

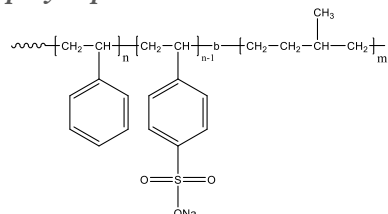
Sample Name: Poly (styrene-co-4-styrene sulfonic acid sodium salt)-b-poly (ethylene propylene)

Polymer obtained by the hydrogenation of
(Poly (styrene -b- isoprene rich in 1,4-addition) and its sulfonation on Polystyrene fraction

Sample #: P41837D-SSO3NaMB

Structure:

1,4-rich microstructure for hydrogenated polyisoprene block:



Composition:

| | |
|-------------------------------------|-------------|
| Mn x 10 ³ SSO3Na-b-MB | Mw/Mn (PDI) |
| 14.0-b-10.5 | 1.08 |
| % of sulfonation | 20% |

Synthesis Procedure:

Poly(styrene-b-isoprene) is prepared by living anionic polymerization in non-polar solvent with sequence addition of styrene followed by isoprene and catalytic hydrogenation, followed by sulfonation.

Characterization:

The product was characterized by size exclusion chromatography (SEC) and ¹H NMR.

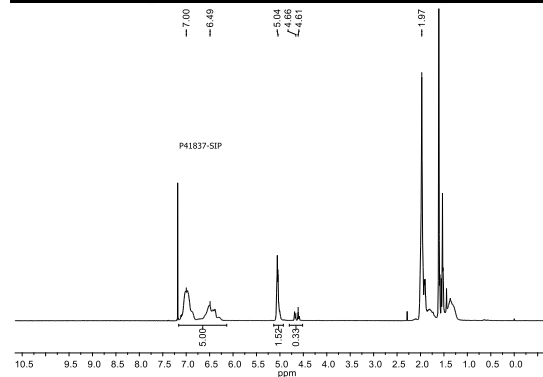
Sample: P41837-A

| Analysis | Method | Result | Basis | Sample Amount Used |
|--------------|---------------------|---------|-------------|--------------------|
| C : Carbon | GLI Procedure ME-14 | 76.01 % | As Received | 1.101 mg |
| H : Hydrogen | GLI Procedure ME-14 | 8.50 % | As Received | 3.765 mg |
| O : Oxygen | GLI Procedure E8-4 | 11.64 % | As Received | 1.881 mg |
| S : Sulfur | GLI Procedure E16-3 | 3.65 % | As Received | 45.657 mg |

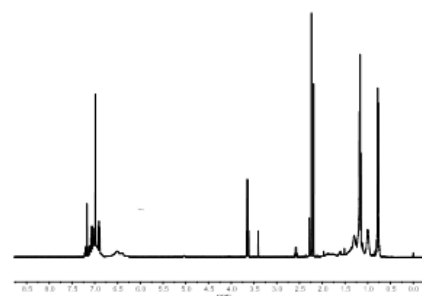
Solubility:

Poly (SSO3H-b-hydrogenated isoprene) is soluble in THF.

¹H-NMR Spectrum of the block copolymer

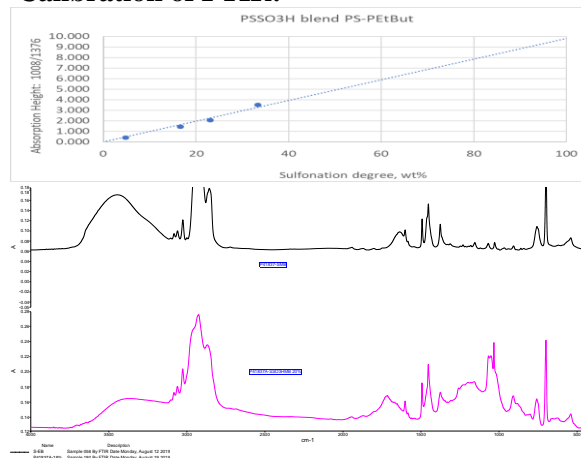


¹H-NMR of Poly (styrene-b-isoprene) after Hydrogenation:



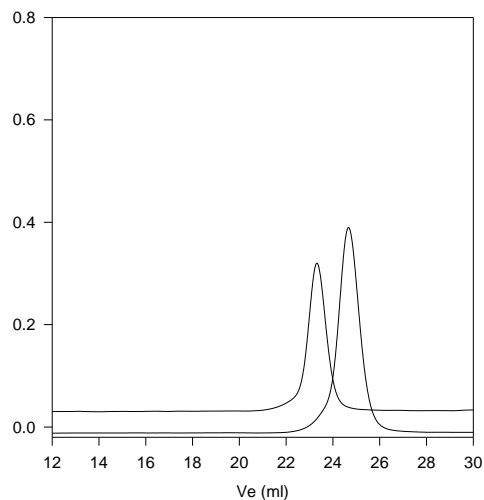
FTIR of the SSO3H-MB

Calibration of FTIR:



SEC elugram of the block copolymer:

P41837-SIP

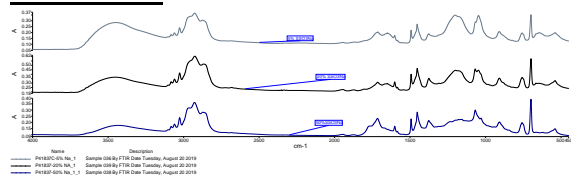


Size exclusion chromatography of polystyrene-b-polyisoprene_{1,4} addition

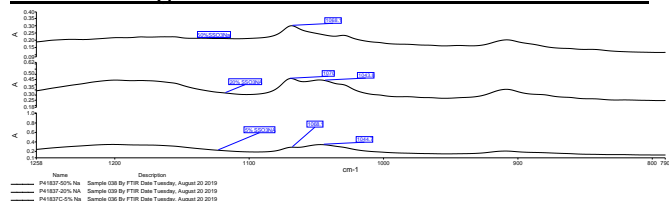
— Polystyrene, $M_n=11,500$, $M_w=12,500$ $PI=1.09$

— Block Copolymer:
PS-IP(11,500)-b-PI(10,500), $PI=1.08$ (by H NMR)

FTIR of PSSO₃Na-b-MB at different level of sodium salt:



Characteristics of FTIR absorbances changes with different degree of sulfonation in their sodium salt:



In FTIR there is difference of for different level of sulfonation in the region from 1100cm⁻¹ to 1000 cm⁻¹.

At 5% Sulfonation level 1044cm⁻¹ the height is higher than at 1068cm⁻¹

At 20% sulfonation level the 1068cm⁻¹ height is higher than 1044cm⁻¹

At 50% sulfonation level 1068 cm⁻¹ is prominent and 1044 completely disappear or weak