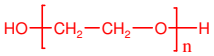
Sample Name: Poly(ethylene glycol) or Poly ethylene oxide

Sample #: P5617-EG2OH or P5617-EO

Structure:

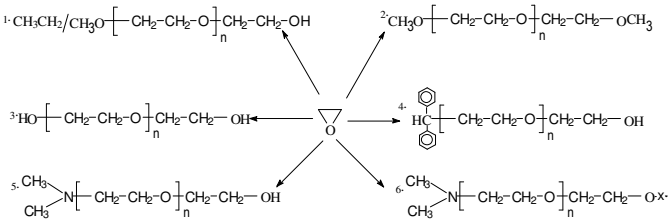


Composition:

Mn × 10^3	PDI
430.0	1.12

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)	$CH_3OCH_2CH(CH_3)OK$	polyethylene glycol methyl ether
2)	$CH_3OCH_2CH(CH_3)OK$	α, ω-term. methyl ether polyethylene glycol
3)	$KOCH_2CH_2OK$	polyethylene glycol
4)	$CH(C_5H_6)_2CK$	polyethylene glycol diphenyl ether
5)	$(CH_3)_2$ N-CH_2CH_2 OK	methyl amino terminated PEG
6)	$(CH_3)_2$ N-CH_2CH_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 GPC software.

Solubility:

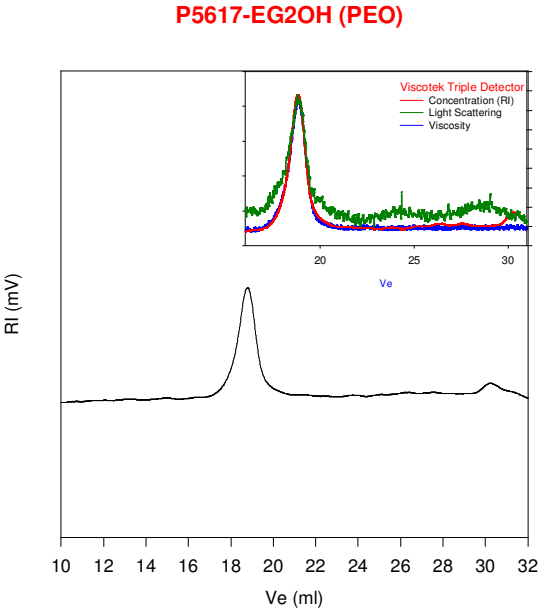
Poly(ethyl glycol) is soluble in toluene, THF, water and $CHCl_3$. The polymer is insoluble in hexane, ether, isopropanol and cold ethanol.

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 Al_2O_3 .
5. Solution concentrated on rota-evaporator
6. Solution precipitated in cold diethyl ether.
7. Dried under vacuum for 48h at 38 oC.

SEC of Sample



Size Exclusion Chromatography of polymer:

—— M_n = 430,000 , M_w = 481,000, M_w/M_n = 1.12

dn/dc in THF: 0.067 ml/g

Rgw: 34.62nm

Thermal analysis of the sample# P5617 EG2OH or PEO

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).

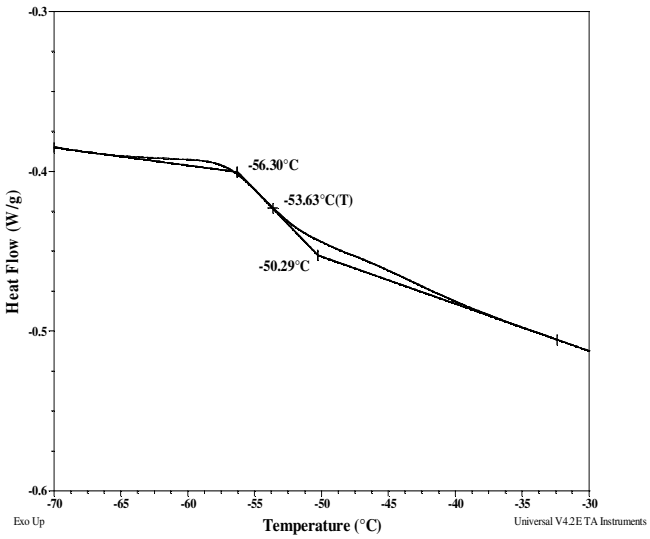
Melting and crystallization curve for the sample

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

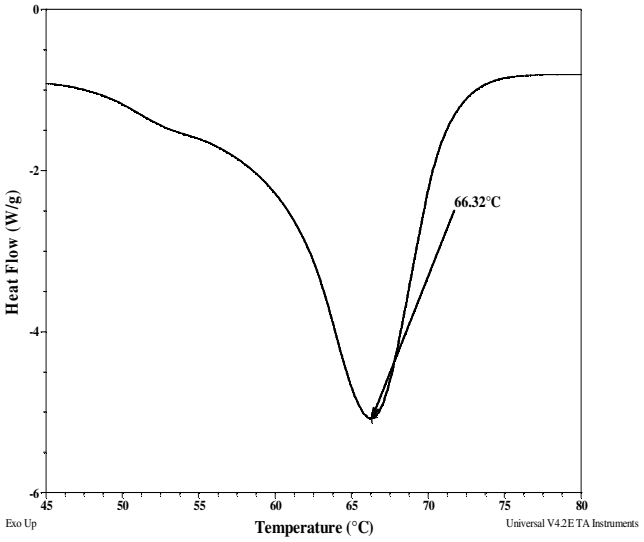
Thermal analysis results at a glance

Sample	T_m (°C)	T_c (°C)	T_g (°C)
EG2OH	66	47	-54

Thermogram for the sample



Melting curve for the sample:



Crystallization curve for the sample: