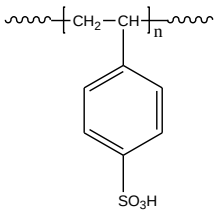
Sample Name: **Poly(4-styrene sulfonic acid)**

Synonym: **Poly(styrene sulfonic acid)**

Sample #: **P8002-SSO3H** (dialyzed)

Structure:

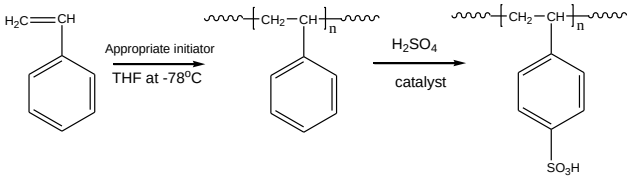


Composition:

Mn x 10^3	PDI
39.0	1.03
C;H;S	36.33;5.57;13.21
Degree of sulfonation	>90%

Synthesis Procedure:

Poly (styrene sulfonic acid) is obtained from the sulfonation of polystyrene that was prepared obtained by anionic living polymerization. The reaction scheme is illustrated below:



Characterization:

The molecular distribution of the obtained polystyrene sulfonic acid remains same as of the parent polymer. Furthermore the HNMR and FTIR spectroscopy of the polymer shows the sulfonation is predominately at par position of phenyl group.

Size exclusion chromatography (SEC) was carried out on a Varian liquid chromatograph equiped with a refractive detector. For the precursor polystyrene, two columns from Supelco (G4000-2000 HXL) were used with THF as the eluent. The columns were calibrated with monodisperse polystyrene standards. The molecular weight and the polydispersity indice were calculated. For polystyrene sulfonic acid, a column from Supelco (G5000 PWXL) was used with 0.1 $NaNO_3$ /water as the eluent.

The degree of sulfonation was determined by acid/base titration and by elemental analysis.

Solubility:

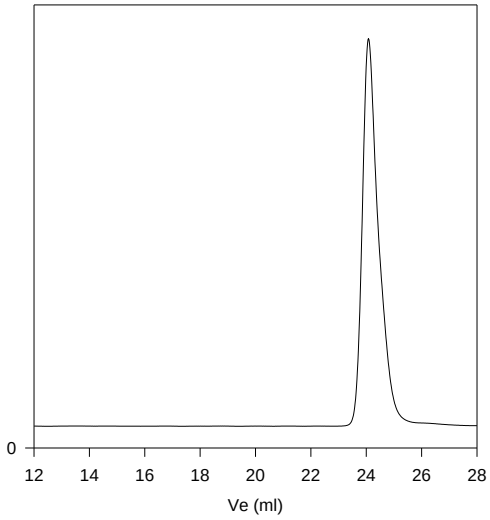
Poly(styrene sulfonic acid) is soluble in methanol, water and precipitated out from the hexane, THF, toluene.

Dialysis of the Polymer:

Dialysis was carried out in a membrane (from spectrum Co). The solution was prepared in H2O (distilled Millipore) and filtered after the dialysis is completed. Normally it was carried out for 3 days. The obtained polymer was freeze dried in water.

SEC of Homopolymer:

Poly styrene used for the P8002SSO3H



Size exclusion chromatograph of polystyrene:

M_n=22000 M_w=22500, PI=1.03

solution Viscosity in THF at 30 oC: 0.199dl/g and radius of gyration: 5.42 nm obtained by Viscoteck detectors

After sulfonation: Mn 39000 Mw/Mn 1.03

After Sodium salt formation Mn: 43,000

degree of sulfonation > 90%

NMR spectrum of the Sample: