

# Shodex<sup>®</sup>

## 充てんカラム取扱説明書

Standard Operation Procedure

### SUGAR KS-800 シリーズ

SUGAR KS-800 Series

[必ずお読み下さい]

この度は Shodex 製品をお買い上げいただき誠にありがとうございます。  
カラムライフや性能を永く保持してご使用いただくために、この取扱説明書を  
読んでからご使用ください。

Thank you for purchasing a Shodex product. Prior to use, be sure to  
read this instruction manual so that the maximum service life and  
performance of your column can be achieved.



SHOWA  
DENKO

## 1. Introduction

Shodex SUGAR KS-800 series are packed with ionexchange resin gels of sulfonated styrene-divinylbenzene copolymer. They are Designed for High-speed and high-performance liquid chromatography. They are capable of separating carbohydrates such as monosaccharides, disaccharides, oligosaccharides and sugaralcohols, as well as nonionic water-soluble substance, with distilled water or 0.001-Mol sodium hydroxide aqueous solution used as the mobile phase.

The columns demonstrate an excelling performance, particularly, in high-speed analysis of saccharides present in living bodies, food, pharmaceuticals and industrial wastewater.

## 2. Specifications

### 1) Nomenclature, exclusion limit and number of theoretical plates

Nomenclature	Exclusion limit	Number of theoretical plate /30cm <sup>1)</sup>
SUGAR KS-801	$1 \times 10^3$	17,000 minimum
SUGAR KS-802	$1 \times 10^4$	17,000 minimum
SUGAR KS-803	$5 \times 10^4$	17,000 minimum
SUGAR KS-804	$4 \times 10^5$	17,000 minimum
SUGAR KS-805	$5 \times 10^6$	9,000 minimum
SUGAR KS-806	$5 \times 10^7$ (est)	9,000 minimum
SUGAR KS-G	Guard column for KS-800 series columns	

NOTE 1) : Specimen, Ethylene glycol(KS-801~803), Glucose(KS-804~806); mobile phase distilled water; flow rate 1mL/min; column temperature 50°C.

2) Size: ID 8mm, length 300mm

(exclusive of KS-G of 6mm in ID and 50mm in length.)

3) End fitting: Internally-threaded type, No.10-32 UNF.

4) Material: SUS 316

5) Packing: Strong cation-exchange resin gels.

6) In-column mobile phase: Distilled water

- 7) Maximum working pressure per column: 5MPa
- 8) Maximum working flow rate when column is heated to 50 – 85°C:  
1.5mL/min
- 9) Maximum working temperature: 85°C.

### 3. Mobile phase

- 1) Use distilled water or 0.001-Mol sodium hydroxide aqueous solution as the mobile phase.
- 2) Remove extraneous substances and insolubles from the mobile phase by passing it through a 0.45  $\mu$ m filter into a bottle and thoroughly degas it by, for instance, heating it about 60°C in a hot water bath and shaking in an ultrasonic washing vessel with the ambient air pressure being simultaneously reduce by an aspirator.

Use of solvent degassing device will facilitate the degassing work.

#### Note

Adsorbed sometimes by the packing, molecules of highly hydrophobic specimens are too slow to flow out of the column. In such a case, add ethanol in an amount of 20% maximum to the mobile phase to reduce the adsorptivity.

### 4. Mounting and start-up

- 1) Before mounting the column on the liquid chromatograph, replace the solvent in the chromatograph with the mobile phase.

#### Caution

In replacing a water-insoluble organic solvent, replace it first with a water-soluble organic solvent, such as acetone or ethanol, and then replace the water-soluble solvent with the mobile phase.

- 2) Set the flow rate at 1mL/min.
- 3) Connect the column to the chromatograph in such a way that the arrow mark on the column will point to the direction of the flow.

#### Caution

Do not let the air into the column during the connection.

- 4 Heat the column to 40 – 50°C and start the pump.

### Caution

i) Keep the column pressure below 5MPa per column; otherwise, the column will be ruined.

ii) The Maximum working flow rate depends on the working temperature, as follows:

<u>Working temperature</u>	<u>Maximum working flow rate</u>
50 – 85°C	1.5mL/min
30 – 49°C	1.0mL/min
29°C or below	0.5mL/min

iii) Do not abruptly change the column pressure or flow rate.

iv) Do not heat the column higher than 85°C.

### 5. Pre-treatment of specimen

1) When the specimen is solid, dissolve it, using some of the degassed mobile phase.

#### Note

Do not use any other solvent; otherwise, the solute sometimes settles in the mobile phase to plug the column.

2) When the specimen is liquid and contains an organic solvent such as alcohol, dilute it with the mobile phase so as to reduce concentration of the organic solvent to 20% maximum; otherwise, the column performance will deteriorate.

3) Pass the specimen through a 0.45  $\mu$  m filter to remove extraneous substances and insolubles. Use of the disposable filter unit Shodex DT is recommended.

4) When the specimen contains proteins, add 2 or 3 drops of distilled water in which sulfosalicylic acid is dissolved at the rate of 20g per deciliter, to 5mL of the specimen, stir and pass it through a 0.45  $\mu$  m filter to remove the proteins.

### 6. Dismounting and storage

1) Set the flow rate at 0.2mL/min, turn off the heater and let the column stand as is until it cools down to room temperature.

- 2) Stop the pump and dismount the column.
- 3) Cap both ends of the column, place it back in the same case in which it was delivered from the manufacturer, and store the case in a place where the temperature does not vary more than  $\pm 5^{\circ}\text{C}$  from the ambient temperature.

Caution

- i) Do not remove the end fittings of the column; otherwise, its performance will deteriorate or the column may be rendered unserviceable.
- ii) Do not let the in-column solvent freeze during storage; otherwise, the column will swell and become unserviceable.
- iii) Storage at abnormally high temperatures will also cause the column to swell and become unserviceable.

## 7. Band broadening

Adsorption of organics and metal ions by the packing sometimes causes the bands of fructose and glucose to be broadened.

If such adsorption occurs, pass 0.2N NaOH aqueous solution through the column at a rate of 0.5mL/min to desorb them and completely replace the solution with distilled water. If, however, the band broadening is moderate, injection of 40  $\mu$  L of 1N NaOH aqueous solution into the column will suffice to carry out the desorption.

## 8. Guard column and column jacket

Use of precolumn, SUGAR KS-G, is recommended immediately before the column to protect the packing from contamination with pollutants or readily adsorbable substances, such as metal ions and amino compounds.

## 9. Performance test

The performance of the column can be checked by calculating the number of theoretical plates under the following conditions.

1) Specimen and Injection amount

KS-801	1.0% ethylene glycol aqueous solution	5 μ L
KS-802	2.5% ethylene glycol aqueous solution	5 μ L
KS-803	0.5% ethylene glycol aqueous solution	15 μ L
KS-804	0.8% glucose aqueous solution	5 μ L
KS-805	0.4% glucose aqueous solution	5 μ L
KS-806	0.8% glucose aqueous solution	5 μ L

2) Mobile phase: Distilled water

3) Flow rate: 1.0mL/min

4) Column temperature: 50°C

5) Detector: High-sensitivity refractive index detector  
such as Shodex RI

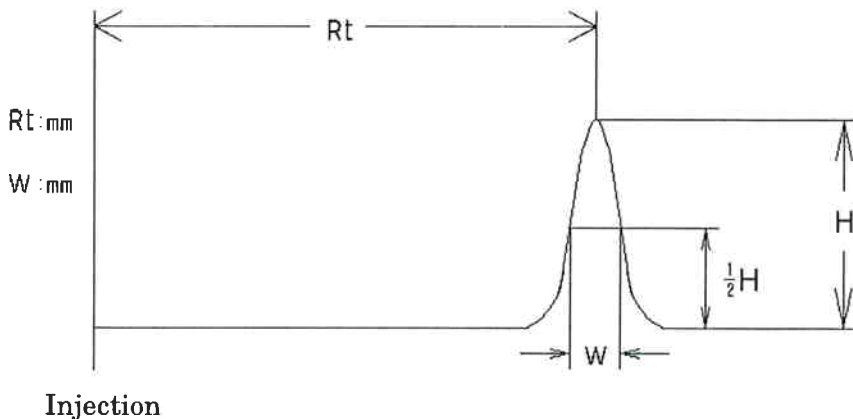
6) Calculation formula

$$NTP=5.54 \times (Rt/W)^2$$

where NTP: Number of theoretical plate

Rt: Retention time

W: Peak half width



## 10. Warranty

1. Showa Denko K. K. warrants that the Shodex Column, at the time of delivery to the user, will conform to the specification of the attached Certificate of Analysis, if the Shodex Column is used in accordance with the operating manual. The foregoing warranty is exclusive and is in lieu of all other warranties with respect to the Shodex Column, whether written, oral, implied, statutory or otherwise. No warranties by Showa Denko K. K. are implied or otherwise created, including, but not limited to, the warranty of merchantability and fitness for particular purposes.

2. Any claim of inconformity to the specification must be notified to Showa Denko K.K. within ten (10) days after delivery to the user. User's exclusive remedy and Showa Denko K.K.'s exclusive liability for such claim are limited to the replacement of the Shodex Column in question. In no event is Showa Denko K.K. liable for any indirect, incidental or consequential damage arising out of in connection with the Shodex Instrument, whether or not such damage is allegedly based on breach of warranty, negligence or otherwise.

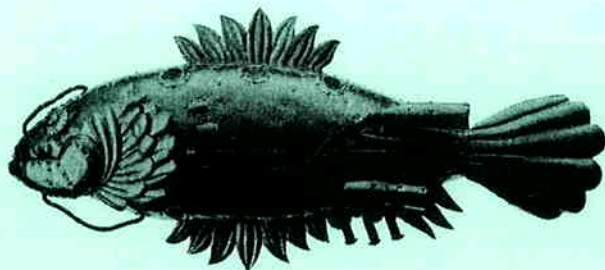
3. No warranty is made in any of the following cases:

- 1) If the Shodex Column is not used in accordance with the operating manual
- 2) If the Shodex Column is remodelled by anyone other than person or firm designated by Showa Denko K.K.
- 3) If the Shodex Column is disposed of
- 4) If the Shodex Column is resold by the user without giving prior written notice to Showa Denko K.K.
- 5) If the performance of the Shodex Column is not conform to the specification of the attached Certificate of Analysis due to any of the reasons below:
  - a) Computer virus
  - b) Impurities contained in the sample, reagent, gas air or cooling water provided by the user
  - c) Breakdown or malfunction of equipment, apparatus or component used in combination with the Shodex Column
  - d) Force majeure such as fire, earthquake, flood, other natural disaster, rime, riot, act of terrorism, war or radioactive contamination

4. In no event is Showa Denko K.K. liable for (i) the results of analyses or preparations using the Shodex Column or any portion of the same, including, but not limited to, the reliability, accuracy, efficacy and safety of said results, and (ii) the occupational hazard in the use of the Shodex Column, whether or not such use is made in accordance with the attached Conditions for use.

5. The Shodex Instrument is for laboratory use only. It must not be used for clinical diagnosis. Showa Denko K.K. is not liable for any use of the Shodex Instrument except laboratory use.





総発売元



昭光通商株式会社

ショウデックス部

〒105-8432 東京都港区芝公園1丁目7番13号

- |                             |                               |                  |
|-----------------------------|-------------------------------|------------------|
| ■ 本社                        | TEL:03-3459-5104              | FAX:03-3459-5081 |
| ■ 大阪支店                      | TEL:06-6314-0775              | FAX:06-6314-0772 |
| ■ 福岡支店                      | TEL:092-711-9575              | FAX:092-781-5277 |
| ■ 技術相談専用電話<br>(Shodex 110番) | TEL:03-3459-5110              | FAX:03-3459-1221 |
|                             | E-mail:shodex.lab@shoko.co.jp |                  |

製造元



SHOWA  
DENKO

昭和電工株式会社

化学品部門 特殊化学品事業部

ショウデックス(分離・分析機器)グループ

〒210-0867 神奈川県川崎市川崎区扇町5-1

SHOWA DENKO K. K.

Chemicals Division

Shodex(Separation & HPLC) Group

5-1, Ogimachi, Kawasaki-ku, Kawasaki Kanagawa 210-0867 Japan

SHOKO AMERICA INC.

2853 Janitell Road  
Colorado Springs, CO 80906 USA  
Tel: +1-719-576-1834  
Fax: +1-719-576-1837  
E-mail: shodex@shoko-america.com

SHOWA DENKO EUROPE GmbH

Chemicals & Electronics Dept  
Martin-Kollar-Str.1.D-81829 Munich  
Tel : +49-(0)89-939-962-34  
Fax : +49-(0)89-939-962-50  
E-mail : shodex@sde.de

<http://www.shodex.com>