A Pasteurella multocida sialyltransferase displaying dual trans-sialidase activities for production of 3′-sialyl and 6′-sialyl glycans - DTU Orbit (16/10/2019)

This study examined a recombinant Pasteurella multocida sialyltransferase exhibiting dual trans-sialidase activities. The enzyme catalyzed trans-sialylation using either 2-O-(p-nitrophenyl)-d-N-acetylneuraminic acid or casein glycomacropeptide (whey protein) as the sialyl donor and lactose as the acceptor, resulting in production of both 3-sialyllactose and 6-sialyllactose. This is the first study reporting -2,6-trans-sialidase activity of this sialyltransferase (EC 2.4.99.1 and 2.4.99.4). A responsesurface design was used to evaluate the effects of three reaction parameters (pH, temperature, and lactose concentration) on enzymatic production of 3- and 6-sialyllactoses using 5% (w/v) casein glycomacropeptide (equivalent to 9 mM bound sialic acid) as the donor. The maximum yield of 3-sialyllactose (2.75 ± 0.35 mM) was achieved at a reaction condition with pH 6.4, 40°C, 100 mM lactose after 6 h; and the largest concentration of 6-sialyllactose (3.33 ± 0.38 mM) was achieved under a condition with pH 5.4, 40°C, 100 mM lactose after 8 h. 6-sialyllactose was presumably formed from -2,3 bound sialic acid in the casein glycomacropeptide as well as from 3-sialyllactose produced in the reaction. The kcat/Km value for the enzyme using 3-sialyllactose as the donor for 6-sialyllactose synthesis at pH 5.4 and 40°C was determined to be 23.22 ± 0.7 M⁻¹s⁻¹. Moreover, the enzyme was capable of catalyzing the synthesis of both 3- and 6-sialylated galactooligosaccharides, when galactooligosaccharides served as acceptors.

General information
Publication status: Published
Organisations: Department of Chemical and Biochemical Engineering, Center for BioProcess Engineering, University of Southern Denmark
Number of pages: 8
Pages: 60-67
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Journal of Biotechnology
Volume: 170
ISSN (Print): 0168-1656
Ratings:
BFI (2014): BFI-level 1
Scopus rating (2014): CiteScore 2.95 SJR 1.116 SNIP 1.128
Web of Science (2014): Impact factor 2.871
Web of Science (2014): Indexed yes
Original language: English
DOI:s:
10.1016/j.jbiotec.2013.11.013
Source: dtu
Source ID: u::10114
Research output: Contribution to journal › Journal article – Annual report year: 2013 › Research › peer-review