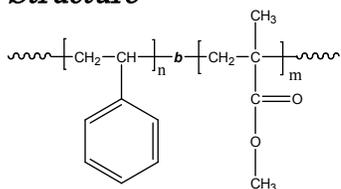


Sample Name: Poly(styrene-b-methyl methacrylate) Electronic Grade

Sample #: P9353P-SMMA

Structure:



Composition:

Mn x 10 ³ S-b-MMA	PDI
950.0-b-325.0	1.08
T _g for PS block: 107°C	T _g for PMMA block: 120 °C
Microstructure for PMMA block	Syndio:hetero:iso contents 75:15:10

Synthesis Procedure:

Poly(styrene-b-methyl methacrylate) is prepared 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 further details please see our published articles.¹⁻⁵

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 and polydispersity index (PDI). The final block copolymer composition was calculated from ¹H-NMR spectroscopy by comparing the peak area of the poly(methyl methacrylate) protons (eg. -OCH₃ at 3.6 ppm) with that of the aromatic protons of polystyrene at 6.3-7.2 ppm. Copolymer PDI is determined by SEC.

Thermal analysis of the samples was carried out using a differential scanning calorimeter (TA Q100) at a heating rate of 10°C/min. The inflection glass transition temperature (T_g) of the sample has been considered.

Solubility:

Poly(styrene-b-methyl methacrylate) is soluble in THF, toluene, dioxane and CHCl₃. This polymer readily precipitates from methanol, ethanol, hexanes and water.

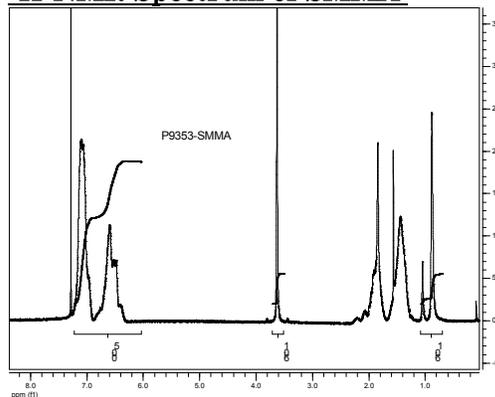
Purification

Purification of the obtained polymer was carried out rigorously as follows to ensure the removal of the catalyst side product:

1. Dissolved the polymer in CHCl₃ and wash with de-ionized distilled water to remove the any soluble organic catalyst side product.
2. Polymer extracted from water with chloroform.
3. Polymer solution in CHCl₃ was dried over anhydrous sodium sulfate.
4. Solution filtered and than passed through a column packed with basic Al₂O₃.
5. Solution concentrated on rota-evaporator
6. Solution precipitated in cold methanol and redissolved in dioxane and frez dried.

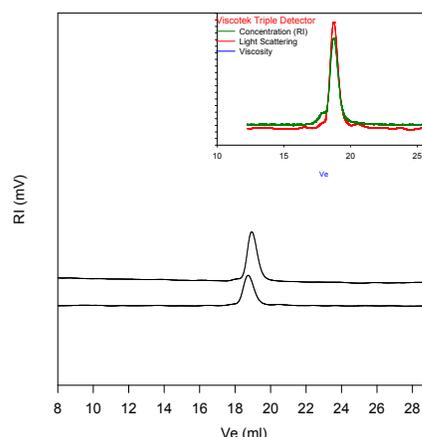
Final dried under vacuum for 48h at 50°C

¹H-NMR Spectrum of SMMA:



SEC of Sample SMMA:

P9353-SMMA

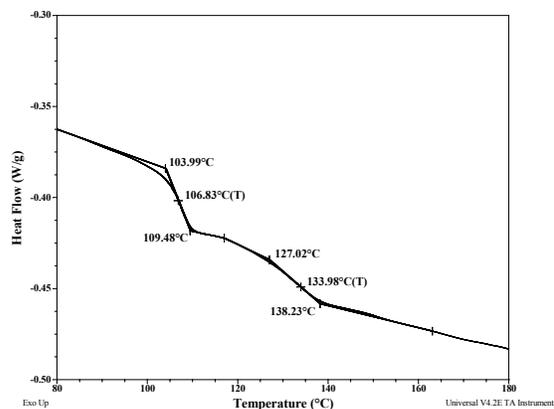


Size Exclusion Chromatography of Poly Styrene-b-MMA

— PS block M_n = 950,000, M_w = 1050,000, M_w/M_n = 1.10

Ps-b-MMA: Mn 950,000-b-325,000 PI: 1.08
Solution Viscosity in THF at 35 °C: 1.603dl/g
dn/dcin THF at 35 °C: 0.110 ml/g RgW: 46.34 nm

Thermogram of the sample



References for further information:

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