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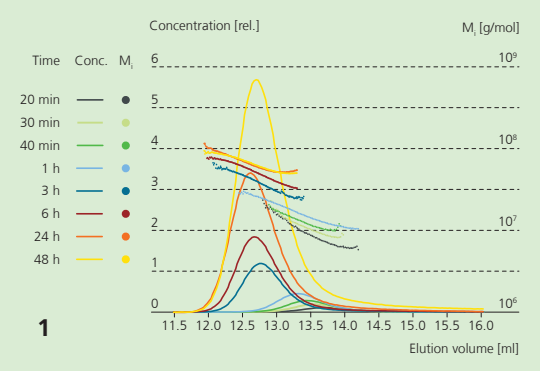
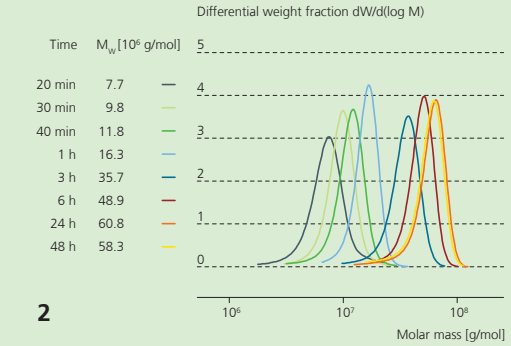


1

1 *Concentration signal and absolute calibration curves of Inulin depending on the synthesis time.*

2 *Molar mass distributions of inulin after different synthesis times.*



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ENZYMATIC SYNTHESIS OF HIGHMOLECULAR INULIN

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Fructanes are polysaccharides composed of D-fructose monomers. In the case of Inulin the polymer chain is build up by ß-(1,2) linked and in the case of Levan by ß-(2,6) linked D-fructose monomers and ending with a glucose unit. Inulin formed in plants can reach a polymerization degree of about 70. The only hitherto known Inulin producing bacteria species belongs to the type streptococcus mutans. This Inulin has a considerably higher molar mass reaching more than 10^6 g/mol [1, 3] and containing approx. 5% ß-(2,6) branchings [2].
Inulin was formed by enzymatic synthesis with a cleaned fructosyl transferase from streptococcus mutans and with sucrose as the substrate [3, 4]. The concentration, the molar mass and the polydispersity of the Inulin were determined by GPC-MALLS. The polymer concentration was calculated from the chromatogram area. The first Inulin was detected after 4 minutes reaction time. After 20 minutes the concentration of the synthesized Inulin allows the determination of the weight average molar mass M_W and the molar mass distribution (Fig. 1 and 2). The highest M_W increase was detected during the first 6 hours. After 24 hours M_W remains constant while the Inulin concentration further increases. The polydispersity remained constant 1.1 during the whole reaction time.
The shift of the absolute molar mass calibration curves to higher molar mass with increasing reaction times means an increase in the density of the synthesized Inulin molecule in diluted solution with increasing molar mass. Indications of aggregate formation were not observed.

Literature:

[1] S. Ebisu, K. Kato u. A. Misaki, J. Biochem. 78 (Tokyo), p. 879 (1975)
[2] K. Rosell, G., D. Birkhed, Acta Chem. Scand. B 28, p. 589 (1974)
[3] A. G. Heyer, B. Schroeer, S. Radosta, D. Wolff, S. Czapla, J. Springer, Carbohydr. Res. 313, p. 165 (1998)
[4] D. Wolff, S. Czapla, A.G. Heyer, S. Radosta, P. Mischnik, J. Springer, Polymer 41, p. 8009 (2000)