

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.

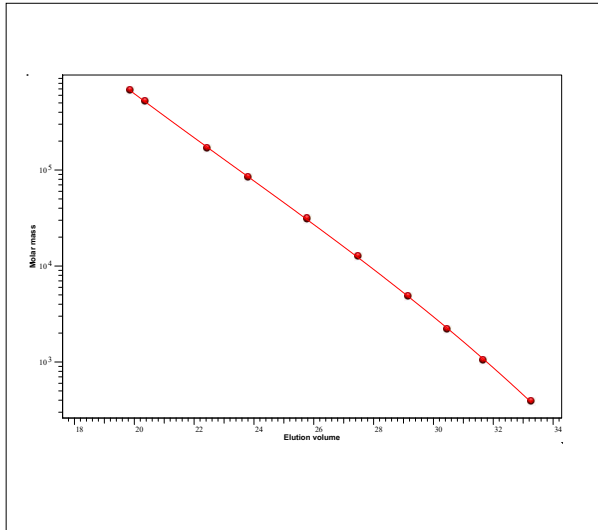
Patrick Kunzweiler

Quality Manager
Liquid Phase Separation Division

Certificate of Analysis

Product: Kit Poly(isobutylene)
 Part No: PSS-PIBKIT
 Lot No: PIBKIT-10

GPC/SEC - Calibration Curve



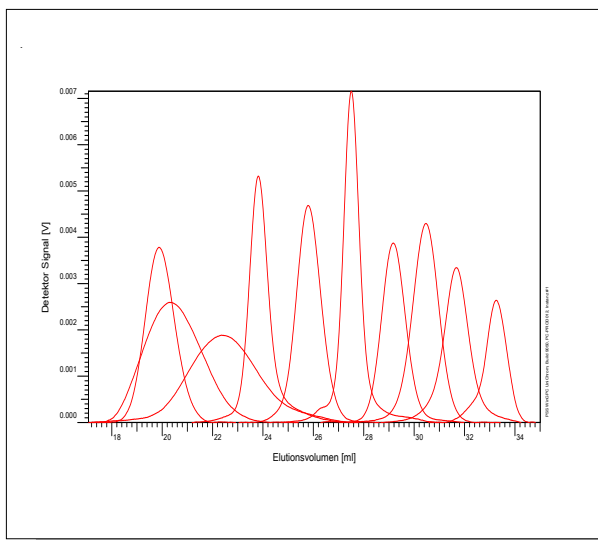
GPC/SEC - Calibration Table

Elution volume [ml]	Mp [Da]	Polymer Lot No:	Polymer Part No:
19,88	674000	PIB3010	PSS-PIB700K
20,36	520000	PIB280917	PSS-PIB600K
22,44	168000	PIB290917	PSS-PIB210K
23,82	83100	PIB150705	PSS-PIB80K
25,80	31000	PIB190705	PSS-PIB30K
27,50	12500	PIB100705	PSS-PIB12K
29,17	4800	PIB140205	PSS-PIB4.7K
30,47	2200	PIB220205	PSS-PIB2.1K
31,67	1040	PIB230205	PSS-PIB1K
33,27	390	PIB4	PSS-PIB390

Note:

Mp = Molar mass at the peak maximum

GPC/SEC - Polymer Overlay



GPC/SEC - Calibration Conditions

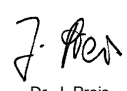
Solvent: Tetrahydrofuran
 Flow rate: 1,00 ml/min
 Precolumn [8 x 50 mm]: PSS SDV 5µm
 Columns [8 x 300 mm]: PSS SDV 5µm 10e3Å / 10e5Å / 10e6Å
 Temperature: 23 °C
 Inject volume: 20 µl
 Internal standard: Toluene at 37,30 ml
 Data Acquisition Software: PSS WinGPC
 Calibration by: A.Klein

Fit quality

Fit-type: Polynomial 3
 R: 0,999955

Storage: Store the tightly recapped polymer standard in a dry, dark, cool area; e.g. a refrigerator (4 °C).
Date of expiry: 2032/03/31 (See also product label.)
Date of approval: 2023/03/01

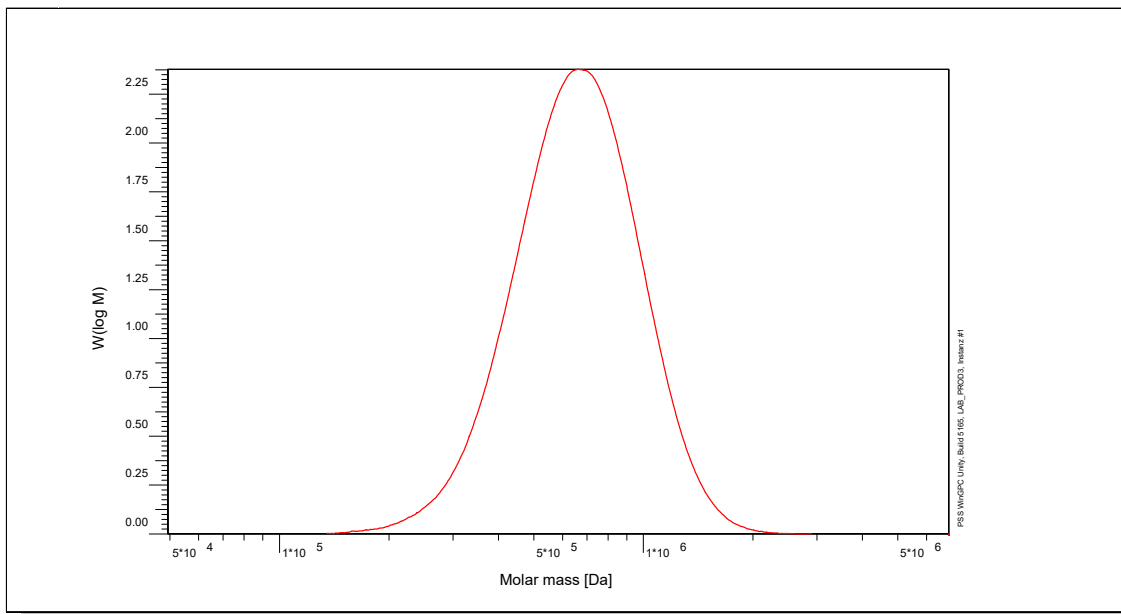
Manufacture control according to PSS method of analysis


 Dr. J. Preis
 production manager

Certificate of Analysis

Polymer type: Poly(isobutylene)
 Part No: PSS-PIB700K
 Lot No: PIB3010

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 10e3Å / 10e5Å / 10e6Å	Operator	S. Fugmann
Data Acquisition Software	PSS WinGPC		

GPC/SEC - Results

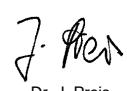
Detector	Mw [Da]	Mn [Da]	Mp [Da]	PDI [Mw/Mn]
PSS SECcurity RI	722000	578000	674000	1,25

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: 2032/03/31 (See also product label.)
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Manufacture control according to PSS method of analysis

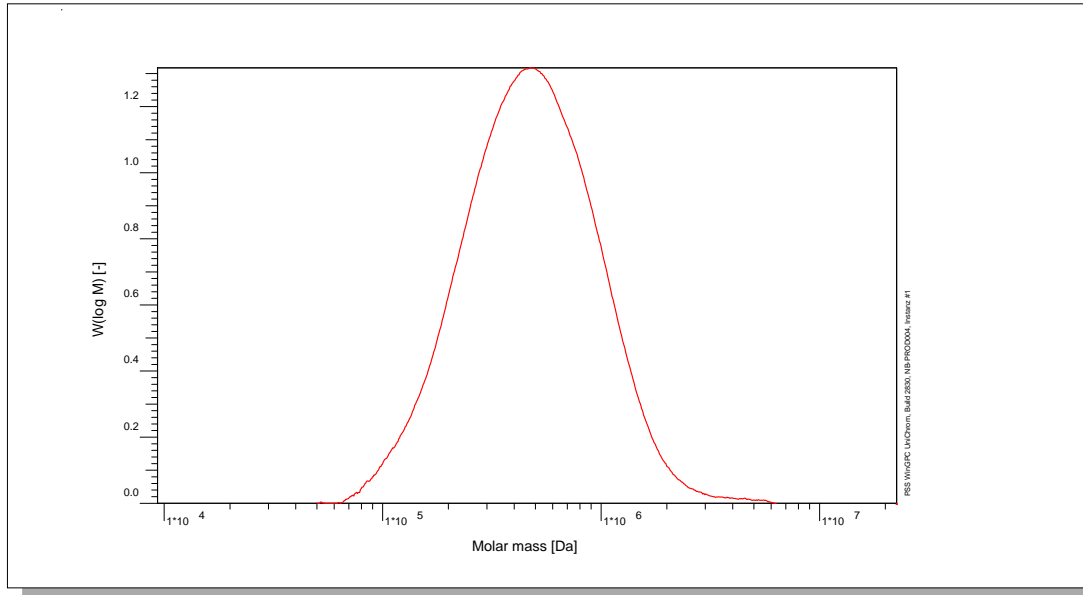

 Dr. J. Preis
 production manager



Certificate of Analysis

Polymer type: Poly(isobutylene)
 Part No: PSS-PIB600K
 Lot No: PIB280917

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 °C
Columns [analytical, each 8 x 300 mm]	PSS SDV 5µm 10e3Å / 10e5Å / 10e6Å		
Data Acquisition Software	PSS WinGPC	Operator	J.Preis

GPC/SEC - Results


Detector	Mw [Da]	Mn [Da]	Mp [Da]	PDI [Mw/Mn]
PSS SECcurity RI	564000	354000	520000	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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Date of approval: 2023/03/01

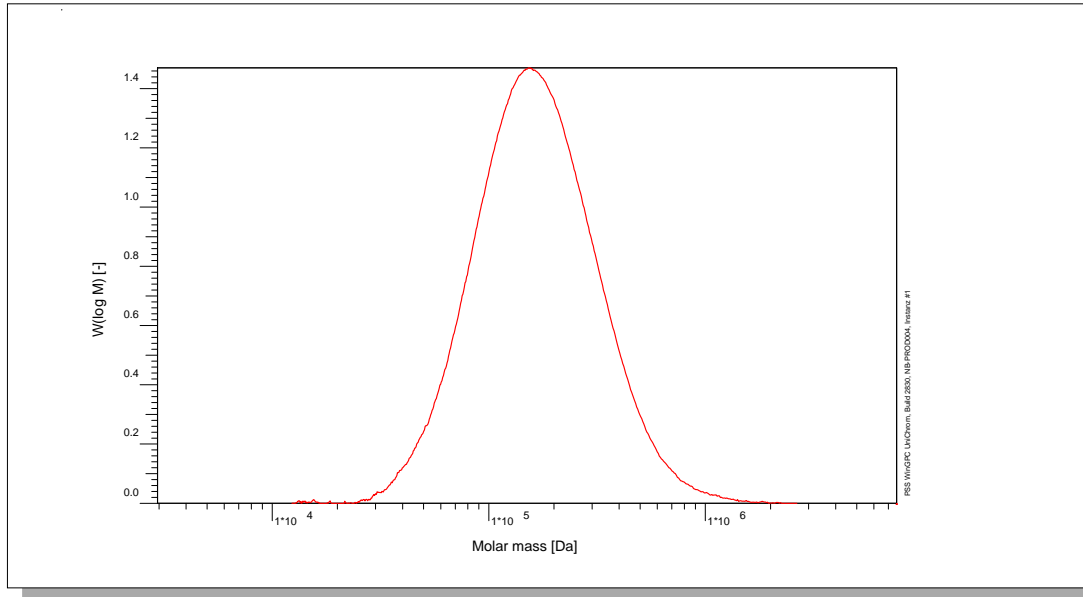
Manufacture control according to PSS method of analysis


 Dr. J. Preis
 production manager

Certificate of Analysis

Polymer type: Poly(isobutylene)
 Part No: PSS-PIB210K
 Lot No: PIB290917

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 °C
Columns [analytical, each 8 x 300 mm]	PSS SDV 5µm 10e3Å / 10e5Å / 10e6Å		
Data Acquisition Software	PSS WinGPC	Operator	J.Preis

GPC/SEC - Results


Detector	Mw [Da]	Mn [Da]	Mp [Da]	PDI [Mw/Mn]
PSS SECcurity RI	192000	130000	168000	1,47

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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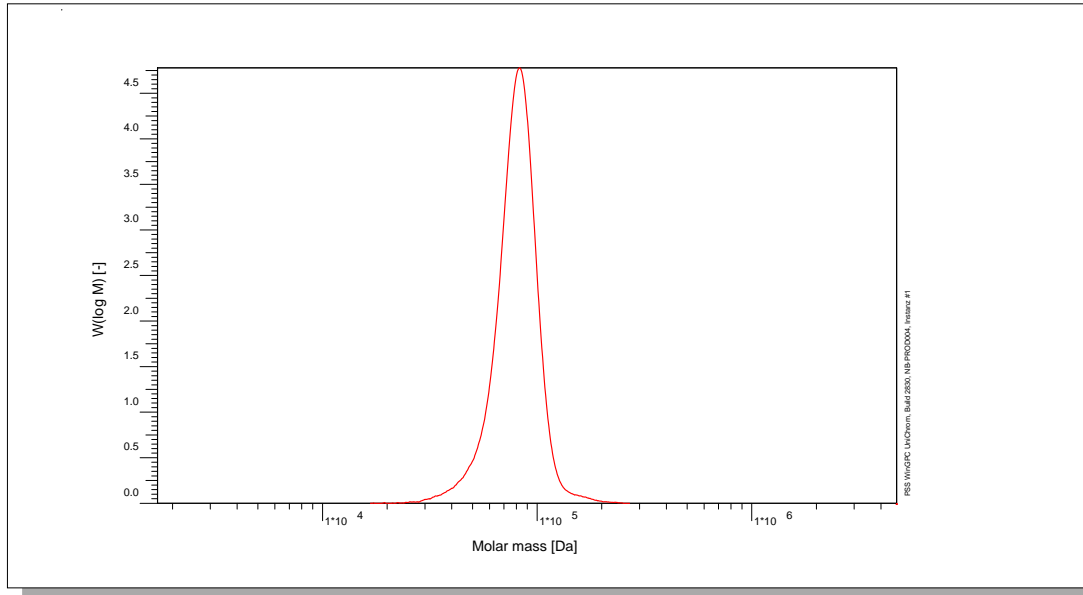
Manufacture control according to PSS method of analysis


 Dr. J. Preis
 production manager

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Polymer type: Poly(isobutylene)
 Part No: PSS-PIB80K
 Lot No: PIB150705

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 °C
Columns [analytical, each 8 x 300 mm]	PSS SDV 5µm 10e3Å / 10e5Å / 10e6Å		
Data Acquisition Software	PSS WinGPC	Operator	J.Preis

GPC/SEC - Results


Detector	Mw [Da]	Mn [Da]	Mp [Da]	PDI [Mw/Mn]
PSS SECcurity RI	82000	76100	83100	1,08

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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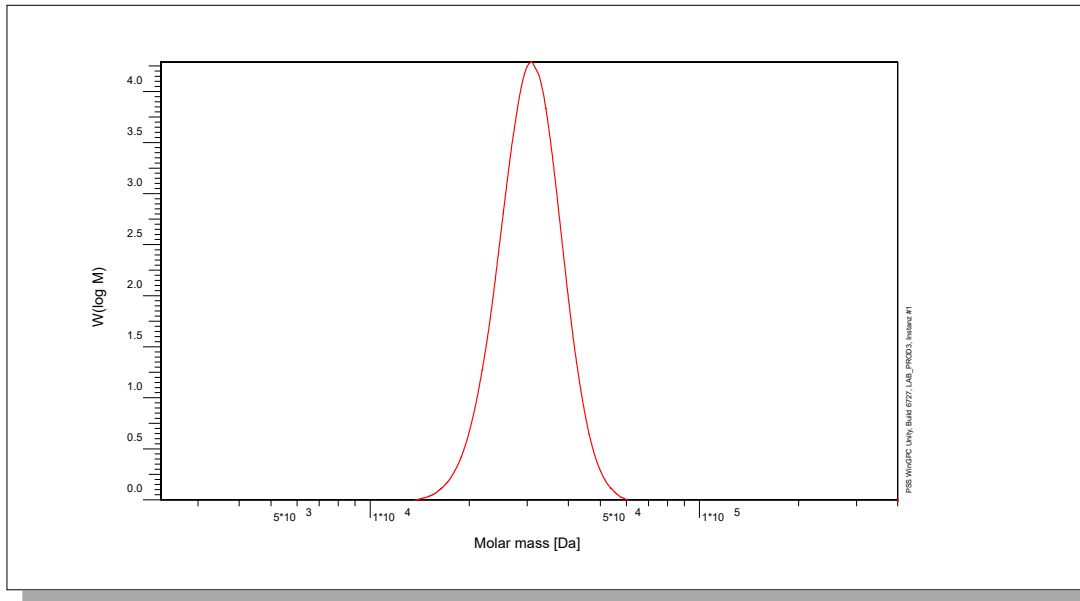
Manufacture control according to PSS method of analysis


 Dr. J. Preis
 production manager

Certificate of Analysis

Polymer type: Poly(isobutylene)
 Part No: PSS-PIB30K
 Lot No: PIB190705

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 °C
Columns [analytical, each 8 x 300 mm]	PSS SDV 5µm 10e3Å / 10e5Å / 10e6Å	Operator	S. Fugmann
Data Acquisition Software	PSS WinGPC		

GPC/SEC - Results


Detector	Mw [Da]	Mn [Da]	Mp [Da]	PDI [Mw/Mn]
PSS SECcurity RI	31500	29800	31000	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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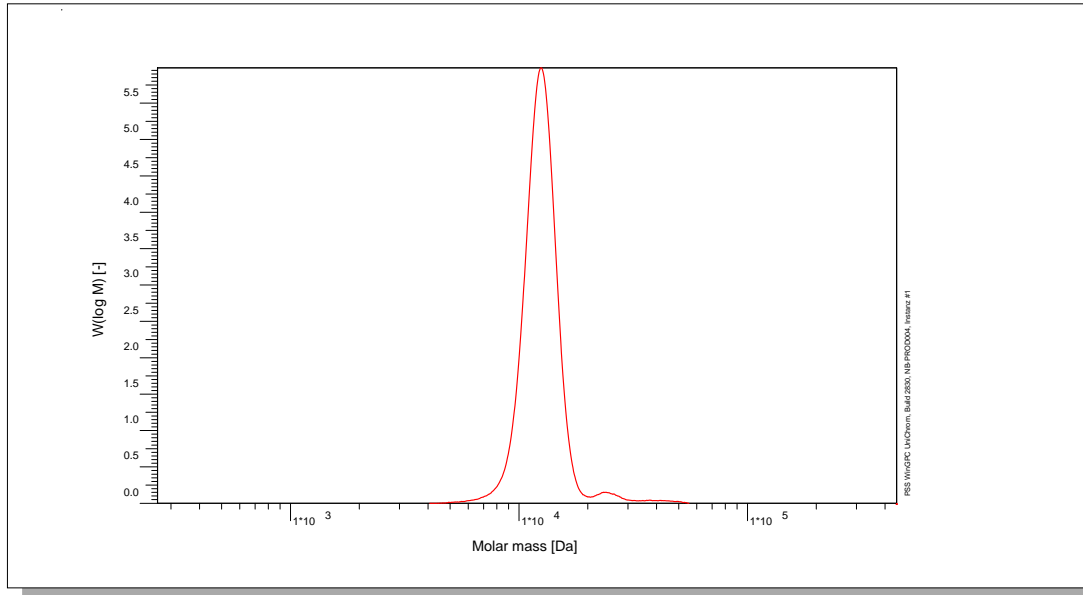
Manufacture control according to PSS method of analysis


 Dr. J. Preis
 production manager

Certificate of Analysis

Polymer type: Poly(isobutylene)
 Part No: PSS-PIB12K
 Lot No: PIB100705

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 °C
Columns [analytical, each 8 x 300 mm]	PSS SDV 5µm 10e3Å / 10e5Å / 10e6Å		
Data Acquisition Software	PSS WinGPC	Operator	J.Preis

GPC/SEC - Results


Detector	Mw [Da]	Mn [Da]	Mp [Da]	PDI [Mw/Mn]
PSS SEccurity RI	12900	12300	12500	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).
Date of expiry: 2032/03/31 (See also product label.)
Date of approval: 2023/03/01

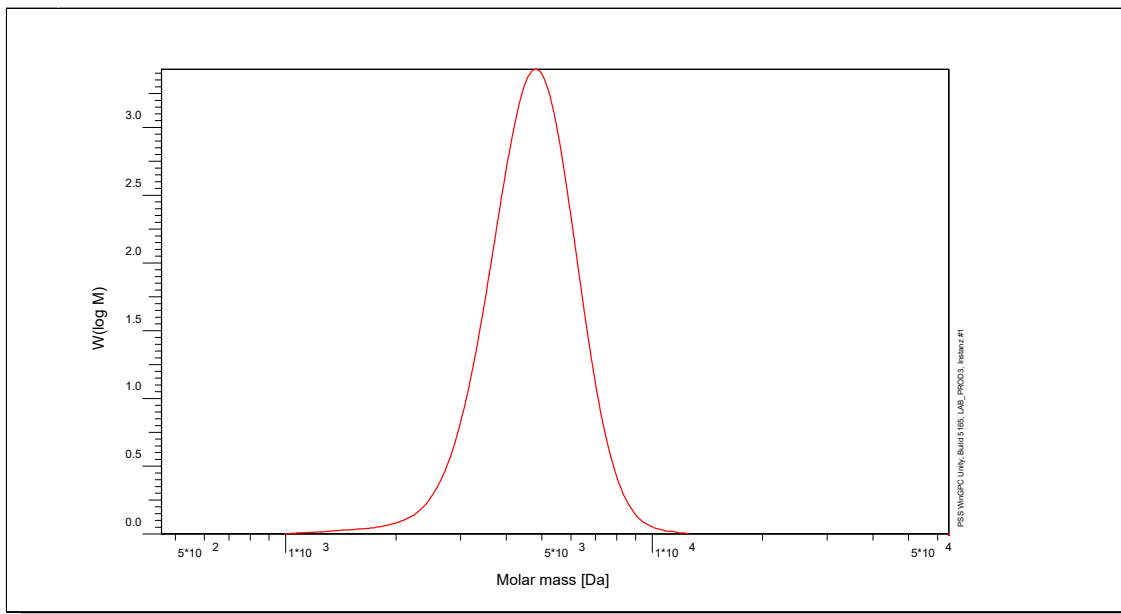
Manufacture control according to PSS method of analysis


 Dr. J. Preis
 production manager

Certificate of Analysis

Polymer type: Poly(isobutylene)
 Part No: PSS-PIB4.7K
 Lot No: PIB140205

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 10e3Å / 10e5Å / 10e6Å	Operator	S. Fugmann
Data Acquisition Software	PSS WinGPC		

GPC/SEC - Results

Detector	Mw [Da]	Mn [Da]	Mp [Da]	PDI [Mw/Mn]
PSS SECcurity RI	4840	4470	4800	1,08

Note:

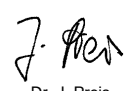
- Mw = Weight Average Molecular Weight
- Mn = Number Average Molecular Weight
- Mp = Molar Mass at the Peak Maximum
- PDI = Polydispersity Index

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

Date of expiry: 2032/03/31 (See also product label.)

Date of approval: 2023/03/01

Manufacture control according to PSS method of analysis

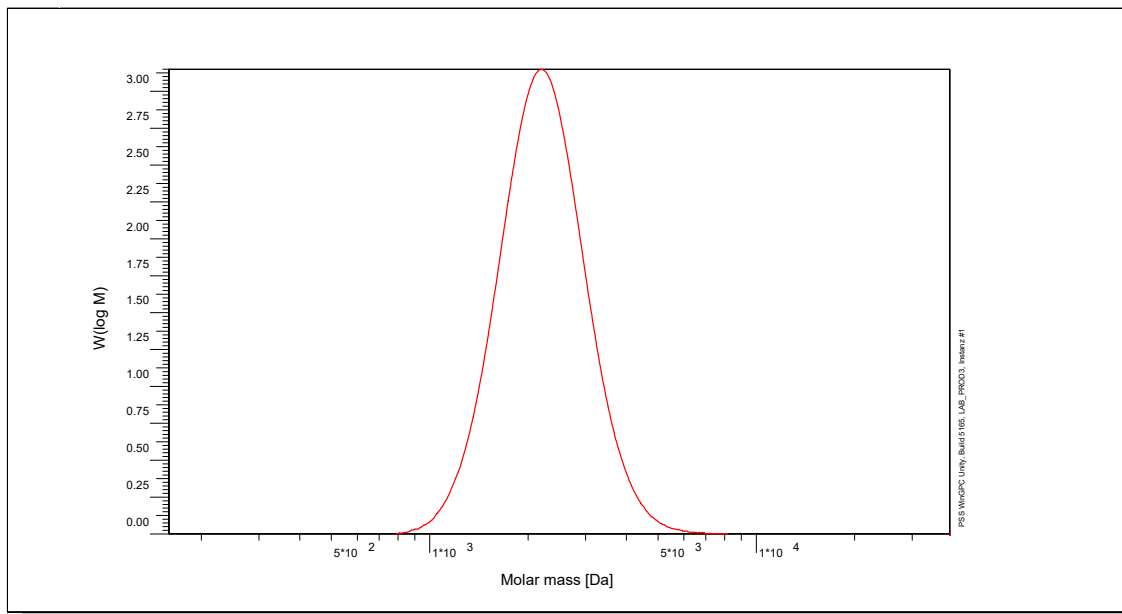

 Dr. J. Preis
 production manager



Certificate of Analysis

Polymer type: Poly(isobutylene)
 Part No: PSS-PIB2.1K
 Lot No: PIB220205

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 10e3Å / 10e5Å / 10e6Å	Operator	S. Fugmann
Data Acquisition Software	PSS WinGPC		

GPC/SEC - Results

Detector	Mw [Da]	Mn [Da]	Mp [Da]	PDI [Mw/Mn]
PSS SECcurity RI	2300	2100	2200	1,10

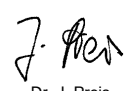
Note:

- 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: 2032/03/31 (See also product label.)
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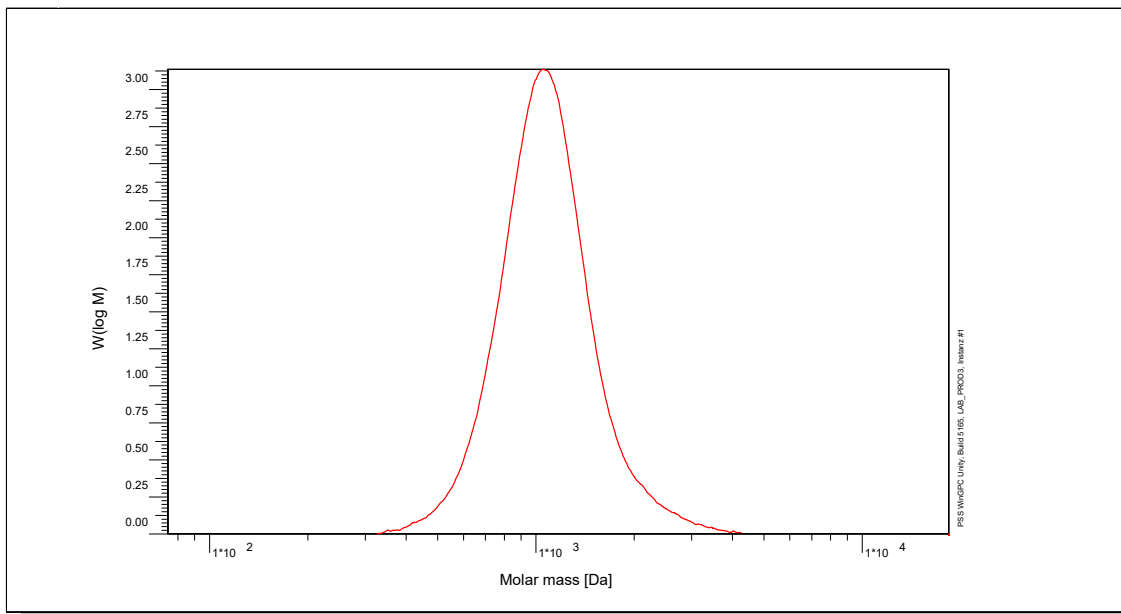
Manufacture control according to PSS method of analysis


 Dr. J. Preis
 production manager

Certificate of Analysis

Polymer type: Poly(isobutylene)
 Part No: PSS-PIB1K
 Lot No: PIB230205

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 10e3Å / 10e5Å / 10e6Å	Operator	S. Fugmann
Data Acquisition Software	PSS WinGPC		

GPC/SEC - Results

Detector	Mw [Da]	Mn [Da]	Mp [Da]	PDI [Mw/Mn]
PSS SECcurity RI	1140	1010	1040	1,12

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

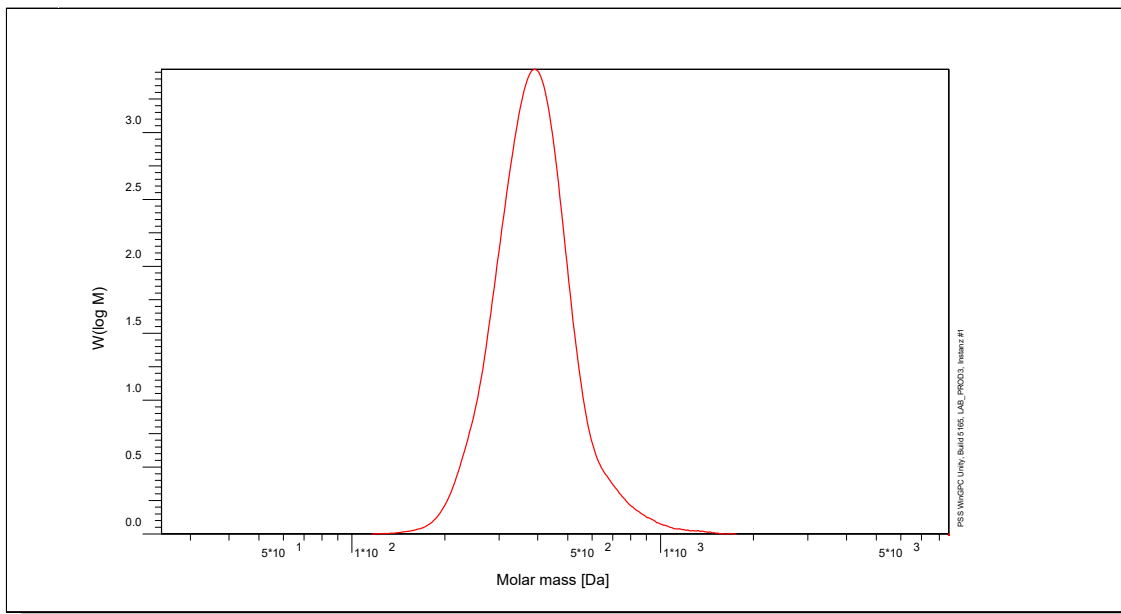

 Dr. J. Preis
 production manager



Certificate of Analysis

Polymer type: Poly(isobutylene)
 Part No: PSS-PIB390
 Lot No: PIB4

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 10e3Å / 10e5Å / 10e6Å	Operator	S. Fugmann
Data Acquisition Software	PSS WinGPC		

GPC/SEC - Results

Detector	Mw [Da]	Mn [Da]	Mp [Da]	PDI [Mw/Mn]
PSS SECcurity RI	390	370	390	1,06

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

