

Sample Name:

Poly(ethylene glycol) monoethyl ether or Poly ethylene oxide

Sample #: P3860-EGOC2H5

Structure:

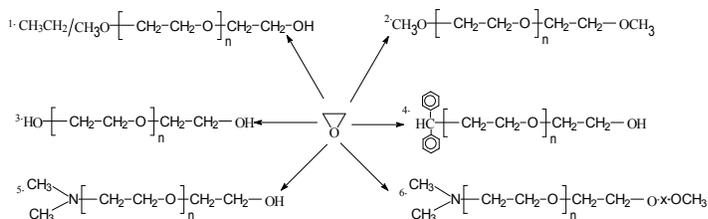


Composition:

Mn x 10 ³	PDI
19.3	1.06

Synthesis Procedure:

Poly (ethylene glycol) (methyl ether/ethy ether or dimiethyl ether) is obtained by living anionic polymerization and the reaction. Scheme of the polymerization is illustrated below:



Initiator System	Resulting Polymer
1) CH ₃ OCH ₂ CH(CH ₃)OK	polyethylene glycol methyl ether
2) CH ₃ OCH ₂ CH(CH ₃)OK	α, ω-term. methyl ether polyethylene glycol
3) KOCH ₂ CH ₂ OK	polyethylene glycol
4) CH(C ₅ H ₅) ₂ CK	polyethylene glycol diphenyl ether
5) (CH ₃) ₂ N-CH ₂ CH ₂ OK	methyl amino terminated PEG
6) (CH ₃) ₂ N-CH ₂ CH ₂ OK	α-methyl amino ω-methyl ether term. PEG

Characterization:

By Size exclusion chromatography (SEC): Varian liquid chromatograph equipped with UV and refractive detector. SEC columns from Supelco were used with THF containing 2 vol% (Et)₃N as the eluent. The molecular weights were determined using light scattering detector and viscosity detector. The molecular weights and the polydispersity indice were calculated.

An aqueous GPC column from Supelco(G5000 PWXL) was also used with 0.5 M acetic acid and 0.8 M NaNO₃ as the eluent. It was kept at a constant temperature of 50°C. The flow rate was 1.0 ml/min. The column was calibrated with monodisperse poly(ethylene oxide) standards. The molecular weights and the polydispersity index of polyethylene oxide were calculated by using a Visual Basic GPC software.

Purification of the obtained polymer:

Purification of the obtained polymer was carried out rigorously as follows to ensure the removal of the catalyst side product:

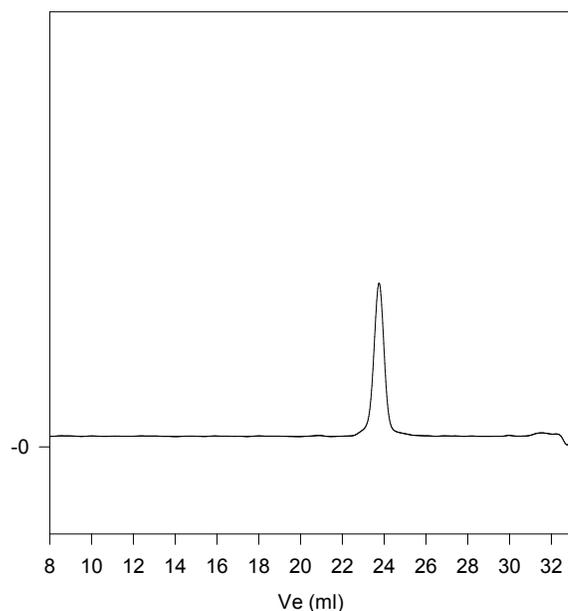
1. Dissolved the polymer in de-ionized distilled water to remove the any insoluble organic catalyst side product.
2. Polymer extracted from water with dichloromethane.
3. Polymer solution in dichloromethane was dried over anhydrous sodium sulfate.
4. Solution filtered and than passed through a column packed with basic Al₂O₃.
5. Solution concentrated on rota-evaporator
6. Solution precipitated in cold diethyl ether.
7. Dried under vacuum for 48h at 38 oC.

Solubility:

Poly(ethyl glycol) is soluble in toluene, THF, water and CHCl₃. The polymer is insoluble in hexane, ether, cold isopropanol and ethanol.

SEC of Sample of the polymer

P3860-EGOC2H5



Size Exclusion Chromatography of Ethoxy poethylene glycol)

— Mn: 19300 Mw: 20600 Mw/Mn = 1.06
Solution viscosity in THF at 30 oC: 0.375 dl/g
Radius of Gyration: 6.45 nm