Production and characterization of oligoglucuronans from the waste of beer fermentation broth using Gluconacetobacter *hansenii* PJK

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Abstract

Microbial exopolysaccharides have unique rheological properties and therefore, the food industry frequently use them as thickening, gelling and stabilizing agents. Immune modulation and tumouristasis by β-D-glucans, and the use of bacterial cellulose in audio membranes and of hyaluronic acid in cosmetics are some of the novel applications of these bacterial products.

Recently, a cellulose-producing strain, identified as *Gluconacetobacter hansenii* PJK, has been isolated from rotten apples[1]. This bacterium has been explored to be able to produce water-soluble polysaccharides in the defined medium[2].

In the present study, *Gluconacetobacter hansenii* PJK was investigated for the production of water-solublepolysaccharides from waste of beer fermentation broth. It was revealed that this strain is able to produce enormous quantitiesof oligoglucuronans from this medium. These experiments were carried out in a jar fermenter equipped with a 6 flat-blade turbine impeller at 500 and 600 rpm and pH 5 and the yield of the produced Glucuronan oligosaccharides was observed. At the impeller speed of 600 rpm the yield of these sugars was found to be 131 g L^{-1} after 10 days of cultivation. The structure of oligoglucuronans wasinvestigated using various modern analytical and spectroscopic techniques. The oligoglucuronansafter hydrolysis were studied for their monosaccharides composition using HPLC, which revealed that the hydrolysates consisted only of glucuronic acid. Various spectroscopic techniques, including FT-IR,

MALDI-TOF MS and ^{1}H- and ^{13}C-NMR of the native WSPS showed that the product was a mixture of oligomers all having the α-glucuronic acid as building blocks with various degrees of derivatization. The possible structure of the major oligoglucuronate has been elucidated.

References

1. Park, J. K., Park, Y. H., Jung, J. Y. *Biotechnol. Bioprocess Eng*. 2003, **8**, 83-88.
2. Jung, J.Y., Park, J.K., Chang, H.N. *Enzyme Microb. Technol*. 2005, **37**, 347-354.