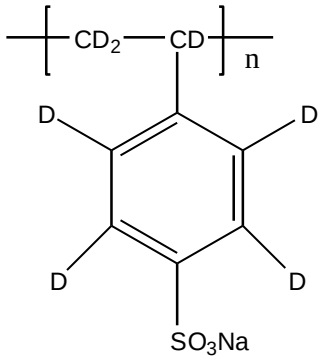
Sample Name:

# Deuterated Poly (styrene sulfonic acid soduim salt)

Sample #: **P9768-dPSSO3Na**

**Structure:**

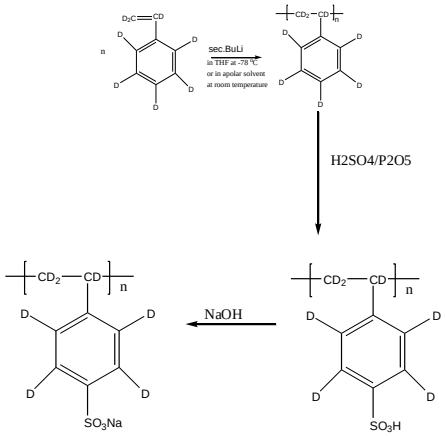



**Composition:**

| Mn x $10^3$ | PDI |
|---|---|
| 63.0 | 1.04 |
| C:H:S<br>By elemental analysis | 39.68:5.43:13.11 |
| Degree of sulfonation | >97% |

**Synthesis Procedure:**

Deuterated polystyrene-$d_8$ is obtained by living anionic polymerization of styrene-$d_8$. The obtained polymer was sulfonated in the presence of H2SO4/P2O5. The polymerization scheme and the sulfonation can be illustrated as below.




**Characterization:**

Size exclusion chromatography (SEC) was carried out on a Varian liquid chromatograph equipped 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:**

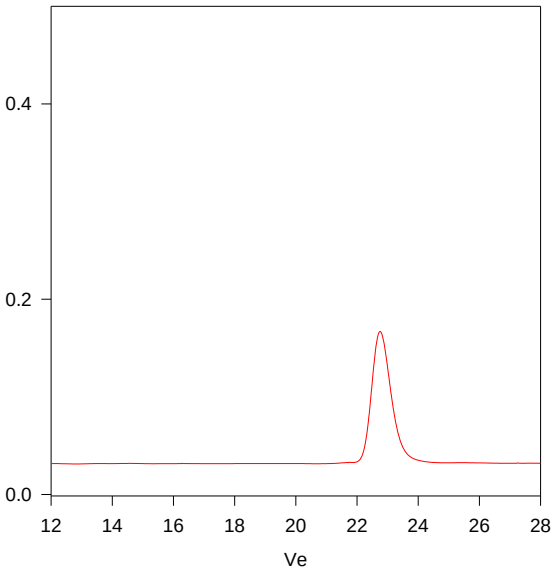
Deuterated polystyrene-(d7)sulfonic acid is soluble in water, methanol and ethanol. It precipitates from hexane, toluene, THF.

**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: (starting polystyrene)**

**P9768-dPS used for sulfonation**




Size Exclusion Chromatography of deuterated (d8) Polystyrene:

$M_n$= 33,000, $M_w$= 34,300, PI=1.04

After sulfonation and its Sodium salt ; Mn; 63,000 Mw/mn 1.04 degree of sulfonation <97%