COSMOSIL

COSMOSIL Application Note
Inulin Analysis

Technical Note
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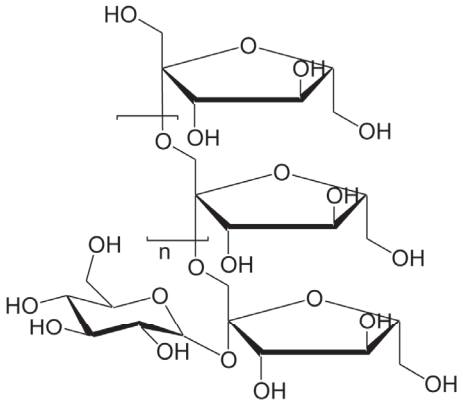
Due to the lack of retention on ODS columns, oligosaccharides have typically been analyzed on specialty sugar columns. We have successfully analyzed inulins using COSMOSIL Sugar-D, a specialty column for saccharide analysis, and PBr, a unique reversed-phase column for polar and non-polar analytes.

Introduction

About Inulin

Inulin ($G\text{-}F_n$) is a polysaccharide composed of a glucose unit (G) bonded to multiple fructose units (F). It is an indigestible, water-soluble dietary fiber, abundant in the roots of chicory and tubers of Jerusalem artichokes. Recently, oolong tea with inulin has been released as a functional food in Japan on the basis that inulins feed intestinal bacteria by forming short-chain fatty acids and facilitate the peristaltic movement in the bowels. In the literature as well, there are references to inulin's effect on bowel movements. [1),2)]



General structure of inulin

(1) Kleessen B. *et al*. *The American Journal of Clinical Nutrition* **65**(5), 1397-1402(1997) .
(2) Castiglia-Delavaud C. *et al*. *British Journal of Nutrition* **80**(4), 343-352(1998).

Sample preparation

Inulin standard

1. Weigh inulin standard.
2. Dissolve in Milli-Q water to a concentration of 10 mg/mL.

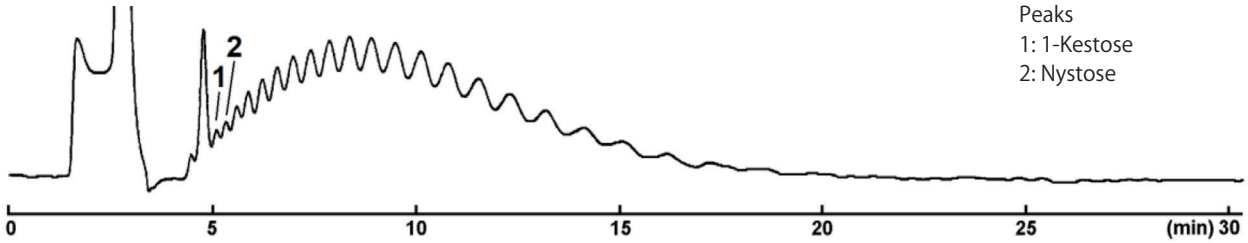
Milli-Q® is a trademark of Merck KGaA.

Oolong tea with inulin

1. Load 400 µL of oolong tea with inulin into a Cosmospin Filter H (pore size 0.45 µm) and centrifuge.
2. Use filtrate as sample.

Applications

Analysis using Sugar-D



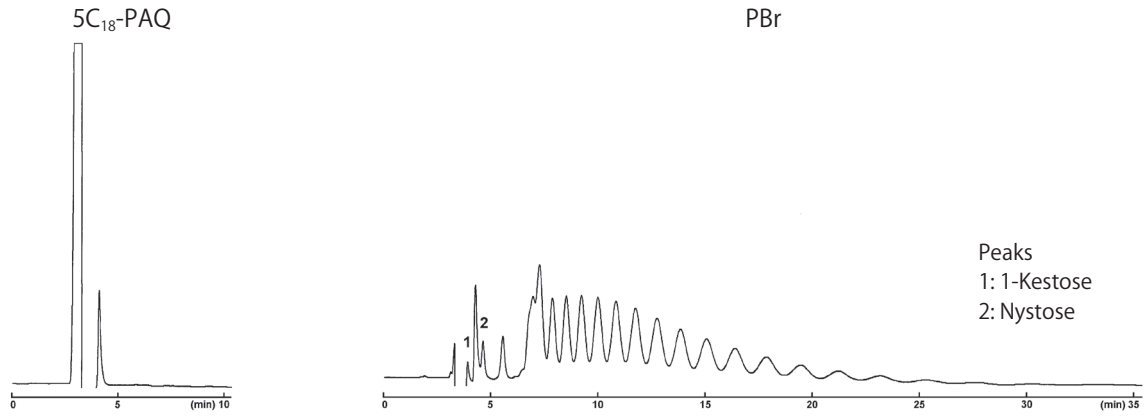
Peaks
1: 1-Kestose
2: Nystose

Column	: COSMOSIL Sugar-D, 4.6 mmI.D.-250 mm
Mobile phase	: MeCN / H_2O = 60 / 40
Flow rate	: 1.0 mL/min
Temperature	: 30℃
Detection	: RI (cell temp. 40℃)
Sample	: Inulin standard (10 mg/mL)
Inj. vol.	: 10 µL

Separation of inulin ($G\text{-}F_n$) was accomplished using Sugar-D, a specialty column for sugars. Based on the retention time of the short-chain 1-kestose (G-F-F) and nystose (G-F-F-F), it is thought that the separation is based on sugar chain length.

Applications

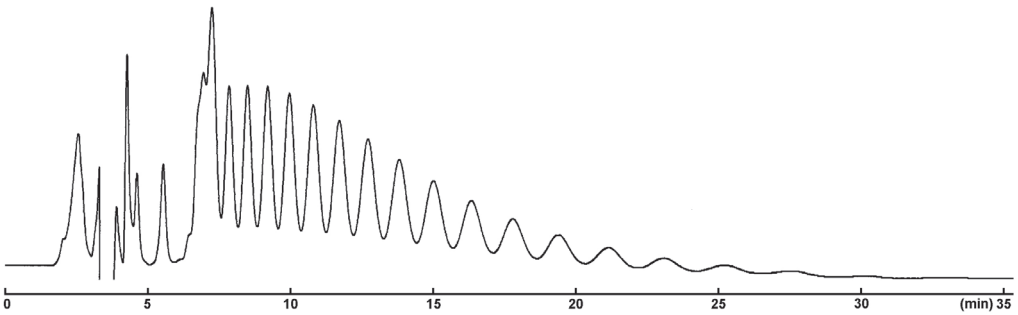
Reversed-phase analysis



Column : COSMOSIL **, 4.6mmI.D.-250mm
Mobile phase : MeOH / H_2O = 15 / 85
Flow rate : 1.0 mL/min
Temperature : 30℃
Detection : RI (cell temp. 40℃)
Sample : Inulin standard (10 mg/mL)
Inj. vol. : 10 µL

Inulins are not retained on the ODS column $5C_{18}$-PAQ. However, PBr can utilize dispersion force interaction to separate inulin by chain length.

Oolong tea with inulin: reversed-phase analysis



Column : COSMOSIL PBr, 4.6mmI.D.-250mm
Mobile phase : MeOH / H_2O = 15 / 85
Flow rate : 1.0 mL/min
Temperature : 30℃
Detection : RI (cell temp. 40℃)
Sample : Oolong tea with inulin (inulin conc. 14.6 mg/mL)
Inj. vol. : 10 µL

Upon analyzing oolong tea with inulin (inulin conc. 7.3 g / 500 mL), a similar chromatogram to the standard was obtained.

Ordering Information

Application	Product Name	Product grade	Product No.	Size
Columns	COSMOSIL Sugar-D Packed Column	SP (for HPLC)	05397-51	4.6mmI.D.-250mm
	COSMOSIL PBr Packed Column		12395-51	4.6mmI.D.-250mm
	COSMOSIL $5C_{18}$-PAQ Packed Column		02485-81	4.6mmI.D.-250mm
Filtration	Cosmospin Filter H (0.45 µm)	—	06540-34	100 pkg

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NACALAI TESQUE, INC.
Nijo Karasuma, Nakagyo-ku, Kyoto 604-0855 JAPAN
TEL : +81-(0)75-251-1730
FAX : +81-(0)75-251-1763
Website : www.nacalai.com
E-mail : info.intl@nacalai.com