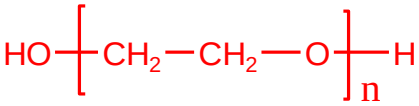
Sample Name: **Poly(ethylene glycol) Lyophilized**

Sample #: **P40000-EG2OH-10K**

**Structure:**




**Composition:**

| Mn × $10^3$ | PDI |
|---|---|
| 11.5 | 1.10 |

| Mp; 9.7 | |
|---|---|

**Synthesis Procedure:**
The polymer was synthesized by anionic process.

**Characterization:**
The polymer was characterized 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.

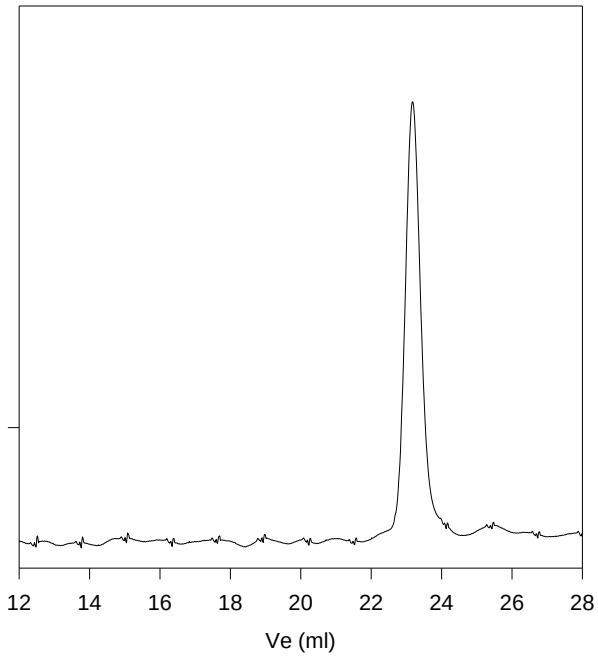
**Purification of the obtained polymer:**
Purification of the obtained polymer was carried out rigorously as follows to ensure the removal of the catalyst side product:

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

**Solubility:**
Poly(ethyl glycol) is soluble in water, alcohol.

**SEC elugram of the polymer:**

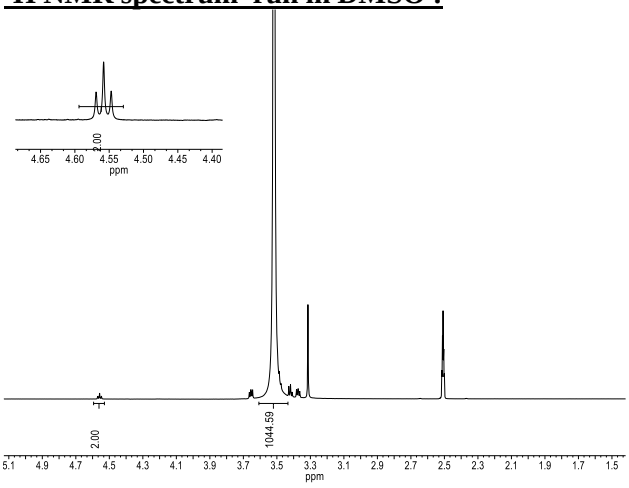
**P40000-10K EG2OH (PEO)**

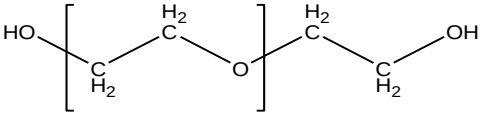


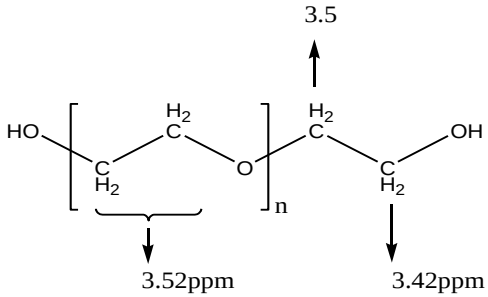

Size exclusion chromatograph of poly(ethylene glycol):

$M_n$=11,500, $M_w$=12,400, $M_p$ =9,700 Mw/Mn =1.10

**$^1$H NMR spectrum run in DMSO :**



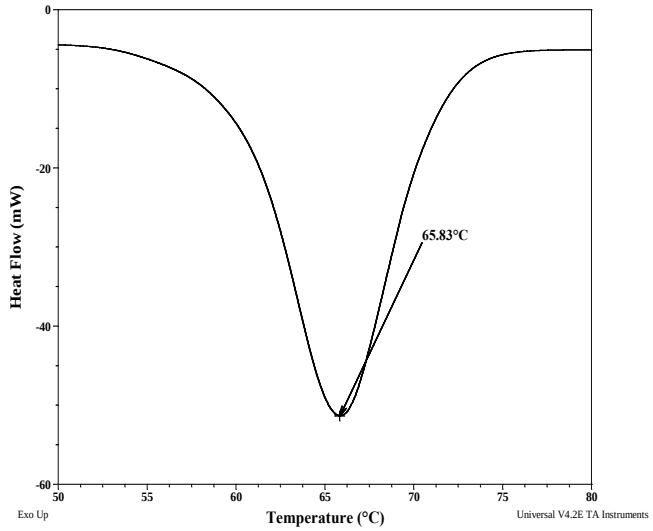
**Thermal analysis of the sample# P40000-EG2OH 10K**

**T**hermal analysis of the samples was carried out on a TA Q100 differential scanning calorimeter at a heating rate of 10$^{o}$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 ($T_g$).

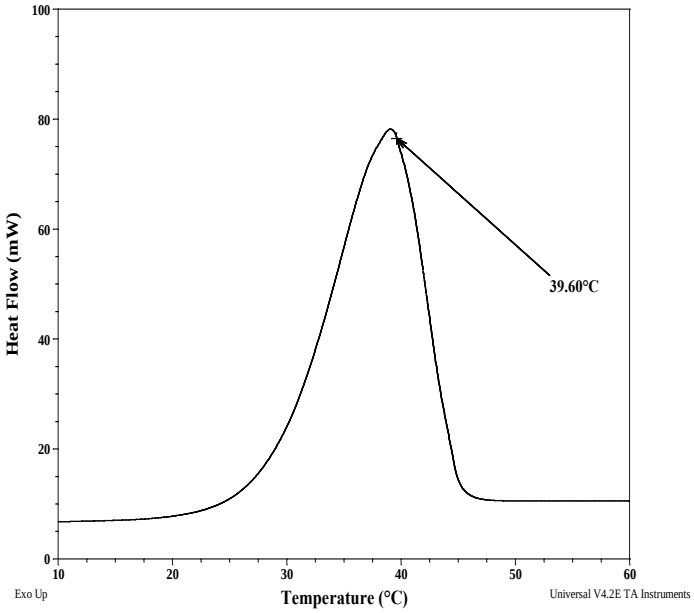
**Melting and crystallization curve for the sample**

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.

**Melting curve for the sample:**




**Crystallization curve for the sample:**




**Thermal analysis results at a glance**

| Sample | $T_m$ ($^{o}$C) | $T_c$ ($^{o}$C) | $T_g$ ($^{o}$C) |
|---|---|---|---|
| PEO | 66 | 40 | Not distinct |