Amylose Analog Aminopolysaccharide : A New Polysaccharide Material

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Amylose Analog Aminopolysaccharide: A New Polysaccharide Material

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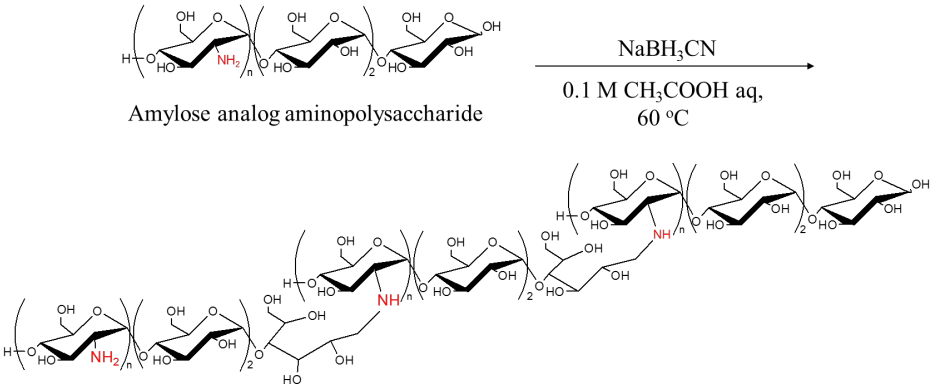
Natural polysaccharides exhibit specific important functions, which are profoundly affected by subtle difference in the chemical structure. Accordingly, enzymatic approach is well accepted as a powerful tool to provide well-defined polysaccharides because enzymatic reaction is progressed with highly controlled regio- and stereoarrangements. Phosphorylase is one of the enzymes, which have been used as catalysts for the synthesis of polysaccharides. This enzyme catalyzes enzymatic polymerization of α-D-glucose 1-phosphate and its analog substrates initiated from the nonreducing end of a maltooligosaccharide primer to produce some α(1→4)-linked polysaccharides [1,2]. For example, we reported that thermostable phosphorylase catalyzed enzymatic polymerization of α-D-glucosamine 1-phosphate (GlcN-1-P) as a monomer initiated from a maltotriose primer to give amylose analog aminopolysaccharide [3].

To obtain functional materials from the aminopolysaccharide, in this study, we performed its reductive amination using $NaBH_3CN$ as a reductant to obtain aggregated polysaccharide materials. The ^1H NMR spectra of the products, which were obtained using 3-5 equivs. of the reductant with the reducing end of the aminopolysaccharide, supported the progress of the reaction. The SEM images of spin-coated samples of the products observed morphology of nanoparticles. The DLS profiles of the products showed that average diameters of the nanoparticles increased with increasing the feed ratios of the reductant. Hydrogels were obtained when large equivs. of reductants were employed.



Scheme 1. Reductive amination of amylose analog aminopolysaccharide.

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