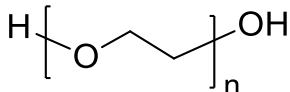


Sample name: **Poly(ethylene glycol)**

Other names: **Poly(ethylene oxide), PEG, PEO**

Sample # **P8017-EG2OH**

Structure:

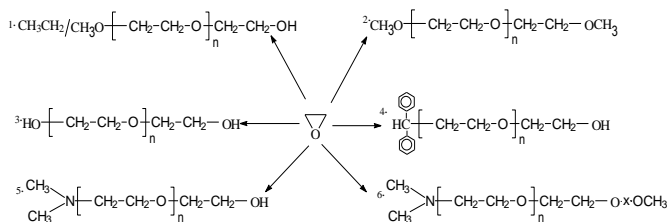


Composition:

$M_n \times 10^3$ (g/mol)	PDI
10	1.01

Synthesis Procedure:

Poly(ethylene glycol) was obtained by living anionic polymerization. The scheme of the reaction is presented below:



Initiator System	Obtained Polymer
1) $\text{CH}_3\text{OCH}_2\text{CH}(\text{CH}_3)\text{OK}$	polyethylene glycol methyl ether
2) $\text{CH}_3\text{OCH}_2\text{CH}(\text{CH}_3)\text{OK}$	α , ω -term. methyl ether polyethylene glycol
3) $\text{KOCH}_2\text{CH}_2\text{OK}$	polyethylene glycol
4) $\text{CH}(\text{C}_6\text{H}_5)_2\text{CK}$	polyethylene glycol diphenyl ether
5) $(\text{CH}_3)_2\text{N-CH}_2\text{CH}_2\text{OK}$	methyl amino terminated PEG
6) $(\text{CH}_3)_2\text{N-CH}_2\text{CH}_2\text{OK}$	α -methyl amino ω -methyl ether term. PEG

Purification of the PEG polymer:

The obtained polymer was rigorously purified to ensure the removal of the catalyst and side products:

1. The polymer was dissolved in de-ionized distilled water to remove any insoluble organic catalyst and/or side products.
2. Polymer was extracted from water with dichloromethane.
3. Polymer solution in dichloromethane was dried over anhydrous sodium sulfate.
4. The solution was filtered and passed through a column packed with basic Al_2O_3 .
5. The solution was concentrated on rota-evaporator, followed by precipitation into cold diethyl ether.
6. The product was dried under vacuum for 48 h at 38°C .

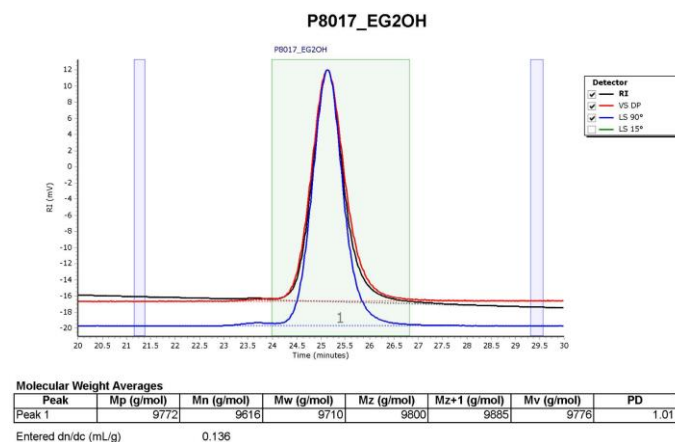
Solubility:

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

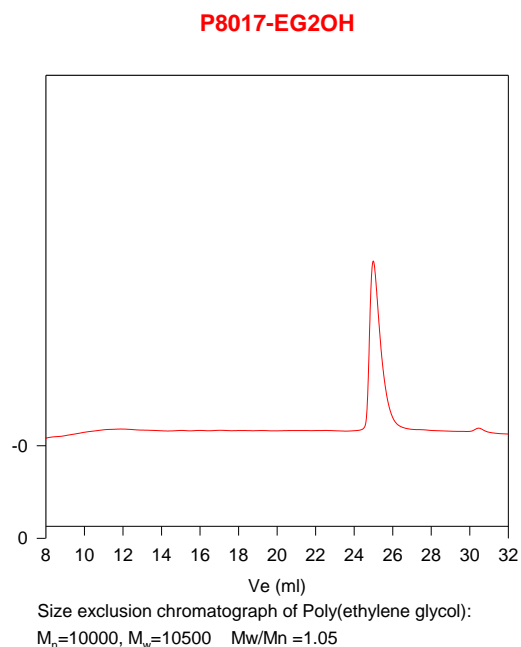
Characterization:

The molecular weight and polydispersity index were obtained by size exclusion chromatography (SEC) performed on [1] Varian liquid chromatograph equipped with UV and refractive detector, SEC columns from Supelco, and using THF containing 2 vol% $(\text{Et})_3\text{N}$ as the eluent; and/or on [2] Agilent 1260 Infinity II multi-detector GPC/SEC system equipped with three columns, and using 2% acetic acid aqueous solution as an eluent.

SEC chromatogram of PEG in water:



SEC chromatogram of PEG in THF:

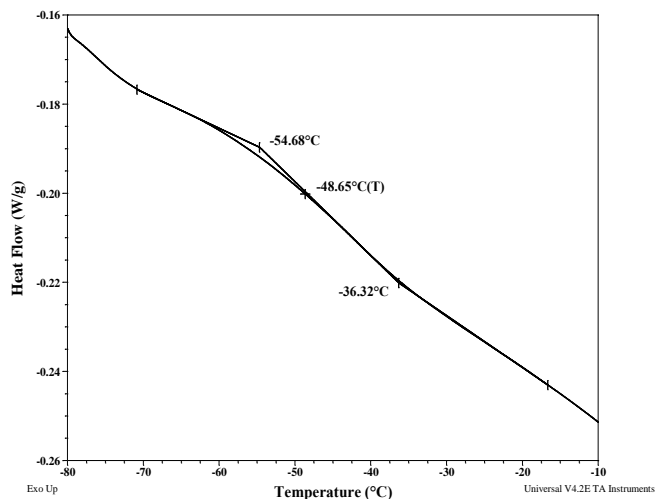


Thermal analysis was performed on TA Instruments Q100 differential scanning calorimeter (DSC) under a nitrogen atmosphere. The glass transition temperature (T_g), melting point (T_m), and crystallization point (T_{cr}) of the polymer were measured at a scan rate of 10°C/min shortly after creating thermal history of the sample.

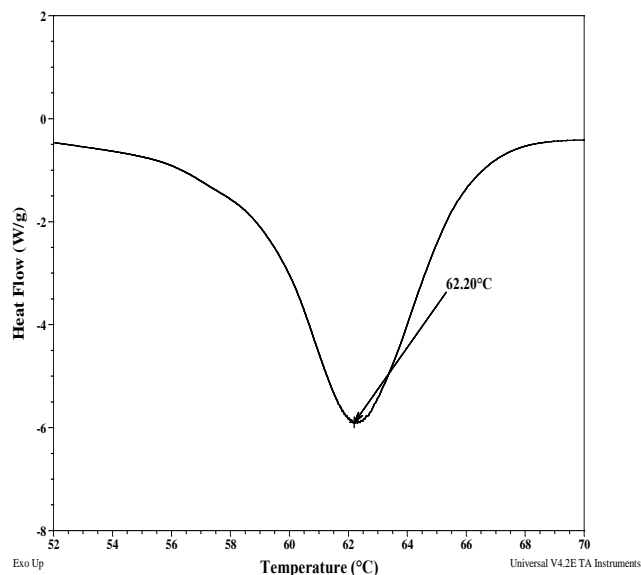
DSC thermal analysis results:

Sample	Glass transition temperature, T_g (°C)	Melting point, T_m (°C)	Crystallization on point, T_{cr} (°C)
EG2OH	-49	62	41

Glass transition of PEG:



Melting point of PEG:



Crystallization point of PEG:

