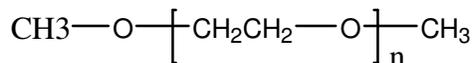


Sample Name:

**Poly(ethylene glycol) di methyl ether or
Poly ethylene oxide**

Sample #: P5401-EG2OCH₃

Structure:

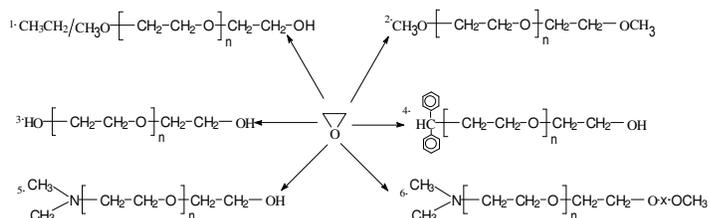


Composition:

$M_n \times 10^3$	PDI
14.0	1.07

Synthesis Procedure:

Poly (ethylene glycol) 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	□, □ -term. methyl ether polyethylene glycol
3) KOCH ₂ CH ₂ OK	polyethylene glycol
4) CH(C ₆ 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	□ -methyl amino □ -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:

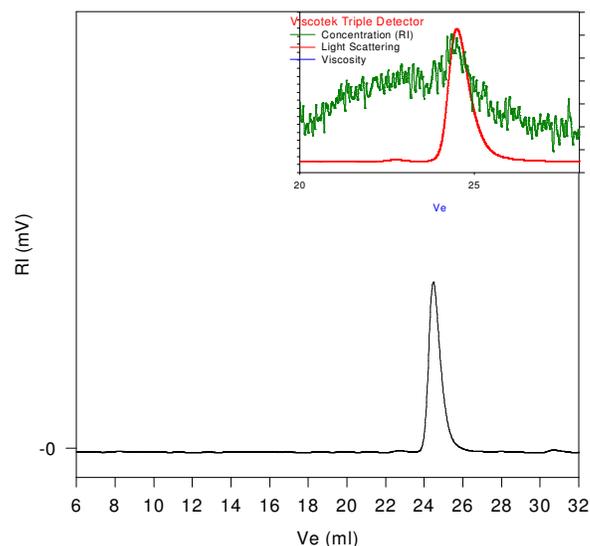
1. Dissolved the polymer in de-ionized distilled water to remove the any insoluble organic catalyst side product.
2. Polymer extracted from water with dichloromethane.
3. Polymer solution in dichloromethane was dried over anhydrous sodium sulfate.
4. Solution filtered and than passed through a column 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 the polymer:

P5401-EG2OCH₃



Size Exclusion Chromatography of poly(ethylene glycol)dimethyl ether:
Poly (ethylene Oxide);

— $M_n = 14,000$, $M_w = 15,000$, $M_w/M_n = 1.07$
Solution Viscosity: in THF at 35 oC: 0.284dl/g
RGw: in THF at 35 oC: 5.31nm
 dn/dc in THF at 35 oC: 0.064ml/g

***Thermal data on the next page**

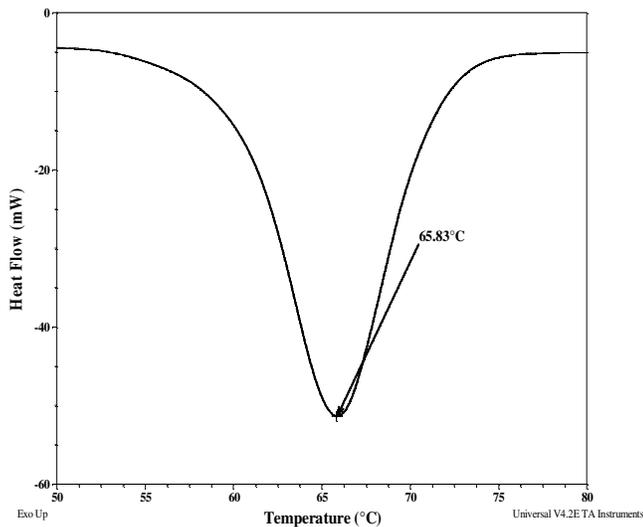
Thermal analysis of the sample# P5401-EG2OCH₃

Thermal analysis of the samples was carried out on a TA Q100 differential scanning calorimeter at a heating rate of 10°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 whereas the crystallization temperature (T_c) was considered as the minimum of the exothermic peak.

Melting curve for the sample:



Thermal analysis results at a glance

Sample	T_m (°C)	T_c (°C)	T_g (°C)
PEO	66	40	Not distinct

Crystallization curve for the sample:

