

Shodex™



HPLC Columns

MANUAL

STANDARD S (PS)

SHOWA
DENKO
EUROPE

Columns manufactured by Showa Denko K.K Japan
Made in Japan

Shodex HPLC Columns
Europe, Middle East, Africa, Russia

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Operation Manual

Shodex™ STANDARD S - series

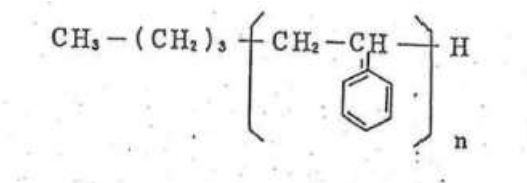
(Please read this manual carefully before using the column to ensure performance and life.)

1. Introduction

Chromatographic determinations of the molecular weight (M.W.) properties of polymers, either in organic or aqueous phase, rely on calibration with Standards of highly characterized M.W.s for accurate results. Expressed simply, Size Exclusion (or Gel Permeation) Chromatography enables polymer molecules of different sizes in solution to be separated from one another, such that the large molecules elute first and small molecules elute last. Since the molecular size in solution (hydrodynamic volume) is related to M.W., a picture of the entire M.W. Distribution (M.W.D) may be obtained quickly and simply. This is in great contrast to the "absolute" techniques of M.W. determination which frequently could take half a day per sample to define a single average M.W.

Polymer Standards are thus in integral part of any quantitative Size Exclusion Chromatography. These Standards need to be highly characterized by as many absolute and chromatographic techniques as possible to define the M.W. averages and M.W.D. The closer the value of the M.W.D. is to unity, the sharper will be the polymer peak and the better the material will be for a Calibration Standard.

Structure of Polystyrene:



n may = 5 to 200,000

2. Preparation of solutions

It is recommended as a general principle that the polymer concentration in solution and the injection volume both be kept as low as possible concurrent with the sensitivity of the system to reduce as much as possible deleterious effects such as column broadening and viscous trapping. This becomes even more critical when very high molecular weights are involved. Solutions

should be made up at room temperature only. Typical values for concentration and injection are suggested below:

M.W. Range	Concentration	Injection Volume
500-700,000	0.05% wv	20 - 200 μ l
1,000,000 and above	0. Wv below	20 - 200 μ l

With M.W.s above 1,000,000 care must be taken to avoid degradation of polymer when making up a solution. It is recommended that gentle agitation by hand is used at intervals throughout a 24hr period, by which time complete dissolution will normally occur.

3. Storage

Polystyrene Standards are extremely stable and have a long shelf life when stored under reasonable conditions, for example room temperature of 20 to 25°C, and either in their box or in a drawer in the dark. They should not be stored in direct sunlight or at elevated temperatures.

4. SM-105

Std. No.	NMR Mn	VPO Mn	MO Mn	I.V. Mv	LALLS Mw	GPC/SEC			
						Mn	Mw	Mp	Mw/Mn
S-1.32	1,191	1,173	+	1,660	+	1,185	1,284	1,320	1.09
S-3.25	3,050	3,200	+	3,190	+	3,091	3,212	3,252	1.04
S-9.25	+	+	+	9,303	9,375	8,995	9,216	9,243	1.03
S-28.5	+	+	26,890	29,500	28,720	27,574	28,577	28,517	1.03
S-66.0	+	+	61,200	62,095	66,000	64,571	66,437	66,001	1.03
S-156	+	+	153,600	158,770	162,000	152,345	156,055	156,528	1.03
S-514	+	+	205,000	498,000	506,000	480,625	504,718	514,091	1.05
S-1030	+	+	+	992,600	1,024,700	979,098	1,027,542	1,029,933	1.05
S-2310	+	+	+	2,505,000	2,290,000	2,233,870	2,304,627	2,311,908	1.04
S-3040	+	+	+	3,021,800	2,973,000	2,905,595	2,999,179	3,038,028	1.04

(Lot No. 00602)

5. SL-105

Std. No.	NMR Mn	VPO Mn	I.V. Mv	LALLS Mw	GPC/SEC			
					Mn	Mw	Mp	Mw/Mn
S-0.580	528	535	643	+	497	581	580	1.17
S-1.06	967	1,007	943	+	918	1,018	1,058	1.11
S-1.32	1,191	1,173	1,660	+	1,185	1,284	1,320	1.09
S-1.70	1,690	1,630	1,720	+	1,589	1,674	1,699	1.06
S-2.45	2,390	2,430	2,790	+	2,318	2,414	2,448	1.05
S-3.25	3,050	3,200	3,190	+	3,091	3,212	3,252	1.04
S-5.05	+	4,720	4,950	+	4,755	4,992	5,049	1.05
S-7.00	+	6,725	6,840	+	6,855	7,075	6,991	1.04
S-11.6	+	+	10,720	11,000	11,356	11,687	11,627	1.03
S-22.0	+	+	21,715	22,000	21,408	22,091	21,900	1.03

(Lot No. 10103)

6. SH-75

Std. No.	NMR Mn	VPO Mn	MO Mn	I.V. Mv	LALLS Mw	GPC/SEC			
						Mn	Mw	Mp	Mw/Mn
S-650	+	+	580,000	619,910	638,000	601,521	623,381	651,502	1.04
S-1030	+	+	+	1,031,400	1,028,500	1,002,656	1,049,063	1,029,160	1.05
S-1570	+	+	+	1,594,000	1,530,200	1,467,256	1,551,363	1,574,106	1.06
S-2250	+	+	+	2,236,900	2,276,000	2,201,646	2,290,525	2,246,970	1.05
S-2880	+	+	+	2,842,000	2,921,000	2,769,257	2,860,638	2,884,277	1.04
S-4000	+	+	+	3,943,100	4,055,840	3,769,515	3,980,021	4,009,185	1.06
S-8500	+	+	+	8,348,700	7,930,747	6,856,082	8,057,760	8,502,788	1.20

(Lot No.90611)

7. SH-75

Std. No.	VISCOMETRY Mv	LIGHT SCATTERING Mw	GPC/SEC			
			Mn	Mw	Mp	Mw/Mn
S-630	631,615	630,390	614,823	630,556	629,442	1.03
S-1010	1,010,857	1,030,800	973,509	1,020,881	1,007,109	1.05
S-1460	1,506,669	1,420,000	1,399,587	1,443,910	1,458,263	1.04
S-1950	1,872,135	1,910,000	1,863,324	1,923,448	1,943,732	1.04
S-3150	3,035,871	3,170,000	3,007,831	3,131,335	3,153,583	1.05
S-3900	3,503,005	4,000,000	3,634,273	3,794,078	3,898,399	1.05
S-7300	6,530,184	7,308,600	6,892,445	7,141,307	7,287,402	1.04