

Complex Formation of Starch and Surfactant in Aqueous Solution

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1 Introduction

Starch is a mixture of amylose, linear chain, and amylopectin, branched chain. The saccharide chain is composed of α -1,4 linked glucose, so its chain tends to have helical conformation. This property reveals the inclusion of various molecules into amylose helix. In this study we prepared the complex of starch and surfactant by mixing at solution state, then analyzed by means of small angle X-ray scattering (SAXS).

2 Experiment

Amylopectin sample (Lintner's soluble waxy corn starch) was purchased from Hayashibara Co., Ltd. Sodium dodecyl sulphate (SDS) was used as surfactant sample. Their aqueous solutions were prepared by heating to make homogeneous transparent solution. Then they were mixed. SAXS experiments were carried out with SAXES optics installed at BL-10C in Photon Factory. The scattering intensity was detected with position sensitive proportional counter (PSPC).

3 Results and Discussion

Figure 1 shows the SAXS from the amylopectin samples ($C_p=17\%$) in aqueous solutions without and with different concentrations of SDS. The scattering profile of amylopectin by addition of SDS gave clear peak around 0.04 as q value, the magnitude of scattering vector. Simultaneously in the figure the scatterings from SDS are also shown. At the comparison of them, the intensity from mixture is higher and the peak is clearer. The peak is due to the correlation hole from the electrostatic repulsive interaction. The SDS molecule has anionic charge of sulfate group, while the starch is neutral polysaccharide. So this scattering behavior suggests that the amylose chains distributed in the surface or inside of branched amylopectin makes the complex by including SDS with helical structure. Consequently it is thought that the interaction between charged complex domains is observed as clear peak.

References

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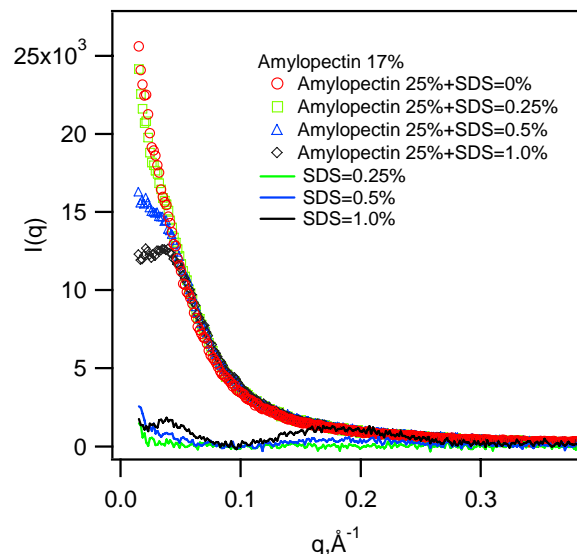


Figure 1. Small angle X-ray scattering (SAXS) from mixture of amylopectin (Lintner's soluble waxy corn starch) and Sodium dodecyl sulphate (SDS) in aqueous solution.

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