



SEC Analysis of Chitosan

Application Note

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Introduction

Chitosan is a naturally occurring polysaccharide made by alkaline N-deacetylation of chitin, which is believed to be the second most abundant biomaterial after cellulose. The term chitosan does not refer to a uniquely defined compound, but merely refers to a family of copolymers with various fractions of acetylated units containing both chitin and chitosan monomers. The main interest in chitosan derives from its cationic nature in acidic solutions, which provides unique properties relative to other polysaccharides that are usually neutral or negatively charged. Application areas of chitosan include biomedical (eg wound healing, burn treatment and use as a hemostatic agent), paper production, textile finishes, photographic products, cements, heavy metal chelating agents and waste removal. GPC/SEC can be used as a quality control tool for the determination of MW and MWD of chitosan. Three grades of chitosan were analyzed using a column set comprising 2 x Agilent PL aquagel-OH MIXED-H 8 μ m columns. These columns offer resolution over a wide molecular weight range (up to 10,000,000 relative to PEO/PEG). Due to the cationic nature of the samples, they were prepared in strong acid and allowed to stand overnight to aid dissolution. They were analyzed in 0.5 M sodium nitrate buffer and at low pH. The system was calibrated with narrow pullulan polysaccharide standards (Figure 1).



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Conditions

Samples: Three chitosan samples
Columns: 2 x PL aquagel-OH MIXED-H 8 μ m,
300 x 7.5 mm (p/n PL1149-6800)
Eluent: 0.5 M NaNO₃ + 0.01 M NaH₂PO₄ at
pH 2
Flow Rate: 1.0 mL/min
Detection: RI

Results and Discussion

Raw data chromatograms and weight average molecular weight values (MW) for the three chitosan samples are shown in Figure 2. Marked imbalance peaks were observed on the RI due to the fact that the samples were prepared in strong acid for dissolution.

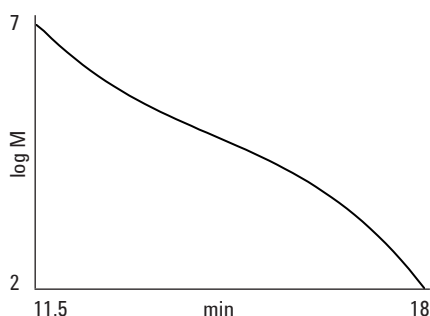


Figure 1. SEC calibration using pullulan standards

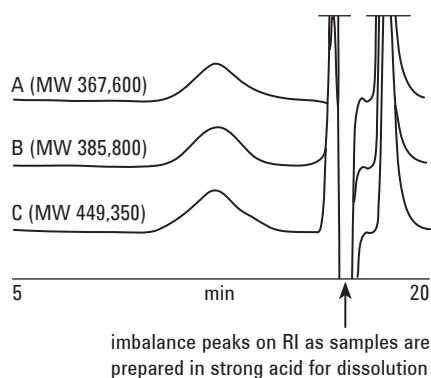


Figure 2. Raw data chromatograms and MW of three chitosan samples

Conclusion

SEC using PL aquagel-OH MIXED-H 8 μ m columns successfully analyzed three different samples of chitosan. Aqueous SEC with PL aquagel-OH columns provides information not only on the molecular weight of the polymer but also on the polydispersity and the shape of the molecular weight distribution. The excellent chemical and mechanical stability of these columns offer high performance with good repeatability and column lifetime.

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