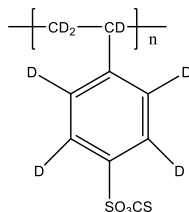


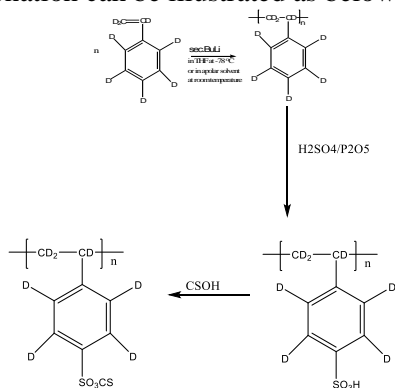
**Sample Name:****Deuterated Poly(styrene sulfonic acid-d7, cesium salt)****Sample #: P2323-dPSSO3Cs****Structure:****Composition:**

Mn x 10 <sup>3</sup>	PDI
10.0	1.05

C:H:S (By elemental analysis)  
39.68:5.43:11.01

**Synthesis Procedure:**

Deuterated polystyrene-d<sub>8</sub> is obtained by living anionic polymerization of styrene-d<sub>8</sub>. The obtained polymer was sulfonated in the presence of H<sub>2</sub>SO<sub>4</sub>/P<sub>2</sub>O<sub>5</sub>. 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 index were calculated. For polystyrene sulfonic acid, a column from Supelco (G5000 PWXL) was used with 0.1 NaNO<sub>3</sub>/water as the eluent.

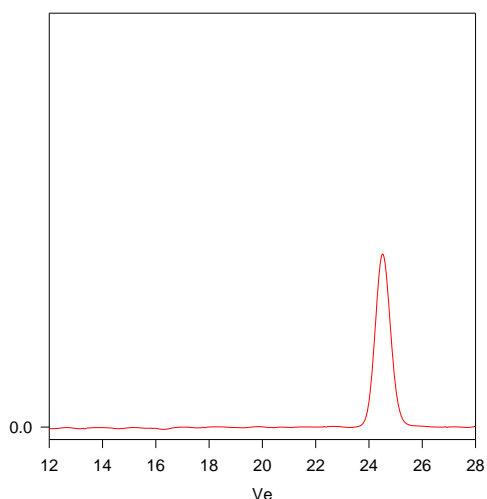
The degree of sulfonation was determined by acid/base titration and by elemental analysis.

**Solubility:**

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

**Dialysis of the Polymer:**

Dialysis was carried out in a membrane (from spectrum Co). The solution was prepared in H<sub>2</sub>O (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 profile of Homopolymer: (starting polystyrene)****P2323-dPS Precursor for P2323-dPSSO3Cs**

Size Exclusion Chromatography of deuterated (d8) Polystyrene:

M<sub>n</sub> = 3490, M<sub>w</sub> = 3660, PI=1.05 After Converting to PdPSSO3H: Mn 6,000  
Mn of dPSS3CS salt : Mn 10,000