

# Characterization of Chitosan Using GPC/SEC

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## Abstract

The characterization of chitosan via GPC/SEC with Agilent NOVEMA Max columns and an aqueous acidic mobile phase is presented.

## Introduction

Chitosan is a linear polysaccharide bearing amino groups. It is prepared by conversion of chitin from the shells of crustaceans. Chitosan is applied in agriculture, the chemical industry, and wound dressing materials.

Due to its amino groups, chitosan is a polycation under acidic eluent conditions. Therefore, NOVEMA Max columns are best suited for GPC/SEC analysis of chitosans.<sup>1</sup>

## Experimental

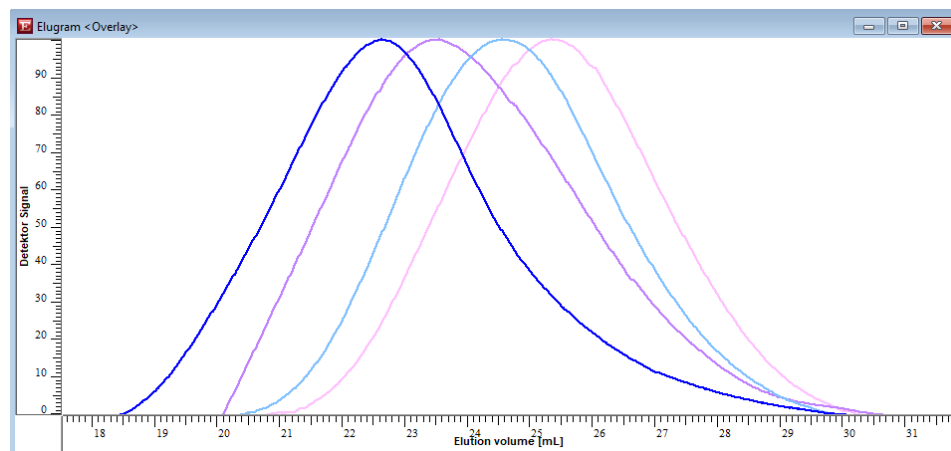
**Table 1.** Instrument and sample conditions.

	Conditions
Pump	Isocratic pump Flow rate: 1 mL/min Mobile phase: H <sub>2</sub> O, 0.1 M sodium chloride, 0.3 vol% trifluoroacetic acid
Injection System	Autosampler Injection volume: 50 µL
Columns	NOVEMA Max ultrahigh MW combination: NOVEMA Max 10 µm precolumn, 8 × 50 mm (p/n NMA080510) 3 × NOVEMA Max 10 µm ultrahigh, 8 × 300 mm (p/n NMA083010LUH)
Temperature	23 °C
Sample Concentration	2 mg/mL
Calibration	Agilent ReadyCal-Kit pullulan high (p/n PSS-PULKITR1H)
Detectors	Refractive index (RI) detector
Software	Agilent WinGPC

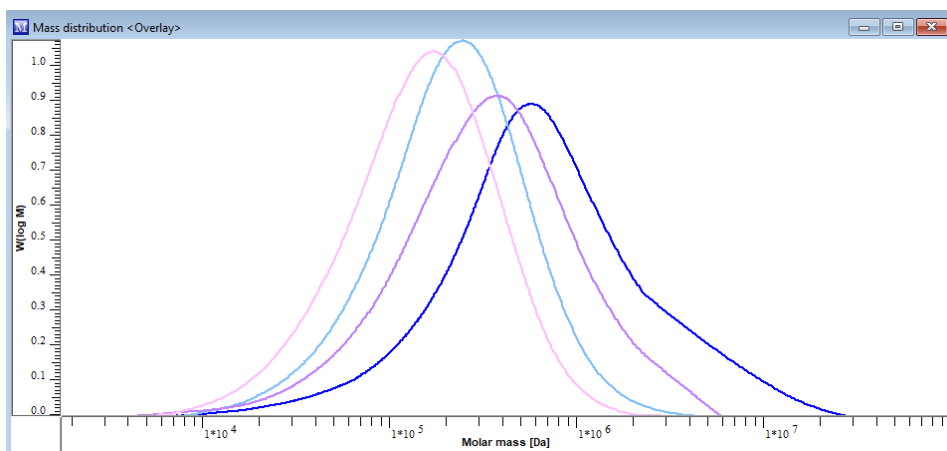
## Results and discussion

Under acidic conditions, the surface of the NOVEMA Max columns as well as chitosan samples are protonated, having a cationic character, which enables separation in GPC/SEC mode. An overlay of four different chitosan samples measured with a set of three NOVEMA Max ultrahigh columns is depicted in Figure 1.

Using a conventional pullulan calibration enables the analysis of the molecular weight distribution (MWD) as well as average molar mass values. However, these values are relative molar masses based on pullulan calibration and not absolute molar masses.



**Figure 1.** Overlay of four different chitosan samples (RI-traces, normalized detector response).



**Figure 2.** Overlay of the molecular weight distribution (based on calibration with pullulan reference materials).

## Conclusion

Robust and reliable GPC/SEC measurements of chitosan is achievable by use of Agilent NOVEMA Max columns as stationary phase and an acidic aqueous mobile phase. Pullulan standards can be used to receive relative molar masses.

## Reference

1. Hasan, S. *et al.* Chitin and Chitosan - Science and Engineering; Springer.