Combined one-pot enzymatic synthesis of dTDP-L-rhamnose from dTMP and glucose-1-phosphate

Young-Bok Kang[1], Kwang-Won Lee[2], Yung-Hun Yang[1],
Jae Kyung Sohng[3], Kwangkyoung Liou[3] and Hei Chan Lee[3], Byung-Gee Kim[1,2]
[1]School of Chemical Engineering, Seoul National University, Seoul, Korea
[2]Institute of Molecular Biology and Genetics, Seoul National University, Seoul, Korea
[3]Institute of Biomolecule Reconstruction Lab, Sunmoon University, Asan, Korea
TEL: +82-2-880-6774, FAX: +82-2-874-1206

Abstract

The two genes, mlr7551 and mlr7553, responsible for synthesis of dTDP-rhamnose from *Mesorhizobium loti* were identified. One gene encodes dTDP-4-keto-6-deoxy-D-glucose 3,5-epimerase and another gene encodes dTDP-4-keto-rhamnose reductase. Furthermore, dTDP-rhamnose was synthesized on large scale by the combination of dTMP kinase, acetate kinase, dTDP-glucose synthase, dTDP-glucose 4,6-dehydratase and dTDP-4-keto-6-deoxy-D-glucose 3,5-epimerase and dTDP-4-keto-rhamnose reductase, starting reation with dTMP. The overall conversion of dTDP-rhamnose based on dTMP was calculated about 82%. The product was purified by anion exchange column and desalting and obtained 180mg. Overall yield of the product was 60% based on initial TMP and the purity was approximately 95%. The final product was confirmed by HPLC, ESI-MS and NMR. As a result, dTDP-rhamnose was produced largely and the economical production method of dTDP-rhamnose from dTMP via six step under the our proposed production method was developed.

References

1. Kaneko, T., Nakamura, Y., Sato, S., Asamizu, E., Tabata, S. (2000), Complete genome structure of the nitrogen-fixing symbiotic bacterium *Mesorhizobium loti*, *DNA Res.* **7**, 331-338.
2. Jong-min Oh and Byung-Gee Kim (2002), Biosynthesis of dTDP-4-keto-6-deoxy-D-glucose using recombinant *E. coli* cells, *Biotechnol. Bioengin.* accepted.