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Analysis of dextran using an AZURA® SEC System

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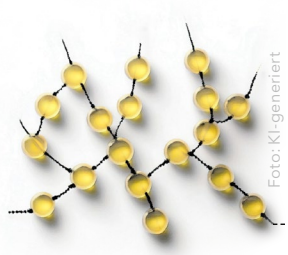

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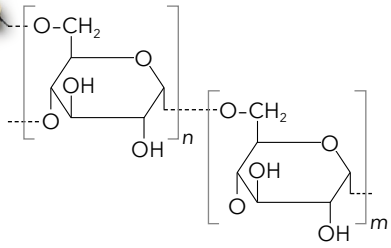

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SUMMARY

In this application note, a dextran sample was measured using the KNAUER AZURA® SEC system. The AppliChrom® SuperOH-P 300 and 350 columns are well-suited for this application, as they combine a large pore volume with high plate counts, resulting in excellent resolution. In this case, these two different SuperOH-P columns were connected in series to cover a molecular weight range from 1 000 to 1 000 000 Da. The developed method was used for the determination of dextran.

INTRODUCTION

Dextran is a biopolymer composed of numerous glucose molecules linked together by glycosidic bonds. These complex carbohydrates are synthesised by bacteria, particularly lactic acid bacteria such as *Leuconostoc mesenteroides*, when exposed to a medium containing sucrose as a carbon source [1]. Such bacteria are commonly found in plant sources as well as fermented foods [1]. The size and structure of dextran depends on the bacterial strain that is used and the specific fermentation or synthesis conditions [1]. Thereby in industry, dextran is produced under controlled conditions and optimized parameters to ensure efficient production [2]. In some cases, chemical modifications are made to achieve specific molecular weights or properties [1]. These adjustments increase the attractiveness of dextran for various applications in the food and pharmaceutical industry as well as for research. For example, dextran is used as a carrier substance in pharmaceuticals and as a thickening and moisturizing agent in the cosmetic industry [1] [3]. The properties of dextran are significantly influenced by its molecular size, which increases the need for effective analytical methods for characterisation [1]. One promising method is **S**ize **E**xclusion **C**hromatography (SEC), which enables molecular size dependent separation and provides valuable information on molecular weight and molecular weight distribution [4] [5].

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RESULTS

Fig. 1 shows the chromatogram of the sample measurement performed on the KNAUER AZURA® SEC system using the AppliChrom® SuperOH-P-300 and SuperOH-P-350 column combination. The sample and the shown data for this application note were provided by AppliChrom®. In a sample with an unknown matrix, the dextran could be reliably identified at a retention time of 10.47 minutes. These results confirm the applicability of the chromatographic method used for the analysis of dextran.

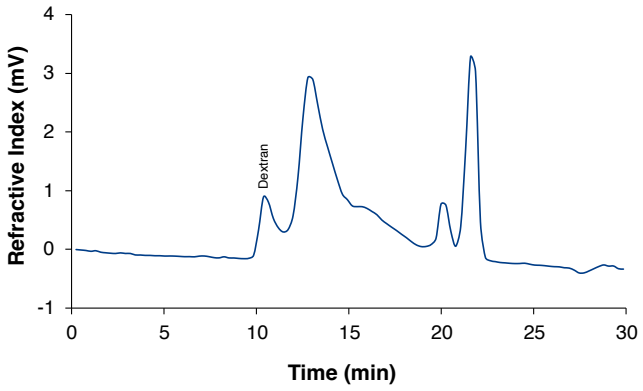

Fig. 1 Chromatogram of the sample measured with SuperOH-P-300 - SuperOH-P-350, RID, d extran eluted at 10.47 min.

CONCLUSION

The KNAUER AZURA® SEC system, in conjunction with the AppliChrom® SuperOH-P columns, is a perfect tool for measurements in SEC. The combination of this advanced SEC system and specialized columns successfully resolve the dextran sample.

MATERIAL AND METHODS

Tab. 1 Method parameter.

Flow rate	**1 ml/min**
Isocratic	H_2O / PBS-Buffer pH 7.1
Column temperature	25 °C
Injection volume	max. 50 µl
Detection	RID
Data rate	10 Hz
Time constant	0.1 s
Time	30 min

Tab. 2 SEC system configuration

Instrument	**Description**	**Article No.**
Pump	AZURA® P 6.1L LPG Pump with 10 ml pump head, stainless steel	APH30EA
Autosampler	AZURA® AS 6.1L, analytical HPLC autosampler, 862 bar	AAA50AA
Detector 2	AZURA® RID 2.1L, analytical refractive index detector	ADD31
Thermostat	AZURA® CT 2.1	ATC00
Eluent tray	AZURA® E 2.1L	AZC00
Column	AppliChrom® SuperOH-P-300, 7 µm, 300 x 8 mm, 1 000 - 300 000 Da	30GK460ABL
Column	AppliChrom® SuperOH-P-350, 10 µm, 300 x 8 mm, 2 500 - 1 000 000 Da	30GN-46WABN
Capillaries	Start-Up Kit with flexible, precut capillaries for analytical HPLC systems with 1/16" connections	AZF120
Software	ClarityChrom® 9.1.0 - Workstation, autosampler control included	A1670
Software	ClarityChrom® 9.1.0 - SEC/GPC extension	A1678

Fig. 2 SEC system setup.

REFERENCES

[1] Díaz-Montes, E. (2021). Dextran: Sources, Structures, and Properties. *Polysaccharides*, 2(3), 554–565.

[2] Aman, A., Siddiqui, N. N. & Qader, S. A. U. (2011). Characterization and potential applications of high molecular weight dextran produced by Leuconostoc mesenteroides AA1. *Carbohydrate Polymers*, 87(1), 910–915.

[3] Kim, C. J., Hamielec, A. E. & Benedek, A. (1982). Characterization of Dextrans by Size Exclusion Chromatography Using DRI/LALLSP Detector System. *Journal Of Liquid Chromatography*, 5(3), 425–441.

[4] Huang, G. & Huang, H. (2018). Application of Dextran As Nanoscale Drug Carriers. *Nanomedicine*, 13(24), 3149–3158.

[5] De Belder, A. N. (1993). DEXTRAN. In *Elsevier eBooks* (S. 399–425).