

Effect of β -cyclodextrins on the physical properties and anti-staling mechanisms of corn starch gels during storage

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The retrogradation of starch during storage was attributed to the high amylose content of corn-based food, resulting in economic losses and restricting the development of food industry. The unique molecular capsule structure of cyclodextrins has been widely developed and applied in food field in recent years.

β -cyclodextrin(β -CD) and hydroxypropyl- β -cyclodextrin(HP- β -CD) are natural cyclic annular oligosaccharides, with less studies in application of inhibiting the retrogradation of corn starch. Our research showed that β -CDs could affect the rheological and gelatinization properties of corn starch gel and enhance the thermal stability of starch granules. Meanwhile, the addition of β -CDs during storage can promote the texture characteristics of gel. This was due to the improvement of gel internal structure by β -CDs, which was also supported by SEM observation. In addition, XRD and FTIR results illustrated that β -CDs could inhibit the formation of ordered starch crystal structure. These results were represented more significantly with the addition of HP- β -CD, which may be due to the intense competition for intermolecular water molecules between HP- β -CD and amylose. The experimental results proved the application prospect of β -CDs in corn-based food. Consequently, the addition of β -CDs could delay the retrogradation of CS gel, and the introduction of hydroxypropyl groups was more effective, which provided a theoretical basis and new insights for the production of starch-based food industrial products.

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