of PS first block in THF:



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	19424	19047	19070	19092	19114	19088	1.001

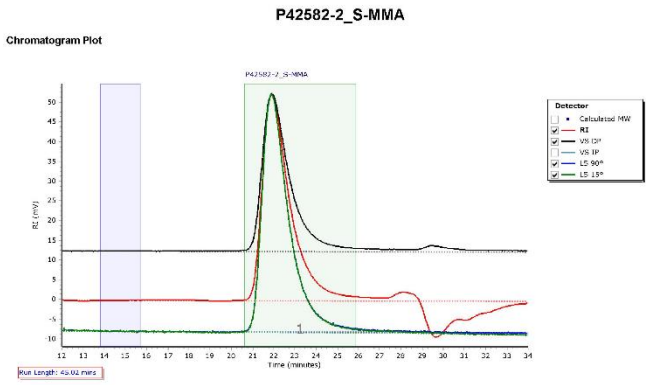
Peak	Mp (g/mol)	Mn (g/mol)	Mw (g/mol)	Mz (g/mol)	Mz+1 (g/mol)	Mv (g/mol)	PD
Peak 1	19287	19002	19015	19027	19039	19023	1.001

Processing Parameters

Entered dn/dc (mL/g) 0.185

Degree of polymerization: $D_p = 182_{[PS]}\text{-}468_{[PMMA]}$

SEC of PS-PMMA diblock copolymer in THF:



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	68965	67023	67200	67365	67521	67344	1.003

Peak	Mp (g/mol)	Mn (g/mol)	Mw (g/mol)	Mz (g/mol)	Mz+1 (g/mol)	Mv (g/mol)	PD
Peak 1	68441	66580	66760	66928	67087	66897	1.003

Processing Parameters

Entered dn/dc (mL/g) 0.113

dn/dc(PS in THF)=0.185; dn/dc(PMMA in THF)=0.084; dn/dc (average for S:MMA=0.29:0.71)=0.113