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## Synthesis and characterization of octenyl succinic anhydride-modified levan

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There is considerable interest in chemical modification of polysaccharides to improve their natural properties and bioactivities and to develop industrial products with specific characteristics. The incorporation of hydrophobic groups into the molecule gives the polysaccharide an amphiphilic nature and thereby surface-active properties. Starches from different botanical origins modified with octenyl succinic anhydride (OSA) are widely used, as emulsifiers and stabilizers, in food industry, pharmacy and cosmetics. Also, OSA derivatives of other polysaccharides such as pullulan, gum Arabic, hyaluronic acid or inulin have been intensively studied.<sup>[1,2]</sup>

The aim of the present study was to optimize the synthesis of OSA-levan derivative. Levan ( $\beta$ -2,6-fructan, 10<sup>5</sup> Da) produced by *Bacillus licheniformis* NS032 growing in medium with 400 g sucrose/L was used for synthesis.<sup>[3]</sup> Reaction was carried out in aqueous medium in mild alkaline conditions (pH 8.5). The influence of the following factors on reaction efficiency was investigated: temperature (20-70 °C), levan concentration (25-35 %), OSA concentration (5, 7.5, 10 % in relation to levan weight) and reaction time (2-8 h). FTIR spectroscopy and NMR spectrometry were used for structural characterization.

The synthesis of OSA-levan derivative was confirmed by FTIR spectrum showing two new peaks at 1730 and 1565 cm<sup>-1</sup> due to the formation of ester linkage. Degree of substitution (DS) was calculated using <sup>1</sup>H NMR from the ratio of area of the peak at 0.85 ppm (OSA) to the area of the peaks from 3.45 to 4.18 ppm from levan and found to be from 0.8 to 2.8 %. In comparison to other reaction parameters, the temperature of 40 °C and reaction time of 5 hours were set as the optimum showing the highest reaction efficiency. Increasing the reaction temperature above 50 °C caused a significant reduction in the DS. The efficiency was higher for lower concentration of OSA reagent. Surface tension values for OSA-levan derivatives (0.25 %) were in the range of 55.9-61.2 mN/m.

[1] Shah et al., *Food Hydrocolloids* 55 (2016) 179

[2] Kokubun et al., *Biomacromolecules* 14 (2013) 2830

[3] Gojgic-Cvijovic et al., *Int J Biol Macromol* 121 (2019) 142