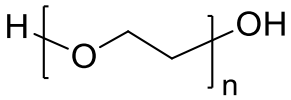
Sample name: **Poly(ethylene glycol)**

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

Sample # **P8016-EG2OH(PEO)**

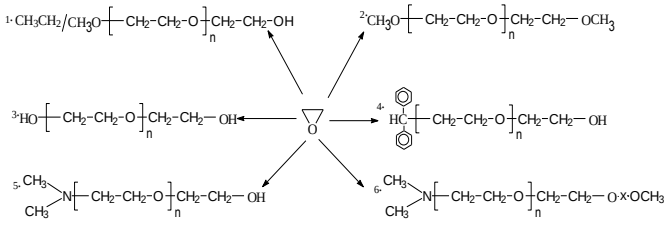
Structure:



Composition:

Mn $\times 10^3$ (g/mol)	PDI
6	1.02

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



	Initiator System	Obtained 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

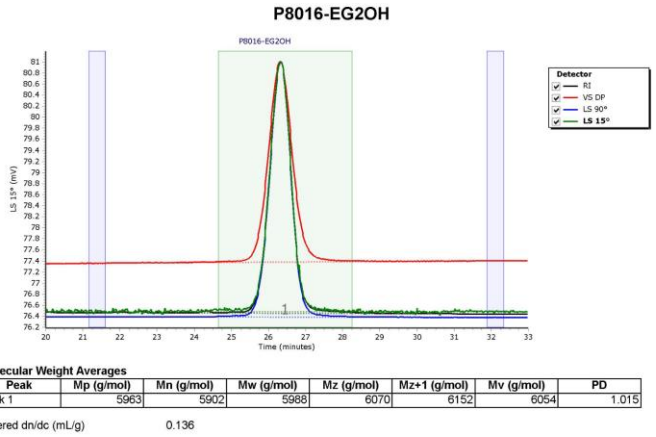
Purification of the PEG polymer:
The obtained polymer was rigorously purified to ensure the removal of the catalyst and side products:

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% $(Et)_3N$ 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:

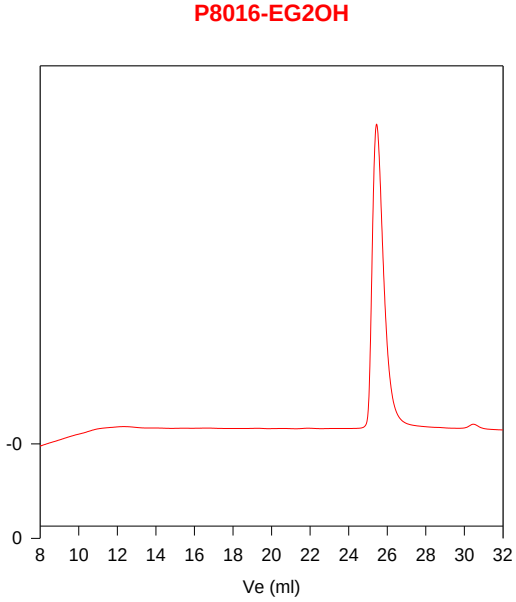


Molecular Weight Averages

Peak	Mp (g/mol)	Mn (g/mol)	Mw (g/mol)	Mz (g/mol)	Mz+1 (g/mol)	Mv (g/mol)	PD
Peak 1	5963	5902	5988	6070	6152	6054	1.015

Entered dn/dc (mL/g) 0.136

SEC chromatogram of PEG in THF:



Size exclusion chromatograph of Poly(ethylene glycol):
M_n=6000, M_w=6200 Mw/Mn =1.03