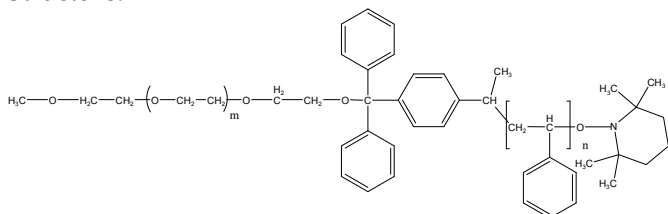


**Sample Name:** Poly(styrene-b-ethylene oxide)Cleavage

**Sample #:** P8790-SEOCleavable

**Structure:**



**Composition:**

|                                |      |
|--------------------------------|------|
| Mn x 10 <sup>3</sup><br>S-b-EO | PDI  |
| 65.0-b-14.0                    | 1.07 |

#### Synthesis Procedure:

1. Synthesis of poly(styrene-block-ethylene oxide) copolymers by anionic polymerization and acid cleavage into its constituent homopolymers for the formation of ordered nanoporous thin films: e-polymer, 2008, 094, 1618

*The process is ready for publication.*

#### Characterization:

The molecular weight and polydispersity index (PDI) of the block copolymer are characterized by size exclusion chromatography (SEC). The composition of the block copolymer was calculated from <sup>1</sup>H-NMR by comparing the peak area of the phenyl polystyrene protons between 6.4 to 7.2 ppm and the ethylene oxide protons at 3.65 ppm.

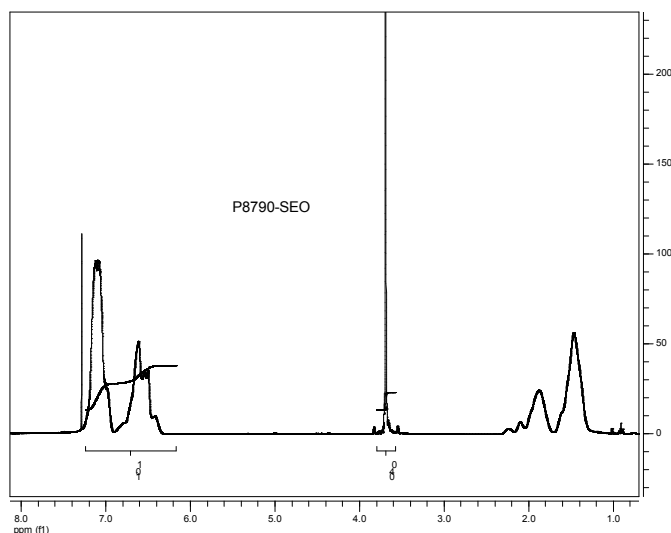
#### Solubility:

The polymer is soluble in THF (at 35 °C), CHCl<sub>3</sub>, benzene, toluene, dioxane. Low molecular weight SEO with high contents of the polyethylene oxide block can also be solubilized in methanol and water.

#### Quick test for the presence of cleavage group at the junction:

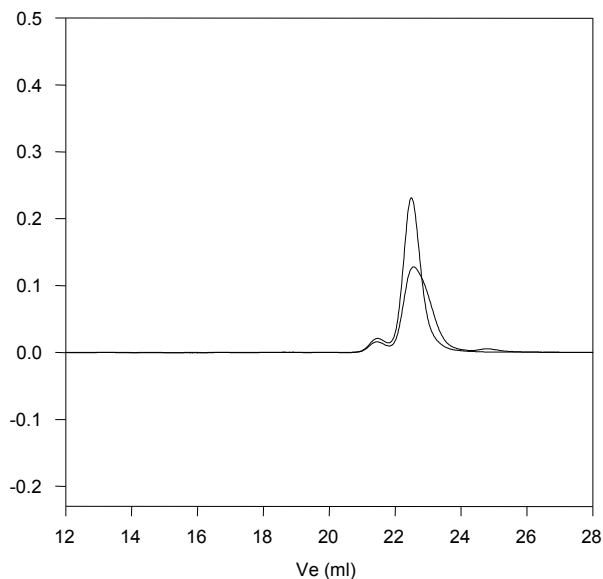
Prepare the solution of polymer in toluene (10mg in 1 ml of toluene) and add a drop of trifluoroacetic acid. Immediately the color turns yellow. This indicates the formation of phenyl moiety charge with cation (Phenyl-C<sup>+</sup>) with the liberation of PEO block. This test rapidly confirms the cleavage of PEO block from the polystyrene block at the junction.

#### <sup>1</sup>H NMR of the polymer:



#### SEC profile of the block copolymer

##### P8790-SEOCleavable



Size exclusion chromatography of poly(St-b-EO) cleavage polymer

- PS, M<sub>n</sub>=65000, M<sub>w</sub>=70,800, Mw/Mn=1.09
- Poly(S-b-EO): PS(65,000)-b-EO(14,000) Mw/Mn=1.07

## Thermal analysis of P8790-SEOCleavable

Thermal analysis of the samples was carried out on a TA Q100 differential scanning calorimeter at a heating rate of 20°C/min. The midpoint of the slope change of the heat flow plot of the second heating scan was considered as the glass transition temperature ( $T_g$ ).

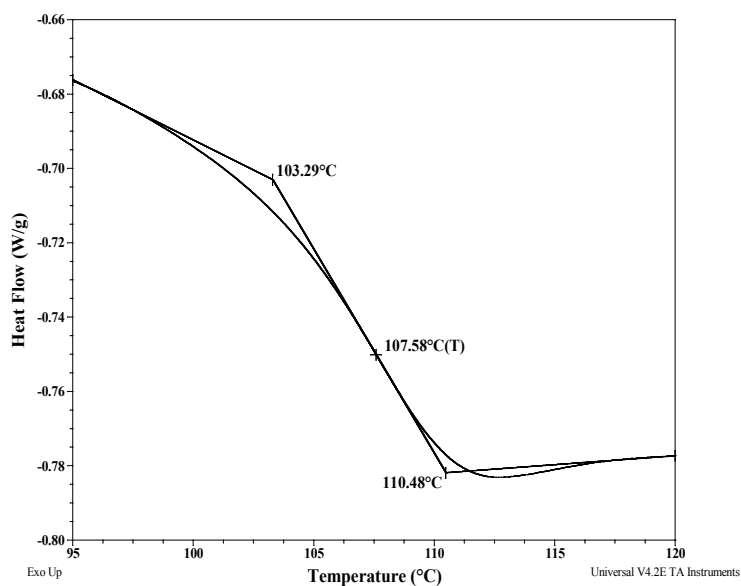
### Melting and crystallization curve for the sample

The melting temperature ( $T_m$ ) was taken as the maximum of the endothermic peak where as the crystallization temperature ( $T_c$ ) was considered as the minimum of the exothermic peak.

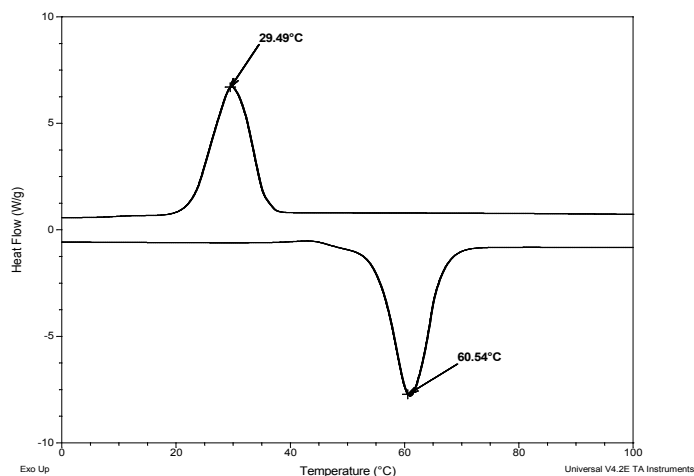
### Thermal analysis results at a glance

| Sample       | $T_m$ (°C) | $T_c$ (°C) | $T_g$ (°C)                  |
|--------------|------------|------------|-----------------------------|
| EO           | 61         | 29         | -65                         |
| PS           | -          | -          | 95                          |
| SEO cleavage | 58         | 12         | PS: 108<br>EO: Not distinct |

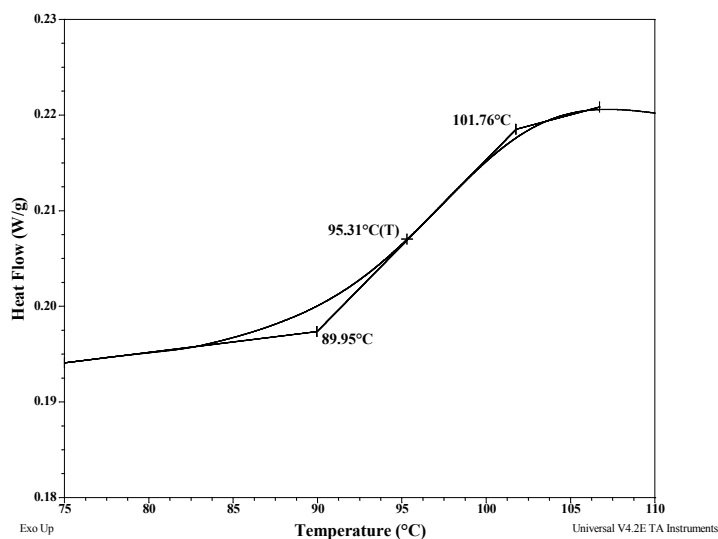
### Thermogram for the PS block



## Thermogram of poly (ethylene glycol) methyl ether (Mn≈5000)



## Thermogram of polystyrene (Mn≈20800)



## Thermogram for SEO cleavage sample #P8790

