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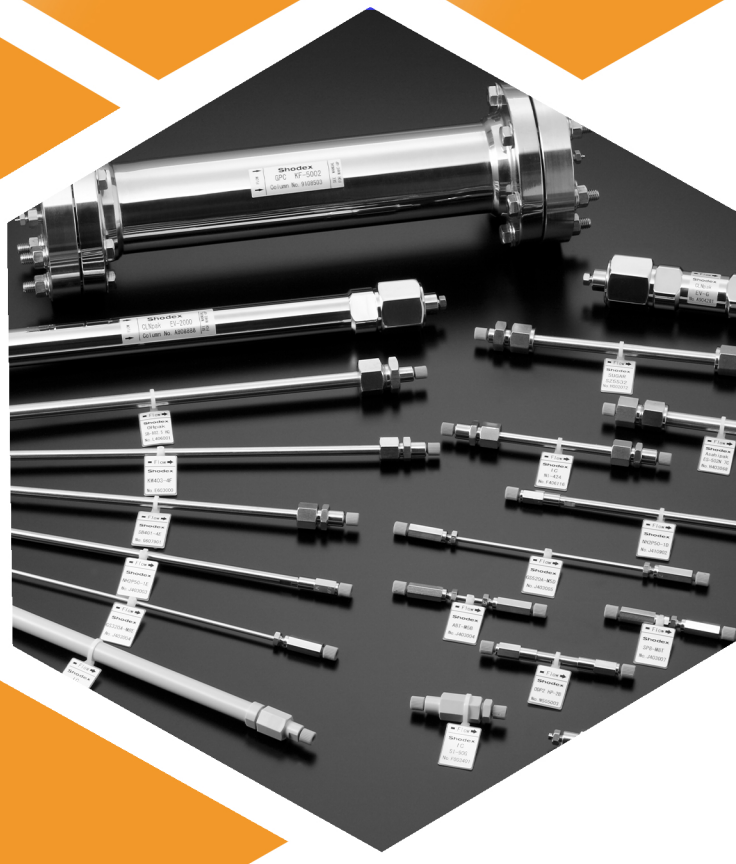
RAPID SUGAR SERIES



Saccharides • Sugar Alcohols • Organic Acids

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RAPID SUGAR SERIES

Following the success of the SUGAR series, Shodex presents a rapid analysis series of ligand exchange columns (LEX). The RAPID SUGAR 8C series is designed for the fast analysis of saccharides, organic acids, and other fermentation metabolites. without high pressure.

SUGAR SP0810 8C

SUGAR SP0810 8C features a lead (Pb) counter ion, this series not only resolves mono, di, and tri saccharides but also sugar alcohols. A variety of samples can be analyzed, including food, biomass, and pharmaceuticals. This column meets USP L22 and L34 requirements.

SUGAR SC1011 8C

SUGAR SC1011 8C features calcium (Ca) counter ion providing different separations than the SP0810 8C. Neutral sugars can be separated using only water as the mobile phase. Like the SP series, the SC series is used for food, biomass, and pharmaceutical analysis and also satisfied the USP L22 and L34 requirements.

SUGAR SH1011 8C

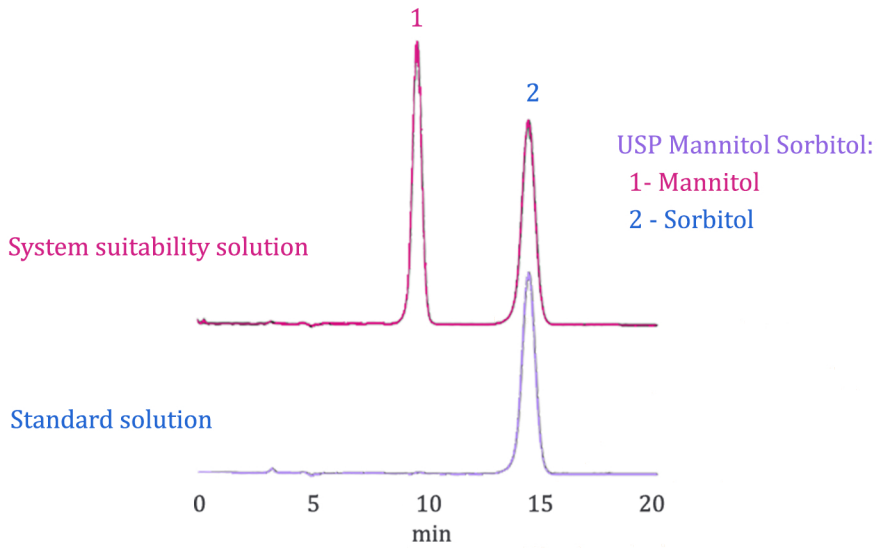
SUGAR SH 1011 8C features a hydrogen counter ion allowing for the simultaneous analysis of saccharides, organic acids, and other fermentation metabolites using ion exclusion chromatography. Simple aqueous sulfuric acid mobile phases are commonly used, making this column ideal for high-throughput fermentation monitoring. This column satisfies the USP L17 and L22 requirements.

SUGAR SP0810 8C

82
Pb
207.2

SUGAR SP08010 8C

Ligand exchange refers to a mode of separation based on the interaction (ligand exchange potential) between metal ions (M+) and the hydroxyl (OH–) groups of the saccharides. Depending upon the structure of saccharide (ex. number of equatorial or axial hydroxyl groups) and the type of counter ion, the intensity of the interactions vary. The order of intensity is as follows:
$Ag^{+} < Li^{+} < Na^{+} < Zn2^{+} < Ca2^{+} < Ba2^{+} < Pb2^{+}$



Column:	**Shodex SUGAR SP0810 8C** (I.D 8.0 x L 100 mm)
Eluent:	Di water
Flow rate:	0.7 ml/min
Detector:	Shodex RI (35° C)
Column temp:	50° C
Injection vol:	10 µL

Figure 1

SP0810 8C has the strongest interaction with saccharides. Applicable to many matrices, the most popular applications are general food analysis (especially dairy products) and biomass applications. The SP0810 8C allows for rapid analysis of well-separated sugars for high throughput applications.

Figure 1. Column SP0810 8C 8 x 100 mm (ID x L) manages to separate sorbitol and mannitol with a resolution greater than 2.0 as required by USP version 40 of the United States Pharmacopeia. An RSD of MNT 2.0%; 10ul injection volume. For more information visit us at shodexhpc.com

SUGAR SP0810 8C			
Standard	**0.6 ml/min**	**1.0 ml/min**	**1.5 ml/min**
Arabinose	6.37	3.86	2.62
Fructose	6.69	4.06	2.78
Galactose	6.03	3.64	2.46
Glucose	5.41	3.27	2.20
Lactose	5.06	3.05	2.06
Maltose	4.94	2.98	2.04
Mannose	6.56	3.97	2.69
Ribose	10.53	6.72	4.70
Sucrose	4.77	2.88	1.94
Xylose	5.72	3.45	2.33

Eluent: Di water
Detectore: Shodex RI
Col. Temp: 85 °C

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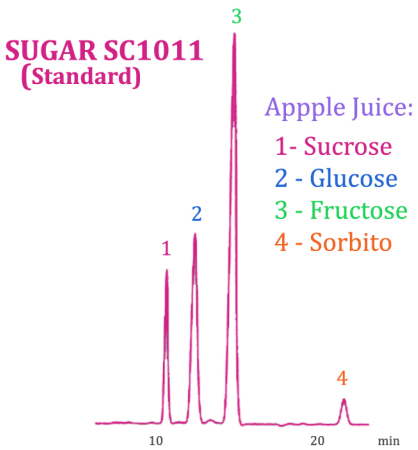
SUGAR SC1011 8C

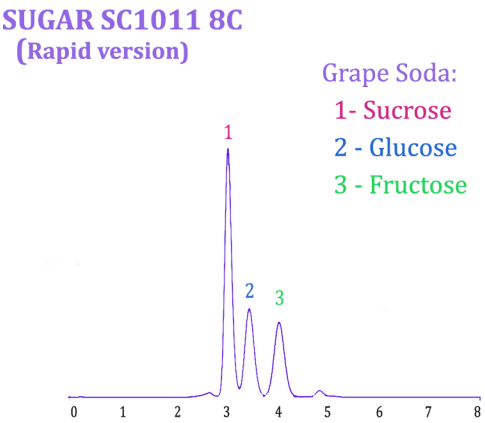
Ca 20 40.078

SUGAR SC1011 8C

Reducing saccharides can adopt various cyclic structures with a linear structure as an intermediate. Two cyclic tautomers, α-type, and β-type are produced when the carbonyl carbon atoms become asymmetric. When the conversion rate between tautomers is low, α and β anomers are separated by the column causing the peak tops to split or widen. Two methods are available to prevent anomer separation during analysis: analysis at high temperature (Ligand Exchange) and analysis under strong alkaline conditions (HILIC).



Column:	**Shodex SUGAR SC1011** (I.D 8.0 x L 300 mm)
Eluent:	DI water
Flow rate:	1.0 ml/min
Detector:	RID (convensional)
Column temp:	85° C
Injection vol:	5 µL



Column:	**Shodex SUGAR SC1011 8C** (I.D 8.0 x L 100 mm)
Eluent:	DI water
Flow rate:	1.0 ml/min
Detector:	RID (convensional)
Column temp:	85° C
Injection vol:	10 µL

Figure 2

SC1011 8C has the second strongest interaction with saccharides and provides a different separation pattern than the SP series. Applicable to many matrices, the most popular applications are general analysis of mixtures of sugars and sugar alcohols. The SC1011 8C allows for rapid analysis of well-separated sugars.

As seen in Figure 2, the SC series separates common sugars in food products using only H2O as the mobile phase. With run times under five minutes for common natural sugars, the SC1011 8C is ideal for high throughput analysis.

SUGAR SC1011 8C		
Standard	**0.6 ml/min**	**1.0 ml/min**
Arabinose	5.93	3.57
Fructose	6.85	4.15
Galactose	5.53	3.32
Glucose	5.87	3.53
Lactose	4.66	2.80
Maltose	4.58	2.75
Mannose	5.54	3.33
Ribose	9.93	6.04
Sucrose	5.17	3.11
Xylose	6.26	3.77

Elutent : Di water
Detector: Shodex RI
Col. Temp: 85 °C

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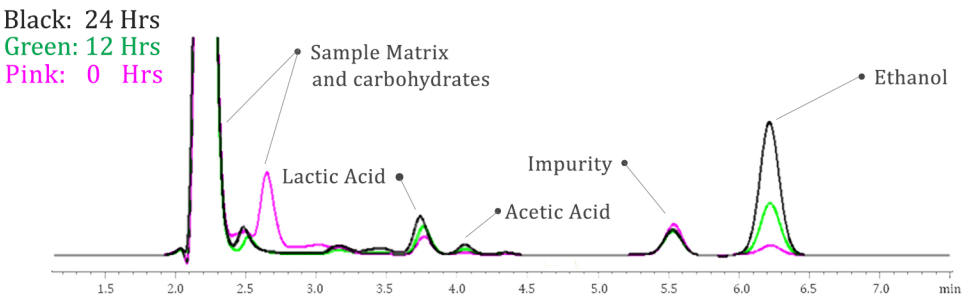
SUGAR SH1011 8C

1
H
1.008

SUGAR SH1011 8C

A hydrogen counter ion allows for the simultaneous analysis of saccharides, organic acids, and other fermentation metabolites. Unlike the previous columns, the main separation mode for the SH series is ion exclusion . Organic acids are eluded in ascending order of pKa (desceding order of acidity) and in descending order of polarity.

Sample: Sour Dough Culture



Column:	**Shodex SUGAR SH1011 8C** (I.D 8.0 x L 100 mm)
Eluent:	1 mM H2SO4 (aq.)
Flow rate:	1.0 ml/min
Detector:	RID (convensional)
Column temp:	75° C
Injection vol:	5 µL

Figure 3.

The Shodex Rapid SUGAR SH1011 8C is designed for rapid fermentation monitoring, allowing for the analysis of saccharides, organic acids, and ethanol in less than 5 minutes. This method uses simple aqueous conditions and RID detection, ideal for large sample work flows and QC environments. The column is also durable, often used to analyze complex matrices including food and fermentation broths

SUGAR SH1011 8C		
Standard	Elution Time	
	Flow Rate / Concentration	
	0.6 ml/min, 5mM	1.0 ml/min, 5mM
Acetic Acid	-	3.57
Adipic	-	3.57
Butric Acid	7.84	4.74
Citric Acid	3.65	2.21
D Malic Acid	4.16	2.50
D-Iso citric acid	3.68	2.21
Formic Acid	5.55	3.37
Fumoric acid	5.39	3.24
Isobutyric acid	7.37	4.45
Lactic Acid	5.19	3.12 Front
Maleic Acid	3.60	2.17
Malonic acid	4.22	2.54
Oxalic Acid	3.09 Void	1.86 Void
Propionic Acid	6.69	4.04
Quinic acid	4.33	2.61
Shikinic Acid	4.81	2.90
Succinic acid	4.82	2.90
Tartaric Acid	3.85	2.31

Eluent: H_2SO_4
Detectore: Shodex RI
Col. Temp: 60 °C

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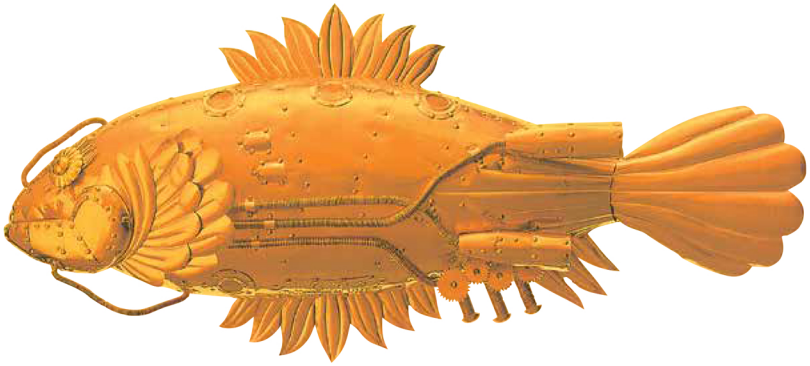

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