

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.

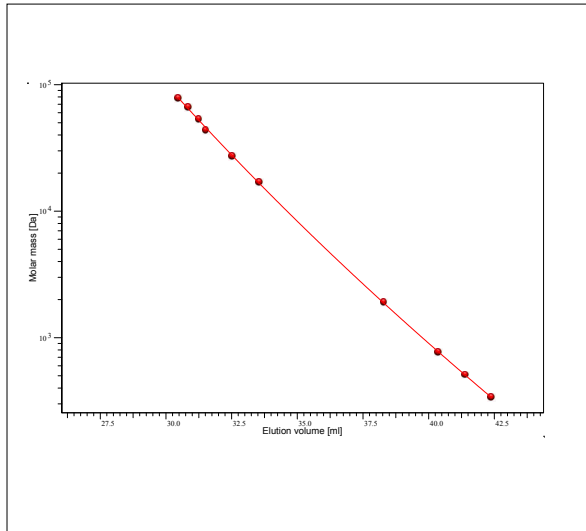
Patrick Kunzweiler

Quality Manager
Liquid Phase Separation Division

Certificate of Analysis

Product: Kit Poly(ethylene)
 Part No: PSS-PEKIT
 Lot No: PEKIT-04

GPC/SEC - Calibration Curve



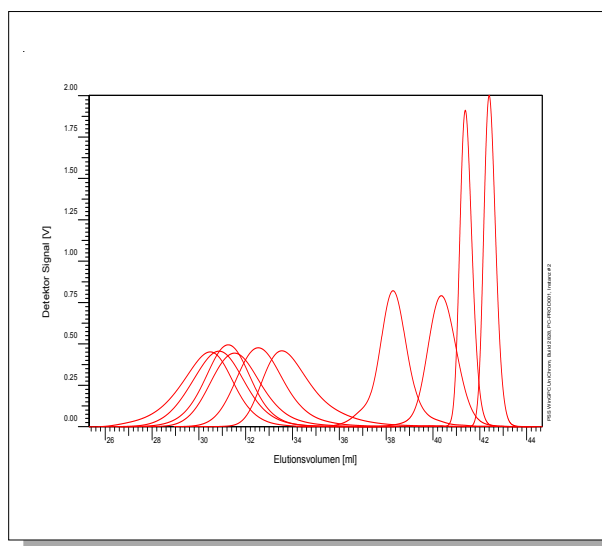
GPC/SEC - Calibration Table

Elution volume [ml]	Mp [Da]	Polymer Lot No:	Polymer Part No:
30,49	78400	PE3N	PSS-PE120K
30,86	65700	PE18N	PSS-PE83K
31,25	53100	PE5N	PSS-PE65K
31,52	43400	PE17N	PSS-PE47K
32,53	27300	PE14N	PSS-PE28K
33,55	17000	PE9N	PSS-PE16K
38,30	1890	PE161110N	PSS-PE2K
40,36	770	PE770	PSS-PE800
41,38	507	C36	PSS-OE500
42,40	338	C24	PSS-OE340

Note:

Mp = Molar mass at the peak maximum

GPC/SEC - Polymer Overlay



GPC/SEC - Calibration Conditions

Solvent 1,2,4-trichlorobenzene
 Flow rate 1,00 ml/min
 Precolumn [8 x 50 mm] PSS POLEFIN 10µm
 Columns [8 x 300 mm] PSS POLEFIN 10µm linear XL / linear XL / linear XL / linear XL
 Temperature 160 °C
 Inject volume 200 µl
 Internal standard none
 Data Acquisition Software PSS WinGPC
 Calibration by P.Montag

Fit quality

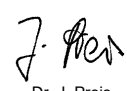
Fit-type Polynomial 3
 R 0,999954

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

Date of expiry: 2032/06/30 (See also product label.)

Date of approval: 2023/02/10

Manufacture control according to PSS method of analysis

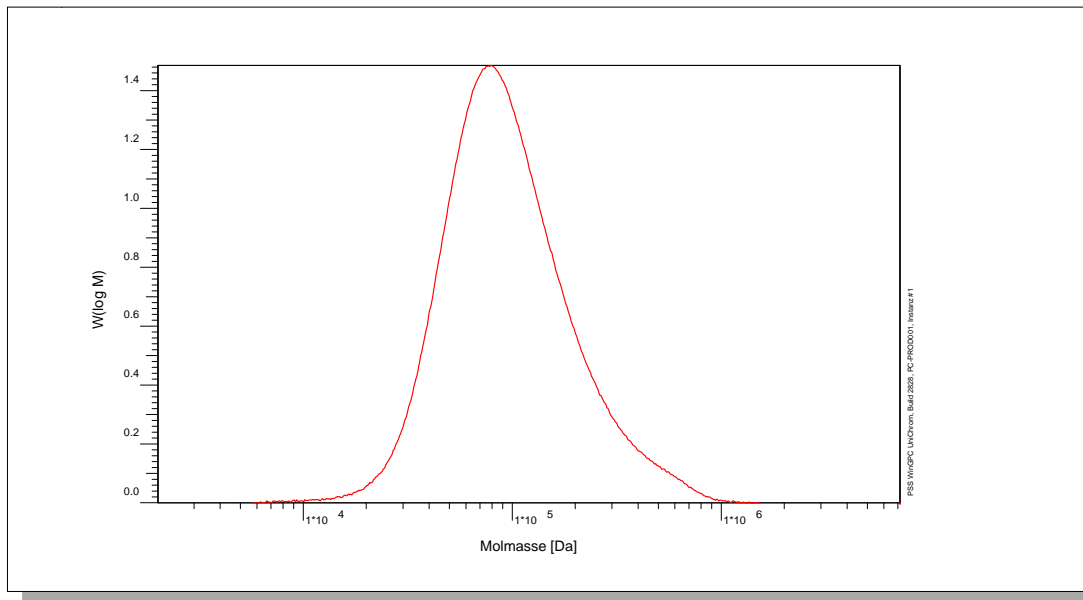

 Dr. J. Preis
 production manager



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Polymer type: Poly(ethylene)
 Part No: PSS-PE120K
 Lot No: PE3N

Molar Mass Distribution



GPC/SEC - Conditions

Sample concentration	1,90 g/l	Inject volume	200 µl
Solvent	1,2,4-Trichlorbenzol	Flow rate	1,00 ml/min
Precolumn [8 x 50 mm]	PSS POLEFIN 10µm	Temperature	160 °C
Columns [analytical, each 8 x 300 mm]	PSS POLEFIN 10µm linear XL / linear XL / linear XL / linear XL		
Data Acquisition Software	PSS WinGPC	Operator	P. Montag

GPC/SEC - Results

Detector	Mw [Da]	Mn [Da]	Mp [Da]	PDI [Mw/Mn]
GPC-IR4-CH2	120000	75600	78400	1,59

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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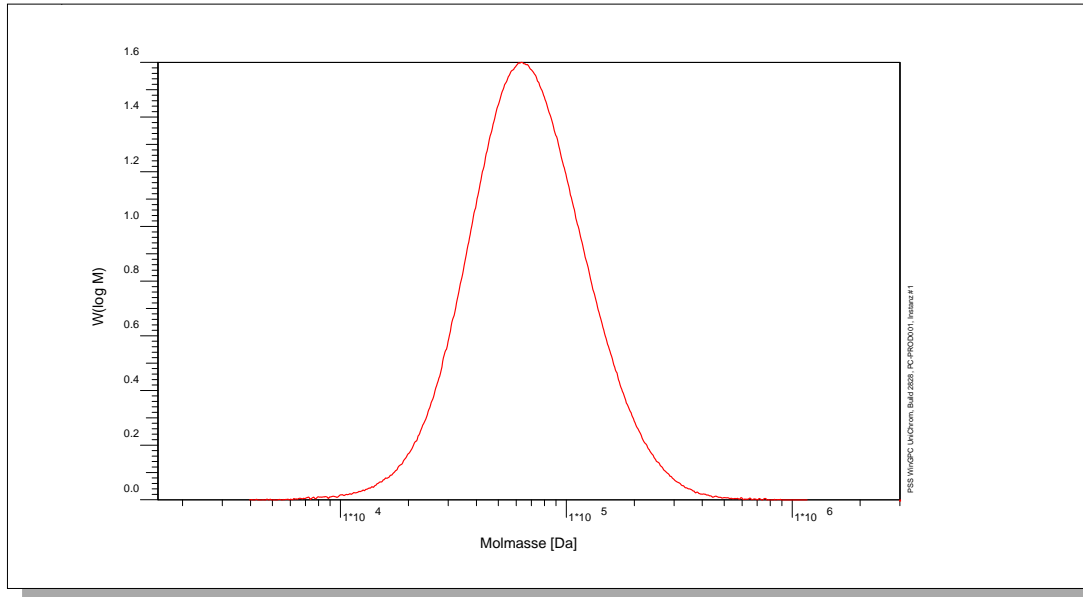

 Dr. J. Preis
 production manager



Certificate of Analysis

Polymer type: Poly(ethylene)
 Part No: PSS-PE83K
 Lot No: PE18N

Molar Mass Distribution



GPC/SEC - Conditions

Sample concentration	2,01 g/l	Inject volume	200 µl
Solvent	1,2,4-Trichlorbenzol	Flow rate	1,00 ml/min
Precolumn [8 x 50 mm]	PSS POLEFIN 10µm	Temperature	160 °C
Columns [analytical, each 8 x 300 mm]	PSS POLEFIN 10µm linear XL / linear XL / linear XL / linear XL		
Data Acquisition Software	PSS WinGPC	Operator	P. Montag

GPC/SEC - Results

Detector	Mw [Da]	Mn [Da]	Mp [Da]	PDI [Mw/Mn]
GPC-IR4-CH2	82900	58200	65700	1,43

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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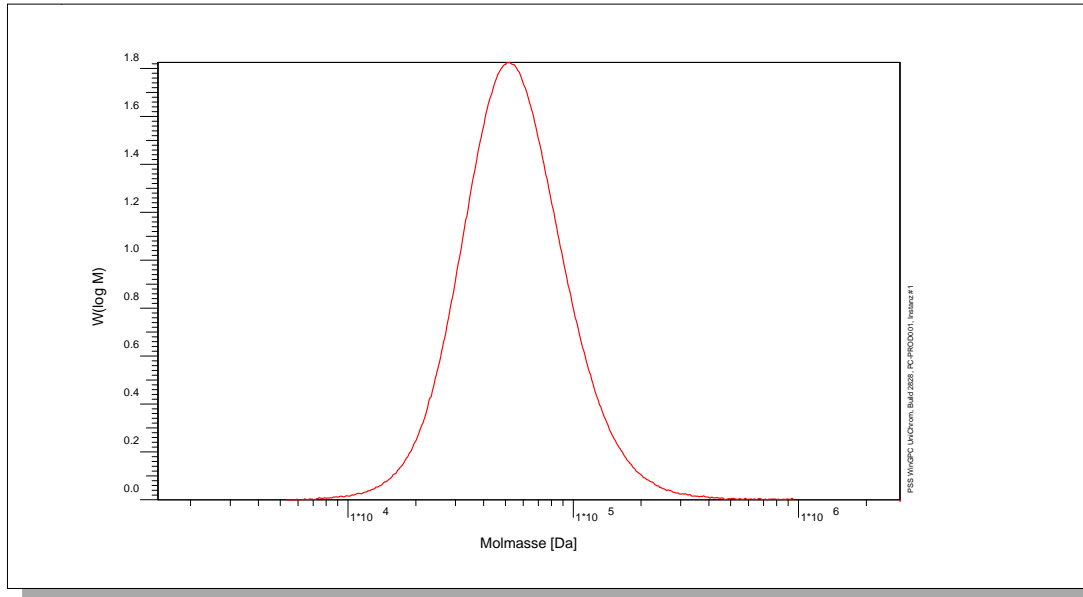
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 Dr. J. Preis
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Polymer type: Poly(ethylene)
 Part No: PSS-PE65K
 Lot No: PE5N

Molar Mass Distribution



GPC/SEC - Conditions

Sample concentration	2,73 g/l	Inject volume	200 µl
Solvent	1,2,4-Trichlorbenzol	Flow rate	1,00 ml/min
Precolumn [8 x 50 mm]	PSS POLEFIN 10µm	Temperature	160 °C
Columns [analytical, each 8 x 300 mm]	PSS POLEFIN 10µm linear XL / linear XL / linear XL / linear XL		
Data Acquisition Software	PSS WinGPC	Operator	P. Montag

GPC/SEC - Results

Detector	Mw [Da]	Mn [Da]	Mp [Da]	PDI [Mw/Mn]
GPC-IR4-CH2	64900	48100	53100	1,35

Note:


Mw = Weight average molecular weight
 Mn = Number average molecular weight
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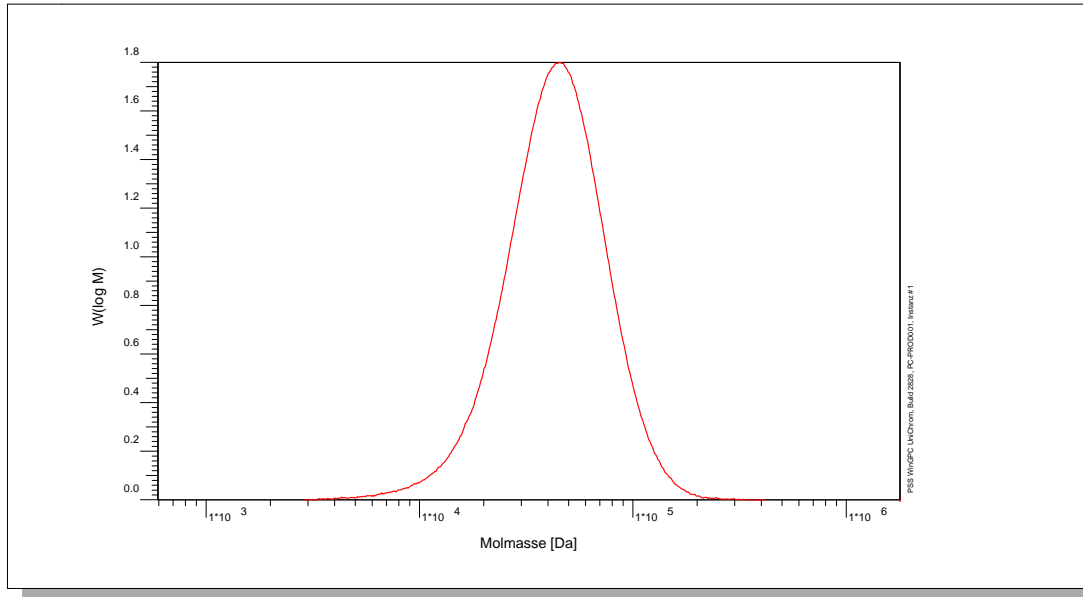
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 Dr. J. Preis
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Polymer type: Poly(ethylene)
 Part No: PSS-PE47K
 Lot No: PE17N

Molar Mass Distribution



GPC/SEC - Conditions

Sample concentration	2,34 g/l	Inject volume	200 µl
Solvent	1,2,4-Trichlorbenzol	Flow rate	1,00 ml/min
Precolumn [8 x 50 mm]	PSS POLEFIN 10µm	Temperature	160 °C
Columns [analytical, each 8 x 300 mm]	PSS POLEFIN 10µm linear XL / linear / XL linear XL / linear XL		
Data Acquisition Software	PSS WinGPC	Operator	P. Montag

GPC/SEC - Results

Detector	Mw [Da]	Mn [Da]	Mp [Da]	PDI [Mw/Mn]
GPC-IR4-CH2	47200	33800	43400	1,40

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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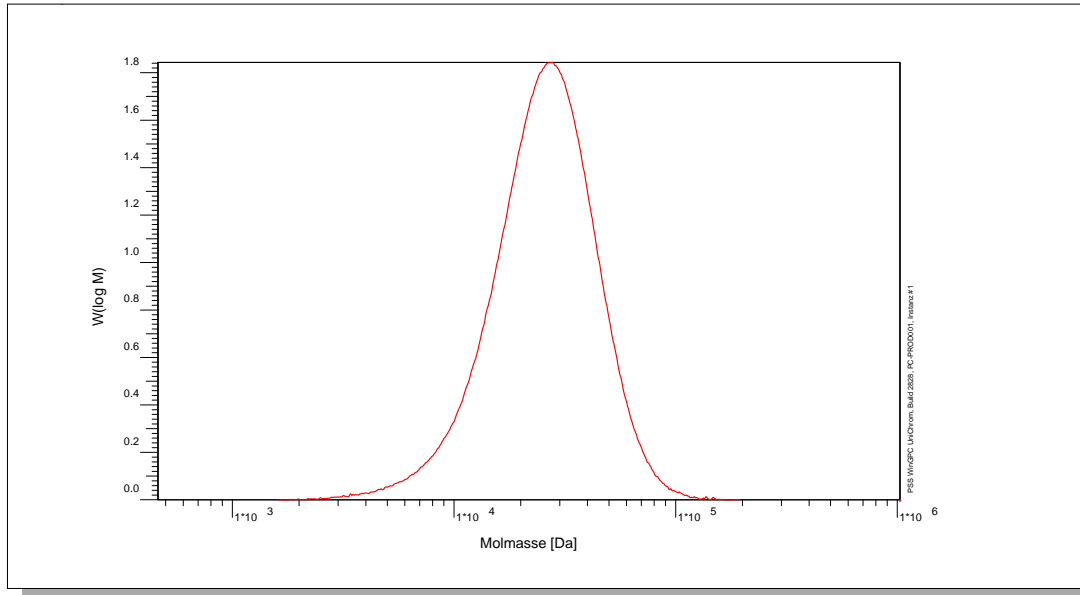
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Polymer type: Poly(ethylene)
 Part No: PSS-PE28K
 Lot No: PE14N

Molar Mass Distribution



GPC/SEC - Conditions

Sample concentration	2,17 g/l	Inject volume	200 µl
Solvent	1,2,4-Trichlorbenzol	Flow rate	1,00 ml/min
Precolumn [8 x 50 mm]	PSS POLEFIN 10µm	Temperature	160 °C
Columns [analytical, each 8 x 300 mm]	PSS POLEFIN 10µm linear XL / linear XL / linear XL / linear XL		
Data Acquisition Software	PSS WinGPC	Operator	P. Montag

GPC/SEC - Results

Detector	Mw [Da]	Mn [Da]	Mp [Da]	PDI [Mw/Mn]
GPC-IR4-CH2	28300	21000	27300	1,35

Note:


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

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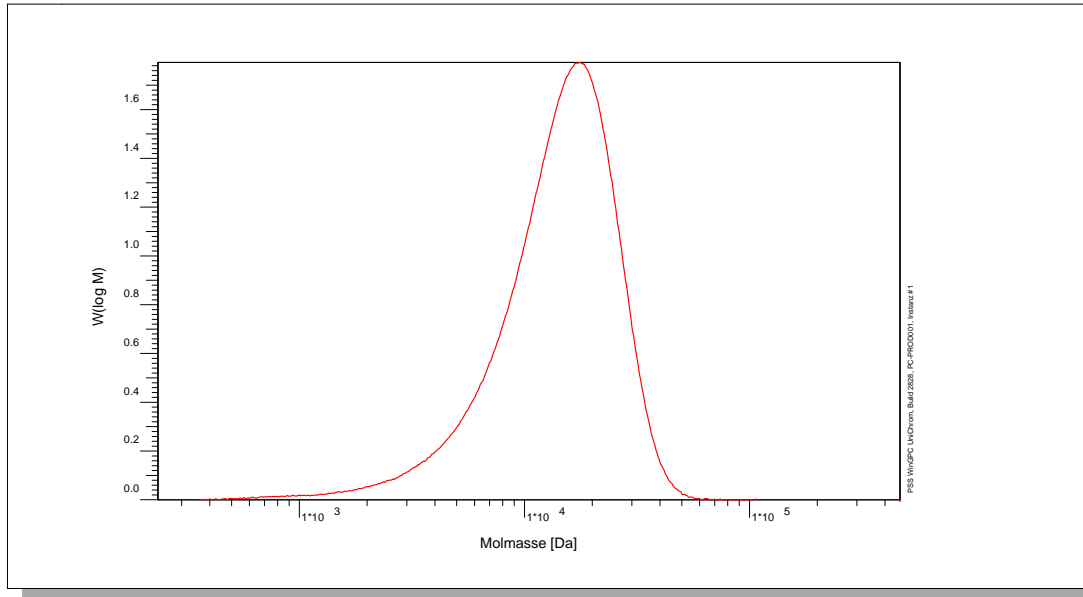
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 production manager

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Polymer type: Poly(ethylene)
 Part No: PSS-PE16K
 Lot No: PE9N

Molar Mass Distribution



GPC/SEC - Conditions

Sample concentration	2,32 g/l	Inject volume	200 µl
Solvent	1,2,4-Trichlorbenzol	Flow rate	1,00 ml/min
Precolumn [8 x 50 mm]	PSS POLEFIN 10µm	Temperature	160 °C
Columns [analytical, each 8 x 300 mm]	PSS POLEFIN 10µm linear XL / linear XL / linear XL / linear XL		
Data Acquisition Software	PSS WinGPC	Operator	P. Montag

GPC/SEC - Results

Detector	Mw [Da]	Mn [Da]	Mp [Da]	PDI [Mw/Mn]
GPC-IR4-CH2	16000	10700	17000	1,50

Note:

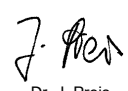
Mw = Weight average molecular weight
 Mn = Number average molecular weight
 Mp = Molar mass at the peak maximum
 PDI = Polydispersity Index

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

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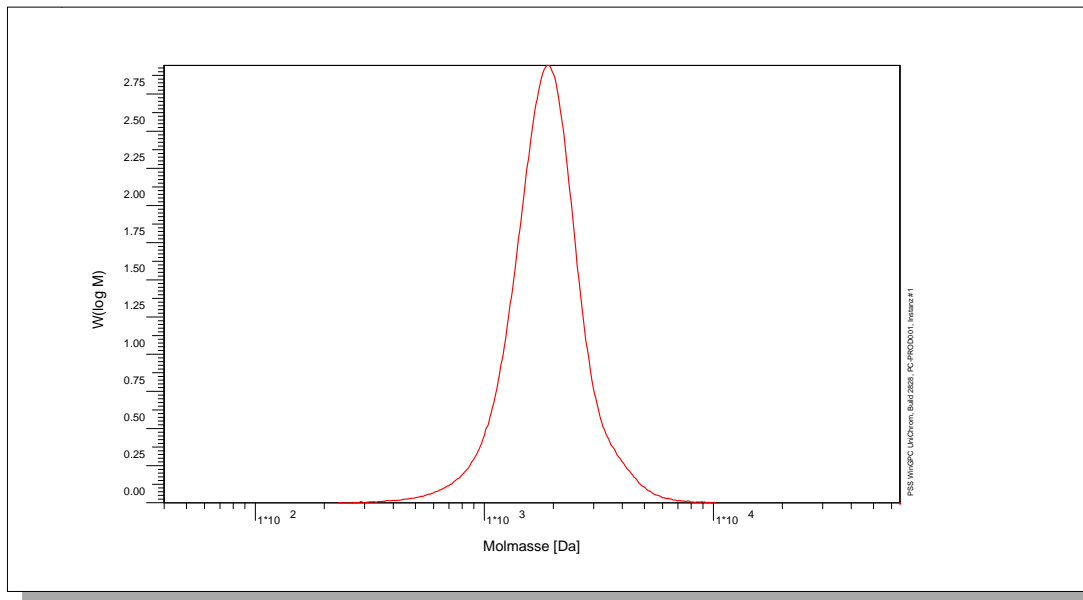
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 production manager

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Polymer type: Poly(ethylene)
 Part No: PSS-PE2K
 Lot No: PE161110N

Molar Mass Distribution



GPC/SEC - Conditions

Sample concentration	2,22 g/l	Inject volume	200 µl
Solvent	1,2,4-Trichlorbenzol	Flow rate	1,00 ml/min
Precolumn [8 x 50 mm]	PSS POLEFIN 10µm	Temperature	160 °C
Columns [analytical, each 8 x 300 mm]	PSS POLEFIN 10µm linear XL / linear XL / linear XL / linear XL		
Data Acquisition Software	PSS WinGPC	Operator	P. Montag

GPC/SEC - Results

Detector	Mw [Da]	Mn [Da]	Mp [Da]	PDI [Mw/Mn]
GPC-IR4-CH2	1970	1700	1890	1,16

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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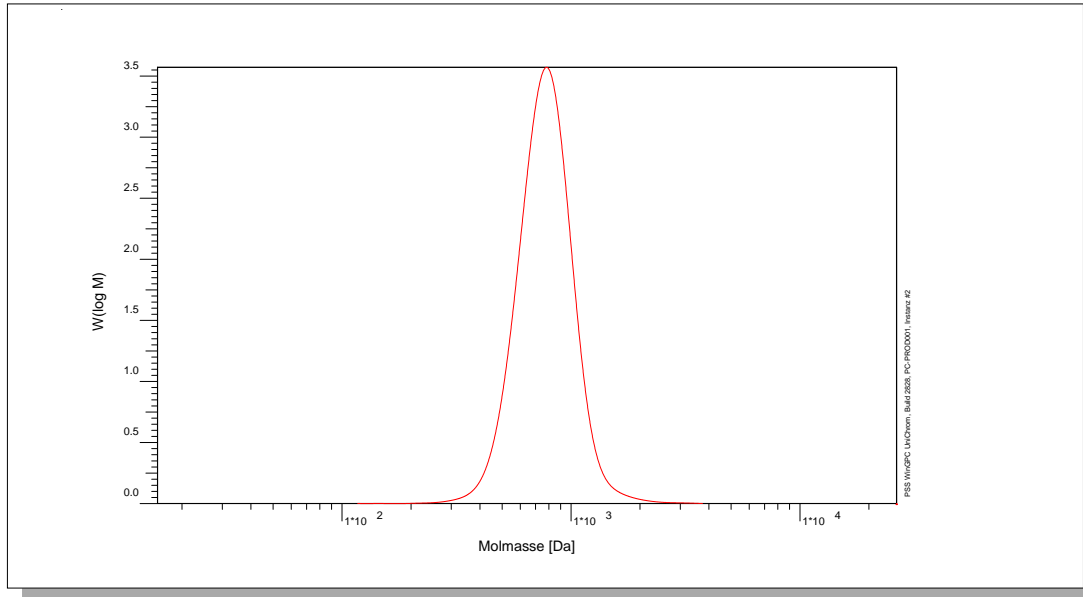
Manufacture control according to PSS method of analysis


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 production manager

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Polymer type: Poly(ethylene)
 Part No: PSS-PE800
 Lot No: PE770

Molar Mass Distribution



GPC/SEC - Conditions

Sample concentration	2,00 g/l	Inject volume	200 µl
Flow rate	1,00 ml/min	Temperature	160 °C
Solvent	1,2,4-trichlorobenzene		
Precolumn [8 x 50 mm]	PSS POLEFIN 10µm		
Columns [analytical, each 8 x 300 mm]	PSS POLEFIN 10µm linear XL / linear XL / linear XL / linear XL		
Data Acquisition Software	PSS WinGPC	Operator	XXXXXXXXXX [} œ

GPC/SEC - Results

Detector	Mw [Da]	Mn [Da]	Mp [Da]	PDI [Mw/Mn]
GPC-IR4-CH2	840	720	770	1,17

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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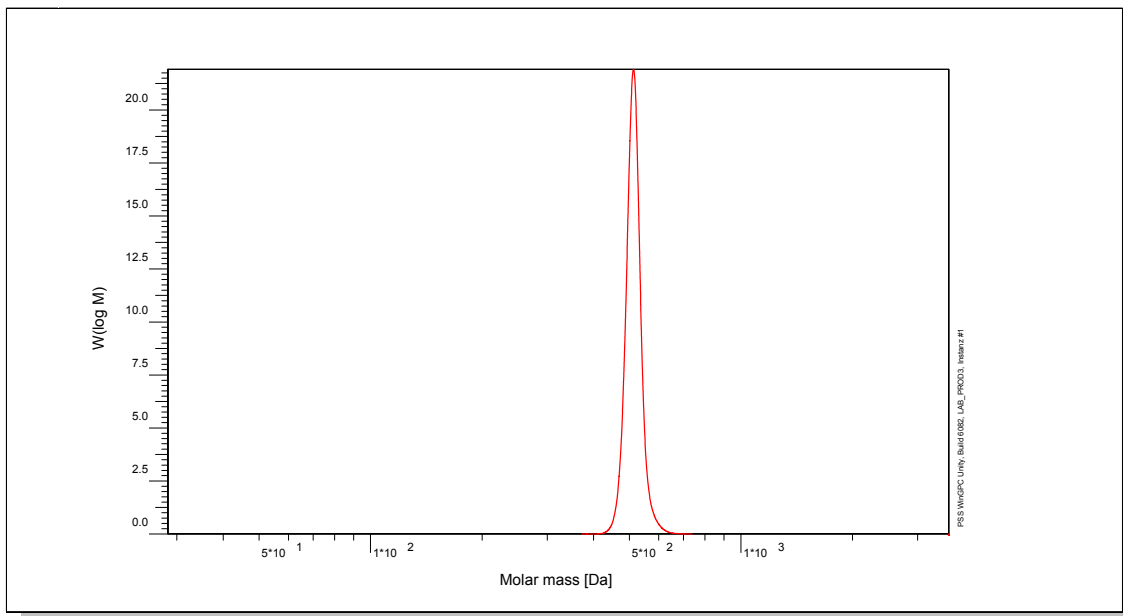

 Dr. J. Preis
 production manager



Certificate of Analysis

Polymer type: Oligo(ethylene) monodisperse
 Part No: PSS-OE500
 Lot No: C36

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 5µm	Temperature	23,0° C
Columns [analytical, each 8 x 300 mm]	PSS SDV 5µm 100Å / 1 000Å		
Data Acquisition Software	PSS WinGPC	Operator	S.Fugmann

GPC/SEC - Results

Detector	Mw [Da]	Mn [Da]	Mp [Da]	PDI [Mw/Mn]
PSS SECcurity RI	507	507	507	1,00

Note:

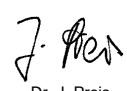
Mw = Weight average molecular weight
 Mn = Number average molecular weight
 Mp = Molar mass at the peak maximum
 PDI = Polydispersity Index

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

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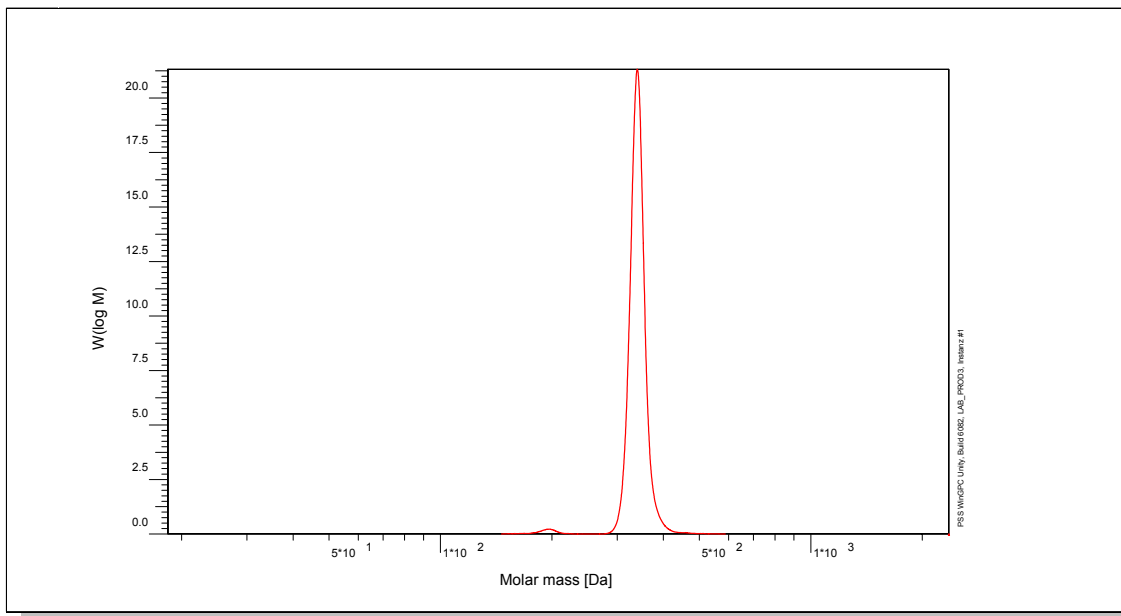

 Dr. J. Preis
 production manager



Certificate of Analysis

Polymer type: Oligo(ethylene) monodisperse
 Part No: PSS-OE340
 Lot No: C24

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 5µm	Temperature	23,0° C
Columns [analytical, each 8 x 300 mm]	PSS SDV 5µm 100Å / 1 000Å	Operator	S.Fugmann
Data Acquisition Software	PSS WinGPC		

GPC/SEC - Results

Detector	Mw [Da]	Mn [Da]	Mp [Da]	PDI [Mw/Mn]
PSS SECcurity RI	338	338	338	1,00

Note:

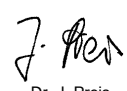
Mw = Weight average molecular weight
 Mn = Number average molecular weight
 Mp = Molar mass at the peak maximum
 PDI = Polydispersity Index

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

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 Dr. J. Preis
 production manager

