

Certificate of Analysis



Agilent Technologies, Inc. acquired Polymer Standards Service GmbH (PSS) on August 01st, 2022.

The Quality Certificate / Certificate of Analysis generated by PSS attached to this Letter is valid for the Product stated in the Certificate sold to You by Agilent Technologies, Inc or its subsidiaries.

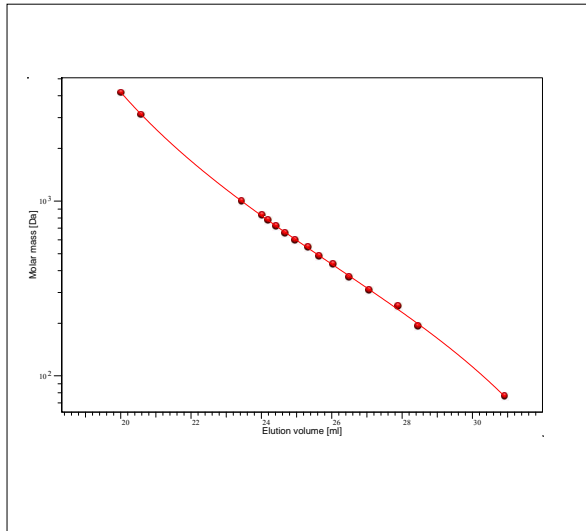
Patrick Kunzweiler

Quality Manager
Liquid Phase Separation Division

Certificate of Analysis

Product: Kit Poly(propylene glycol)
 Part No: PSS-PPGKIT
 Lot No: PPGKIT-03

GPC/SEC - Calibration Curve



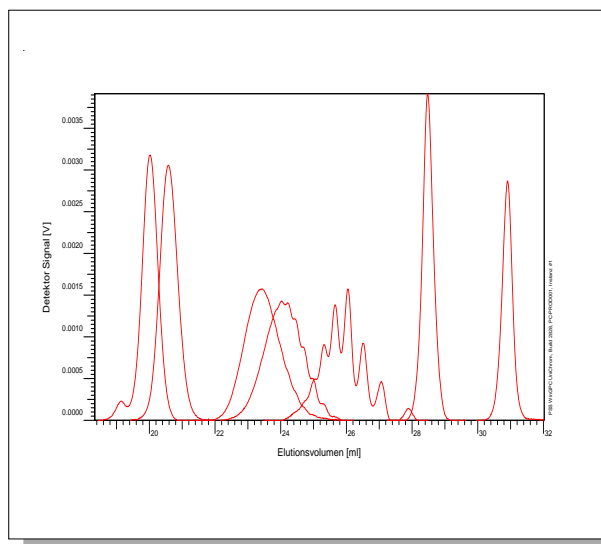
GPC/SEC - Calibration Table

Elution volume [ml]	Mp [Da]	Polymer Lot No:	Polymer Part No:
20,03	4150	PPG231014	PSS-PPG4.5K
20,58	3110	PPG241014	PSS-PPG3K
23,45	999	PPG251014	PSS-PPG1K
24,03	830	PPG261014	PSS-PPG790
24,21	775	PPG261014	PSS-PPG790
24,43	714	PPG261014	PSS-PPG790
24,68	656	PPG261014	PSS-PPG790
24,98	598	PPG261014	PSS-PPG790
25,33	540	PPG271014	PSS-PPG450
25,66	482	PPG271014	PSS-PPG450
26,05	435	PPG271014	PSS-PPG450
26,51	366	PPG271014	PSS-PPG450
27,06	308	PPG271014	PSS-PPG450
27,90	250	PPG271014	PSS-PPG450
28,48	192	PPG192	PSS-PPG192
30,93	76	PPG76	PSS-PPG76

Note:

Mp = Molar mass at the peak maximum

GPC/SEC - Polymer Overlay



GPC/SEC - Calibration Conditions

Solvent	Tetrahydrofuran
Flow rate	1,00 ml/min
Precolumn [8 x 50 mm]	PSS SDV 3µm
Columns [8 x 300 mm]	PSS SDV 3µm 50Å / 100Å / 100Å
Temperature	23 °C
Inject volume	20 µl
Internal standard	Toluene at 33,36 ml
Data Acquisition Software	PSS WinGPC
Calibration by	J.Preis

Fit quality


Fit-type	PSS Poly 5
R	0,999867

Storage: Store the tightly recapped polymer standards in a dry, dark, cool area; e.g. a refrigerator (4 °C).

Date of expiry: 2027/08/31 (See also product label.)

Date of approval: 2023/02/26

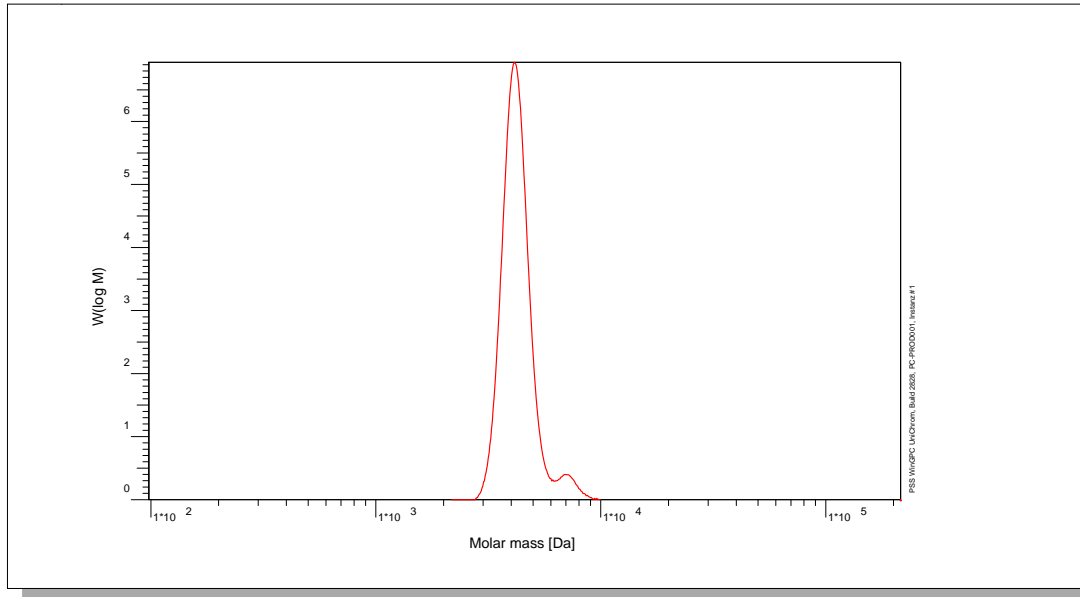
Manufacture control according to PSS method of analysis


 Dr. J. Preis
 production manager

Certificate of Analysis

Polymer type: Poly(propylene glycol)
 Part No: PSS-PPG4.5K
 Lot No: PPG231014

Molar Mass Distribution



GPC/SEC - Conditions

Sample concentration	1,00 g/l	Inject volume	20 µl
Solvent	Tetrahydrofuran	Flow rate	1,00 ml/min
Precolumn [8 x 50 mm]	PSS SDV 3µm	Temperature	23 °C
Columns [analytical, each 8 x 300 mm]	PSS SDV 3µm 50Å / 100Å / 100Å		
Data Acquisition Software	PSS WinGPC	Operator	J.Preis

GPC/SEC - Results


Detector	Mw [Da]	Mn [Da]	Mp [Da]	PDI [Mw/Mn]
PSS SECcurity RI	4340	4220	4150	1,03

Note:

Mw = Weight average molecular weight
 Mn = Number average molecular weight
 Mp = Molar mass at the peak maximum
 PDI = Polydispersity Index

Storage: Store the tightly recapped polymer standard in a dry, dark, cool area; e.g. a refrigerator (4 °C).
Date of expiry: 2027/08/31 (See also product label.)
Date of approval: 2023/02/26

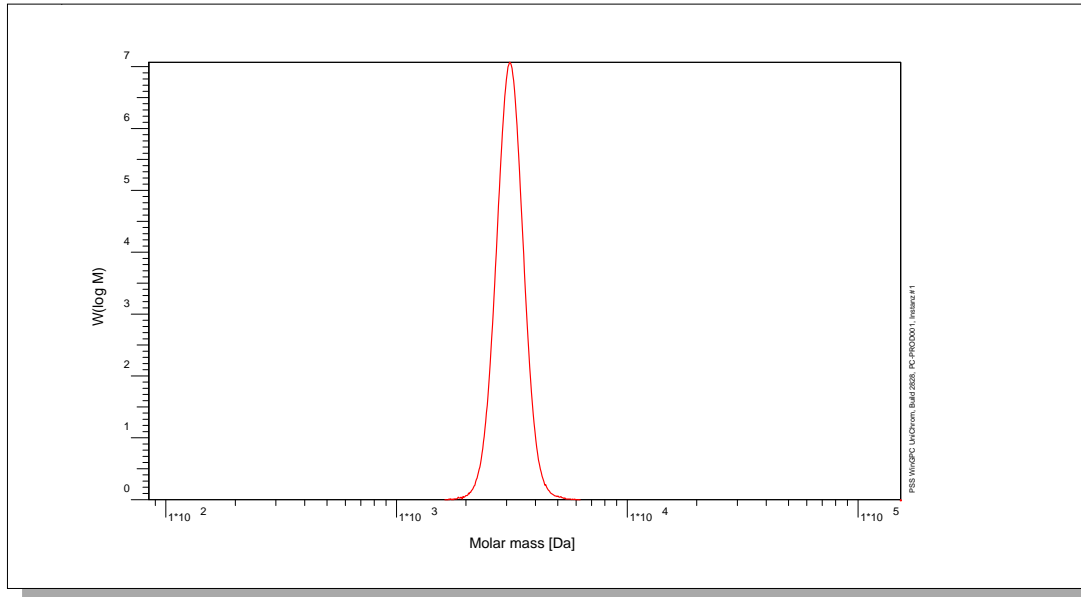
Manufacture control according to PSS method of analysis


 Dr. J. Preis
 production manager

Certificate of Analysis

Polymer type: Poly(propylene glycol)
 Part No: PSS-PPG3K
 Lot No: PPG241014

Molar Mass Distribution



GPC/SEC - Conditions

Sample concentration	1,00 g/l	Inject volume	20 µl
Solvent	Tetrahydrofuran	Flow rate	1,00 ml/min
Precolumn [8 x 50 mm]	PSS SDV 3µm	Temperature	23 °C
Columns [analytical, each 8 x 300 mm]	PSS SDV 3µm 50Å / 100Å / 100Å		
Data Acquisition Software	PSS WinGPC	Operator	J.Preis

GPC/SEC - Results


Detector	Mw [Da]	Mn [Da]	Mp [Da]	PDI [Mw/Mn]
PSS SECcurity RI	3130	3070	3110	1,02

Note:

Mw = Weight average molecular weight
 Mn = Number average molecular weight
 Mp = Molar mass at the peak maximum
 PDI = Polydispersity Index

Storage: Store the tightly recapped polymer standard in a dry, dark, cool area; e.g. a refrigerator (4 °C).
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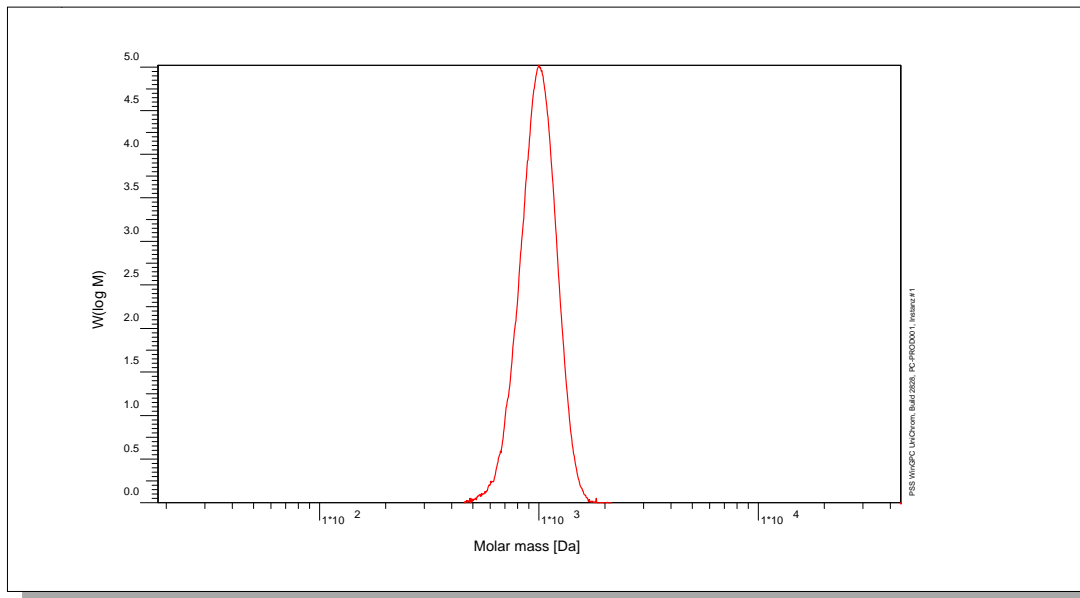
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 Dr. J. Preis
 production manager

Certificate of Analysis

Polymer type: Poly(propylene glycol)
 Part No: PSS-PPG1K
 Lot No: PPG251014

Molar Mass Distribution



GPC/SEC - Conditions

Sample concentration	1,00 g/l	Inject volume	20 µl
Solvent	Tetrahydrofuran	Flow rate	1,00 ml/min
Precolumn [8 x 50 mm]	PSS SDV 3µm	Temperature	23 °C
Columns [analytical, each 8 x 300 mm]	PSS SDV 3µm 50Å / 100Å / 100Å		
Data Acquisition Software	PSS WinGPC	Operator	J.Preis

GPC/SEC - Results

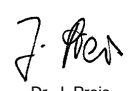
Detector	Mw [Da]	Mn [Da]	Mp [Da]	PDI [Mw/Mn]
PSS SECcurity RI	1010	972	999	1,04

Note:

Mw = Weight average molecular weight
 Mn = Number average molecular weight
 Mp = Molar mass at the peak maximum
 PDI = Polydispersity Index

Storage: Store the tightly recapped polymer standard in a dry, dark, cool area; e.g. a refrigerator (4 °C).
Date of expiry: 2027/08/31 (See also product label.)
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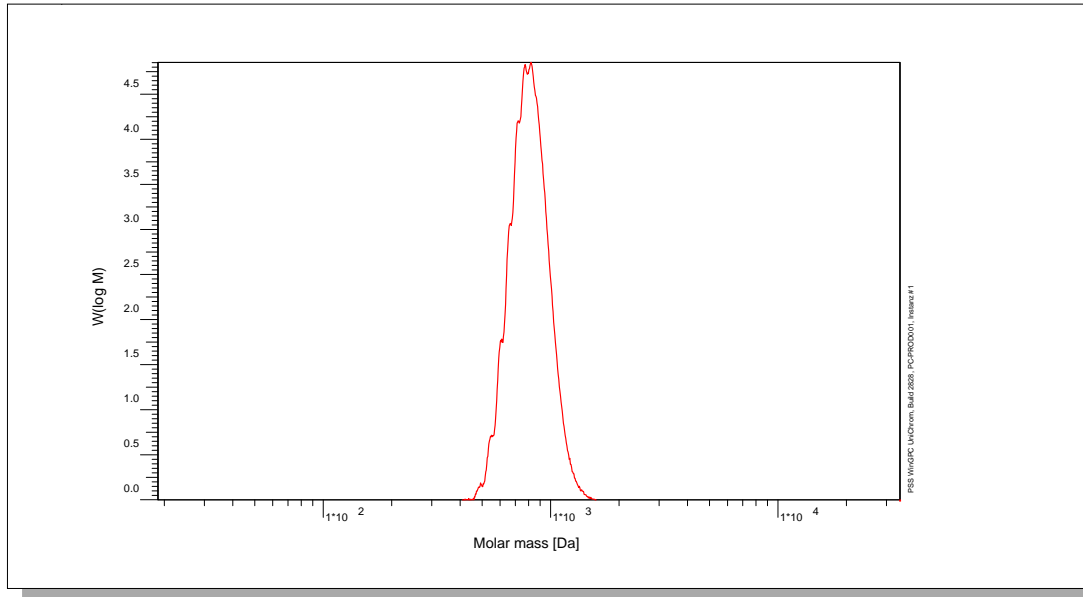
Manufacture control according to PSS method of analysis


 Dr. J. Preis
 production manager

Certificate of Analysis

Polymer type: Poly(propylene glycol)
 Part No: PSS-PPG790
 Lot No: PPG261014

Molar Mass Distribution



GPC/SEC - Conditions

Sample concentration	1,00 g/l	Inject volume	20 µl
Solvent	Tetrahydrofuran	Flow rate	1,00 ml/min
Precolumn [8 x 50 mm]	PSS SDV 3µm	Temperature	23 °C
Columns [analytical, each 8 x 300 mm]	PSS SDV 3µm 50Å / 100Å / 100Å		
Data Acquisition Software	PSS WinGPC	Operator	J.Preis

GPC/SEC - Results


Detector	Mw [Da]	Mn [Da]	Mp [Da]	PDI [Mw/Mn]
PSS SECcurity RI	817	789	830	1,04

Note:

Mw = Weight average molecular weight
 Mn = Number average molecular weight
 Mp = Molar mass at the peak maximum
 PDI = Polydispersity Index

Storage: Store the tightly recapped polymer standard in a dry, dark, cool area; e.g. a refrigerator (4 °C).
Date of expiry: 2027/08/31 (See also product label.)
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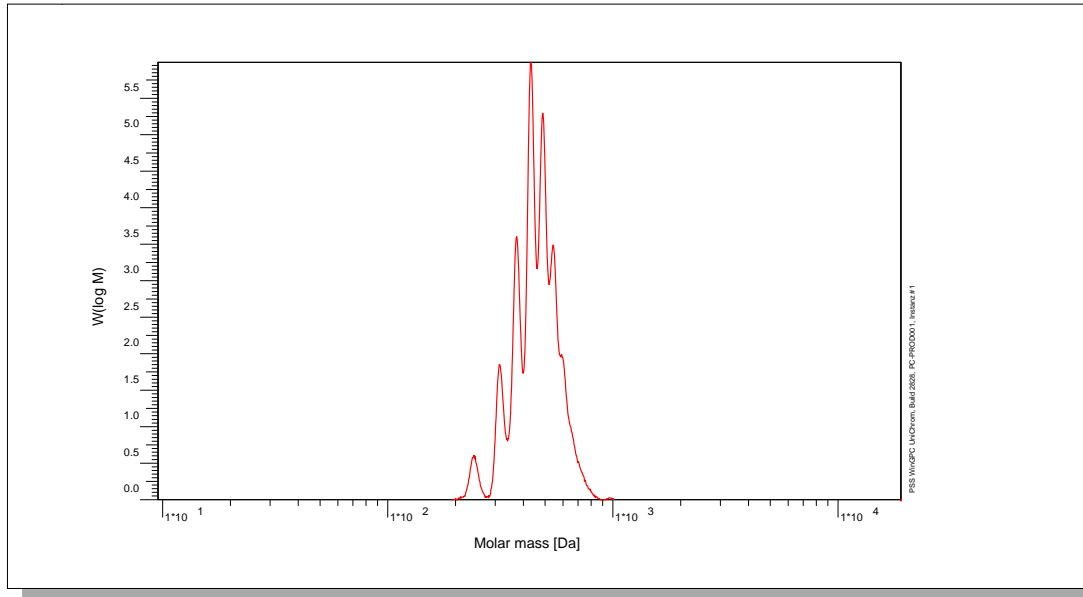
Manufacture control according to PSS method of analysis


 Dr. J. Preis
 production manager

Certificate of Analysis

Polymer type: Poly(propylene glycol)
 Part No: PSS-PPG450
 Lot No: PPG271014

Molar Mass Distribution



GPC/SEC - Conditions

Sample concentration	1,00 g/l	Inject volume	20 µl
Solvent	Tetrahydrofuran	Flow rate	1,00 ml/min
Precolumn [8 x 50 mm]	PSS SDV 3µm	Temperature	23 °C
Columns [analytical, each 8 x 300 mm]	PSS SDV 3µm 50Å / 100Å / 100Å		
Data Acquisition Software	PSS WinGPC	Operator	J.Preis

GPC/SEC - Results

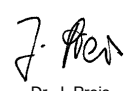
Detector	Mw [Da]	Mn [Da]	Mp [Da]	PDI [Mw/Mn]
PSS SECcurity RI	462	439	435	1,05

Note:

Mw = Weight average molecular weight
 Mn = Number average molecular weight
 Mp = Molar mass at the peak maximum
 PDI = Polydispersity Index

Storage: Store the tightly recapped polymer standard in a dry, dark, cool area; e.g. a refrigerator (4 °C).
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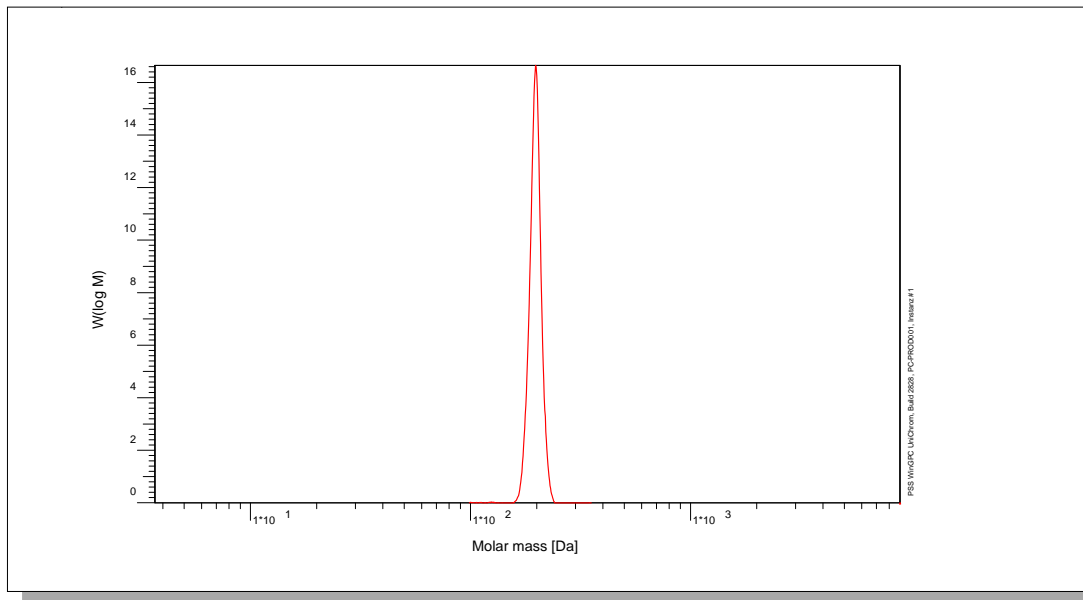
Manufacture control according to PSS method of analysis


 Dr. J. Preis
 production manager

Certificate of Analysis

Polymer type: Poly(propylene glycol)
 Part No: PSS-PPG192
 Lot No: PPG192

Molar Mass Distribution



GPC/SEC - Conditions

Sample concentration	1,00 g/l	Inject volume	20 µl
Solvent	Tetrahydrofuran	Flow rate	1,00 ml/min
Precolumn [8 x 50 mm]	PSS SDV 3µm	Temperature	23 °C
Columns [analytical, each 8 x 300 mm]	PSS SDV 3µm 50Å / 100Å / 100Å		
Data Acquisition Software	PSS WinGPC	Operator	J.Preis

GPC/SEC - Results


Detector	Mw [Da]	Mn [Da]	Mp [Da]	PDI [Mw/Mn]
PSS SECcurity RI	192	192	192	1,00

Note:

Mw = Weight average molecular weight
 Mn = Number average molecular weight
 Mp = Molar mass at the peak maximum
 PDI = Polydispersity Index

Storage: Store the tightly recapped polymer standard in a dry, dark, cool area; e.g. a refrigerator (4 °C).
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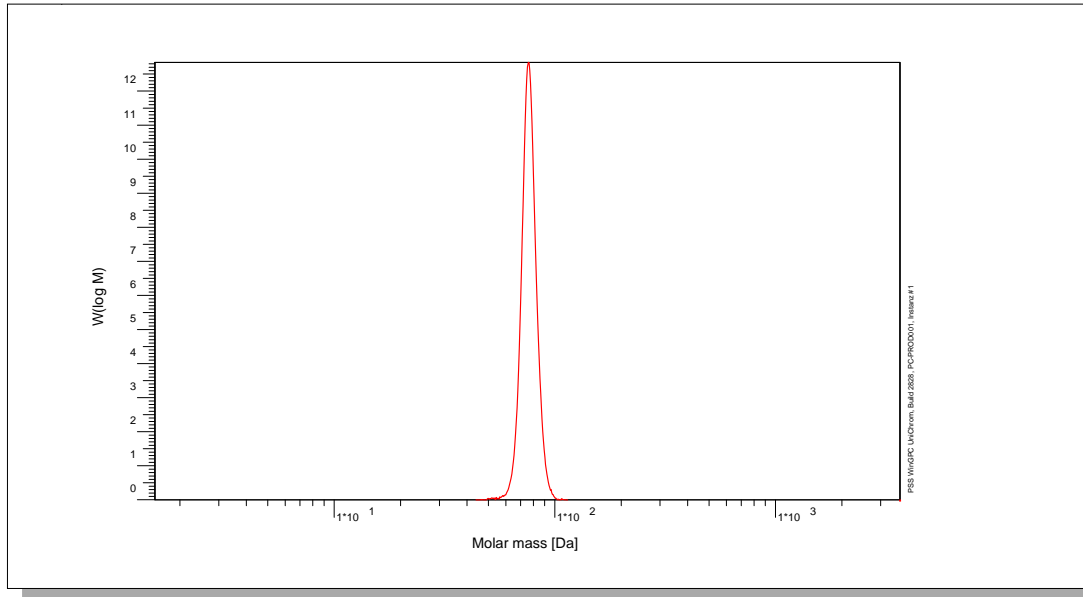
Manufacture control according to PSS method of analysis


 Dr. J. Preis
 production manager

Certificate of Analysis

Polymer type: Poly(propylene glycol)
 Part No: PSS-PPG76
 Lot No: PPG76

Molar Mass Distribution



GPC/SEC - Conditions

Sample concentration	1,00 g/l	Inject volume	20 µl
Solvent	Tetrahydrofuran	Flow rate	1,00 ml/min
Precolumn [8 x 50 mm]	PSS SDV 3µm	Temperature	23 °C
Columns [analytical, each 8 x 300 mm]	PSS SDV 3µm 50Å / 100Å / 100Å		
Data Acquisition Software	PSS WinGPC	Operator	J.Preis

GPC/SEC - Results


Detector	Mw [Da]	Mn [Da]	Mp [Da]	PDI [Mw/Mn]
PSS SECcurity RI	76	76	76	1,00

Note:

Mw = Weight average molecular weight
 Mn = Number average molecular weight
 Mp = Molar mass at the peak maximum
 PDI = Polydispersity Index

Storage: Store the tightly recapped polymer standard in a dry, dark, cool area; e.g. a refrigerator (4 °C).
Date of expiry: 2027/08/31 (See also product label.)
Date of approval: 2023/02/26

Manufacture control according to PSS method of analysis


 Dr. J. Preis
 production manager