

# NEWS RELEASE

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## Showa Denko to Launch New *Shodex*<sup>TM</sup> Analytical Columns —Five New Types Developed for SEC and Ion Exchange Chromatography—

Showa Denko (SDK) (TOKYO:4004) will start selling next month five new types of *Shodex*<sup>TM</sup> high-performance liquid chromatography (HPLC) columns, namely, “GPC HK-401,” “GPC HK-405” and “GPC HK-HFIP404L” packed columns for gel permeation chromatography (GPC\*<sup>1</sup>: size exclusion chromatography [SEC\*<sup>2</sup>] using organic solvents) as well as “OHpak<sup>TM</sup> LB-805” packed column for gel filtration chromatography (GFC\*<sup>3</sup>: SEC using aqueous solvents) and “IEC SP-FT 4A” packed column for ion exchange chromatography\*<sup>4</sup>.

The five new analytical columns SDK developed this time feature rapider analysis and higher sensitivity, which has been desired by analytical column users. SDK will continue meeting our customers’ needs by developing columns which enhances accuracy of analysis of target materials in a certain range of molecular weight, as well as those which enable analysis of hardly-soluble polymers and rapid analysis which is desired by users in the fields of medicine manufacturing and biochemistry, even with general analyzers.

SDK will introduce the five new types of packed columns at JASIS 2017 exhibition (Japan Analytical & Scientific Instruments Show) to be held at Makuhari Messe, Japan, from September 6 through 8.

### 1. Three new types in GPC HK Series for environment-friendly ultra rapid analysis

GPC (organic SEC) is the most commonly used method for molecular weight determination of polymers. On the other hand, GPC column uses organic solvent as eluent. In 2016, aiming to realize more environment-friendly GPC column, SDK put on the market “GPC HK-404L” ultra rapid analytical column, which enabled us to shorten the analysis time to one-sixth that of conventional columns and reduce the amount of organic solvent to one-sixth. Uniform base material particles and downsizing of column enabled GPC HK-404L to achieve ultra rapid analysis with less environmental impact. Furthermore, it is not necessary to use different GPC columns for different types of solvents due to a high solvent exchangeability of GPC HK-404L columns. No analytical device for ultra-high-performance liquid chromatography (UHPLC) is needed despite the rapid analysis achieved by GPC HK-404L. Thus, after the launch, sales of GPC HK-404L have been expanding especially in the field of analysis of polymers with molecular weight of 1 million or less, such as polycarbonate.

- 1) “GPC HK-401” and “GPC HK-405” for ultra rapid analysis of polymers with specific range of molecular weight

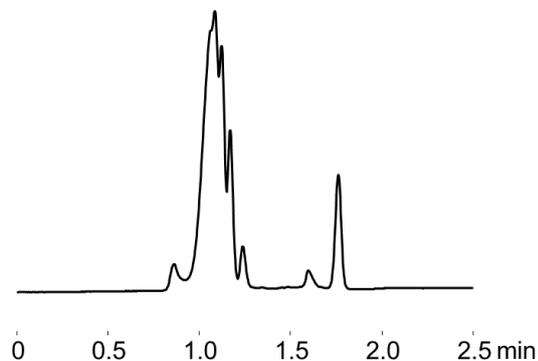
Following the launch of GPC HK-404L, many customers expressed their needs for more detailed analysis of polymers with specific range of molecular weight. To respond to these needs, SDK will launch two new products, namely, “GPC HK-401” and “GPC HK-405.” GPC HK-401 is specialized for low molecular weight range of 100 to 1500, and suitable for the analysis of antioxidant additives contained in polymers. GPC HK-405

enables us to conduct ultra rapid analysis of polymers with molecular weight range of 1 million to 2.5 million, which is not covered by GPC HK-404L.

<Analysis of standard polystyrene>

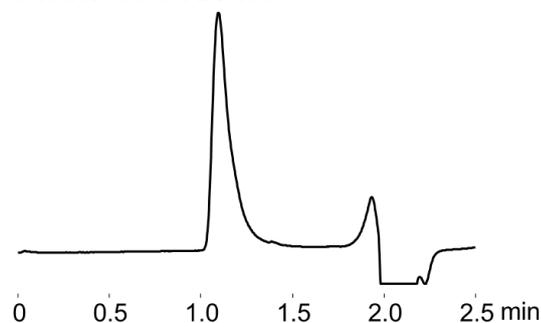
GPC HK-401 and -405 can analyze diverse ranges of molecular weight.

Shodex GPC HK-401



[Analytical conditions]  
Sample: 5 $\mu$ L, 0.2% Polystyrene (Mw: 580)  
Eluent: THF  
Flow rate: 1.0mL/min.  
Detector: UV (254nm) (small cell volume)  
Column temperature: 40°C

Shodex GPC HK-405



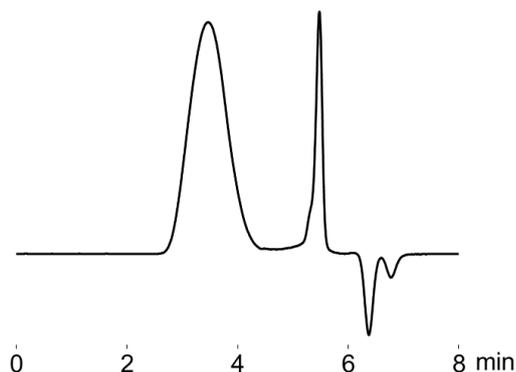
[Analytical conditions]  
Sample: 10 $\mu$ L, 0.2% Polystyrene (Mw: 1,636,000)  
Eluent: THF  
Flow rate: 1.0mL/min.  
Detector: RI (small cell volume)  
Column temperature: 40°C

## 2) “GPC HK-HFIP404L” for rapid analysis of hardly-soluble polymers

GPC HK-HFIP404L, which is to be marketed this time, enables us to conduct rapid analysis of hardly-soluble polymers. Polar polymers such as nylon and polyethylene terephthalate (PET) cannot be dissolved in ordinary organic solvents. Therefore, analysis of hardly-soluble polymers is usually conducted with general GPC device and hexafluoroisopropanol (HFIP) as an eluent. However, since HFIP is a highly expensive solvent, cost reduction in the analysis of hardly-soluble polymers was a problem to be solved as soon as possible. GPC HK-HFIP404L is a GPC column that enables us to shorten the analysis time to be halved, and reduce the amount of HFIP used in the analysis to one-sixth of that used in conventional analysis<sup>\*5</sup>. Thus, GPC HK-HFIP404L drastically reduces costs of analysis of hardly-soluble polymers.

<Analysis of polyamide (nylon 11)>

GPC HK-HFIP404L uses 2.1ml of HFIP and finishes analysis in 8 minutes.



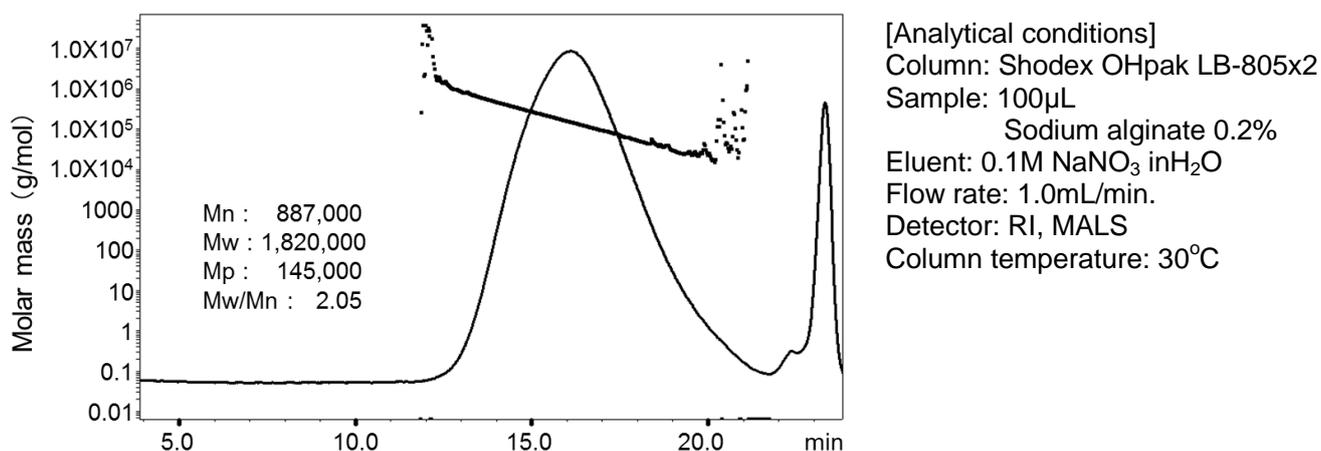
[Analytical conditions]  
Column: Shodex GPC HK-HFIP404L  
Sample: 5 $\mu$ L, 0.25% Nylon 11  
Eluent: 5mM CF<sub>3</sub>COONa in HFIP  
Flow rate: 0.3mL/min.  
Detector: RI (small cell volume)  
Column temperature: 40°C

## 2. “OHpak™ LB-805” MALS compatible aqueous GFC column

SDK offers “OHpak™ Series” GFC columns, which are aqueous SEC columns using hydrophilic polymer base as packing material. OHpak™ Series have a wide variety of pore sizes to choose from, and can analyze wide range of molecular weight. “OHpak™ LB-800 Series” columns, which SDK started to offer in 2015, are compatible with MALS (multi-angle light scattering) detector that can measure absolute molecular weight. OHpak™ LB-800 Series columns feature minimum baseline noise to enable us to detect low molecular samples which were difficult to be detected with conventional columns. OHpak™ LB-800 Series columns are adopted by more and more users centering on the pharmaceutical industry because they make it easy for users to analyze additives to pharmaceuticals and conjugate vaccines which comprise bound proteins and polysaccharides. OHpak™ LB-805, which is to be launched this time, can take accurate measurement of polymers with molecular weight range of 100 thousand to 1 million\*<sup>6</sup>. SDK will continue expanding the lineup of OHpak™ LB-800 Series columns.

<Analysis of sodium alginate with MALS detector>

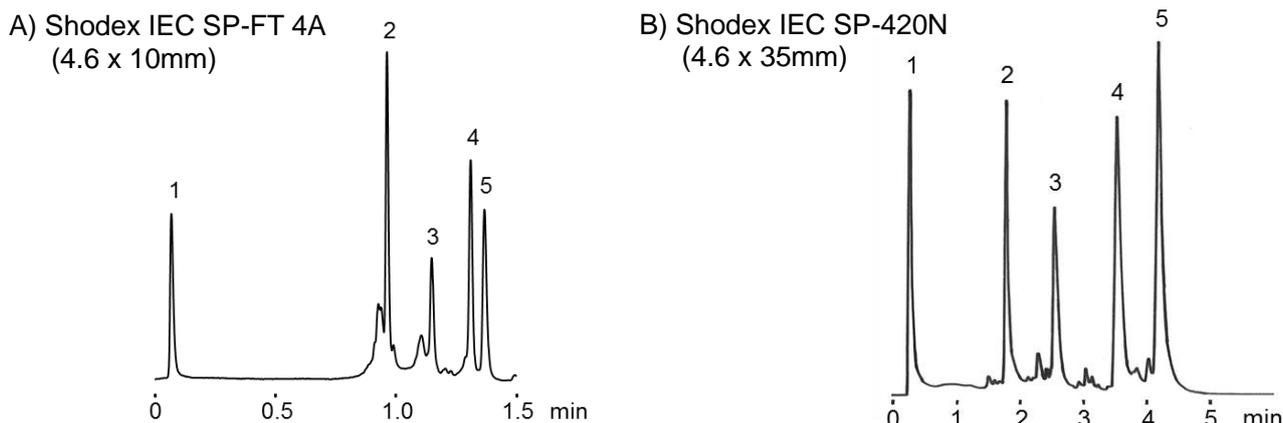
By minimizing noise level, OHpak LB-805 can detect a peak of trace compound.



## 3. “IEC SP-FT 4A” column for ultra rapid analysis with cation exchange chromatography

Ion exchange chromatography is an analysis method used mainly in the field of biochemistry to analyze proteins and nucleic acids. SDK offers a lineup of columns for analysis of proteins and amino acids with a wide variety of bases and functional groups to choose from. IEC SP-FT 4A, which is to be launched this time, has a newly developed base particle structure that enables us to shorten analysis time to one third of that achieved by our conventional rapid column\*<sup>7</sup>. IEC SP-FT 4A enables us to conduct ultra rapid analysis with general HPLC devices as fast as that conducted with UHPLC. It is optimum for continuous analysis of many samples and analysis of trace compounds.

<Comparison with IEC SP-420N (a conventional rapid column of ours) in terms of analysis speed>  
 Analysis speed of standard protein turned out to be 1.5 minutes for IEC SP-FT 4A vs. 5 minutes for IEC SP-420N.



[Analytical conditions]

Samples: 1. Ovalbumin 2. Trypsinogen 3. Ribonuclease A 4. Cytochrome C 5. Lysozime

Eluent: (A); 20mM MES buffer (pH6.0) (B); (A) + 0.5M Na<sub>2</sub> SO<sub>4</sub>

Linear gradient; «IEC SP-FT 4A» (A) to (B), 2min

«IEC SP-420N» (A) to (B), 15min

Flow rate: 1.5mL/min.

Detector: UV (280nm)

Column temperature: 30°C

[Notes]

- \*1) GPC (gel permeation chromatography): A variety of SEC, uses organic solvents (such as tetrahydrofuran and chloroform) as eluent.
- \*2) SEC (size exclusion chromatography): A form of chromatography that uses pores of packing materials to separate and analyze sample ingredients (such as proteins and synthesized polymers) according to the size of molecules (molecular weight).
- \*3) GFC (gel filtration chromatography): Also a variety of SEC, uses aqueous solutions as eluent.
- \*4) Ion exchange chromatography: A method to separate and analyze target materials by utilizing differences in electric charges of biomolecules such as proteins, peptides, amino acids, etc. It elutes each ingredient by gradually changing electric property of the eluent.
- \*5) Comparison with GPC HFIP-800 Series columns
- \*6) Comparison with OHpak™ LB-806 column
- \*7) Comparison with IEC SP-420N column

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