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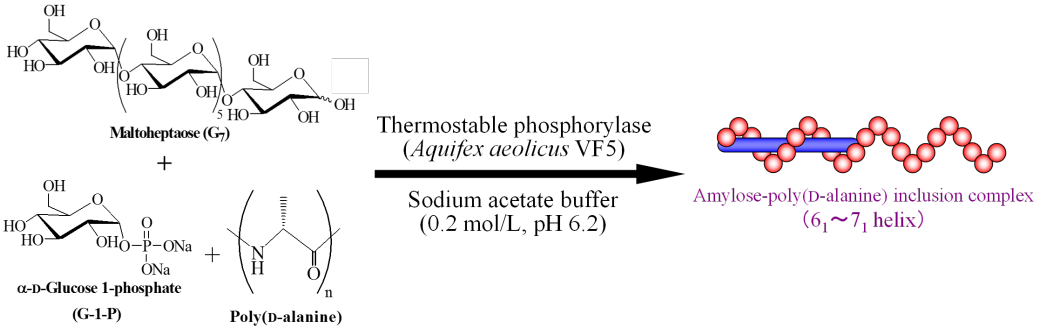
Abstract

Amylose is a well-known helical host compound that forms inclusion complexes with relatively lower molecular weight guest compounds by noncovalent interaction. However, little has been reported regarding the formation of inclusion complexes between amylose and polymeric compounds. The main difficulty in incorporating polymeric compounds into the cavity of amylose is that the driving force for the binding is only caused by hydrophobic interaction. Amylose, therefore, does not have sufficient ability to include the long chains of guest polymers into its cavity. By means of the enzymatic method for direct construction of amylose, we have developed a new methodology, named "vine-twining polymerization", for the preparation of inclusion complexes composed of amylose and synthetic polymers, which was achieved by the phosphorylase-catalyzed enzymatic polymerization forming amylose in the presence of guest polymers [1-3]. In this study, we found that amylose-poly(D-alanine) inclusion complex was obtained by the vine-twining polymerization using poly(D-alanine) as a new guest polymer [4] (Scheme). The XRD pattern of the product showed the typical diffraction peaks due to inclusion complex composed of helical conformation between 7_1 and 6_1 of amylose. Although the ^{1}H NMR spectrum of the product showed both the signals assignable to amylose and poly(D-alanine), the integrated ratio of the poly(D-alanine) signal was lower than the theoretical value. This result suggested that amylose partially included poly(D-alanine) in the product.



Scheme. Stereoselective inclusion by amylose in vine-twining polymerization.

References

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