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論文名稱(英)	Effect of Compatibility on the Gel of the TNuS19 Rice Starch and Pectin
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摘要(中)	食品中普遍存在澱粉、多醣類等成份，由於彼此分子結構或親水性不同，其相互間相容程度可能有所差異。兩相容物質於水溶液中混合可能形成交互作用，反之，兩物質若不相容，則分子間可能互相排斥。成份間相容性

	對於食品之物性及品質影響極大。實驗採用糊化台農秈 19 號(TNuS19)米澱粉與不同酯化度之果膠混合膠體當模式系統，藉由示差掃描熱分析(DSC)和動態機械分析(DMA)測定其玻璃轉化溫度(Tg)，並藉原成份與混合膠體之 Tg 來評估兩成份之相容性。由黏度分析和失水率分析了解不同酯化度果膠分別對 TNuS19 米澱粉膠體黏度及其保水力的影響，最後尋求兩分子間的相容性與膠體物性的關係。 DSC 分析 TNuS19 米澱粉、低甲氧基果膠(LMP)、中甲氧基果膠(IMP)、高甲氧基果膠(HMP)及其混合膠體(S-LMP, S-IMP, S-HMP)顯示，在 Tg 之前均出現 sub-Tg 及 sub-Tg 焓。S-HMP 之 sub-Tg 焓比預估值降低程度較 S-IMP 及 S-LMP 者為大，由焓鬆弛原理推測 HMP 之側鏈與 TNuS19 米澱粉外端小分支之交互作用程度比其他兩者高。 TNuS19 米澱粉、LMP、IMP 及 HMP 的 Tg 分別為 75.2℃、96.2℃、96.4℃與 93.5℃。而 S-LMP 在原成份 Tg 附近均有 Tg 存在，這顯示 TNuS19 米澱粉與 LMP 不相容。S-IMP 在原 IMP 之 Tg 消失，而在 87.8℃出現新的 Tg。S-HMP 僅於 86.2℃發現新的 Tg，因此推測 TNuS19 米澱粉之相容程度依序為: HMP>IMP>LMP。研究進一步以 DMA 分析 Tg 證明 HMP 與 TNuS19 米澱粉之相容性。DMA 分析發現 S-HMP 在原兩成份 Tg 溫度之間有新的 Tg 之外，另外於原 HMP 之 Tg 仍然存在，故推測是混合比例不恰當會使混合膠體中多餘 HMP 仍呈現原有的 Tg。 相容混合膠體 S-HMP 之黏度及保水力顯著高於 TNuS19 米澱粉、S-IMP 及 S-LMP 者，且其偽膠特性較 S-LMP 者低。這顯示因 HMP 與 TNuS19 米澱粉兩分子相容，而可能形成異分子交互作用，因此提高了膠體黏度與保水力。相容性分別與膠體黏度及保水力皆呈正相關。混合膠體之膠體黏度與保水力均依序為: S-HMP>S-IMP>S-LMP。
摘要(英)	Starch and polysaccharides are commonly existed in food. Difference in structure and hydrophilicity of food components may affect their mutual compatibility. If compatible, two substances may form an interaction in an aqueous solution after mixing. On the other hand, mixing incompatible substances may lead to molecular repulsion. Thus, the compatibility between two food components had a great influence on the physical properties and the qualities of foodstuffs. Gelatinized TNuS19 rice starch and pectin with different degrees of esterification was used as a model system. The glass transition temperatures (Tg) of each components and corresponding mixing gels analyzed by Differential Scanning Calorimetry (DSC) and Dynamic Mechanical Analysis (DMA) were used to evaluate the compatibility of the TNuS19 rice starch and pectin. Viscosity and water-loss percentage were used to monitor the gel strength of the TNuS19 rice starch with added pectin and relationship between compatibility and gelling properties. Below Tg, it showed the existence of sub-Tg and sub-Tg endotherm of the TNuS19 rice starch, low methoxyl pectin (LMP), intermediate methoxyl pectin (IMP), high methoxyl pectin (HMP) and the mixing gel of TNuS19 rice starch-pectin (S-LMP, S-IMP, S-HMP), when analyzed by DSC. The sub-Tg endotherm of S-HMP was lower than the predicted value, and the endothermic decrease of S-HMP was higher than those of S-IMP and S-LMP. This implies that the degree of interaction between the side chains of HMP and the outmost branches of the TNuS19 rice starch is higher than those of S-IMP and S-LMP. Tg of the TNuS19 rice starch, LMP, IMP and HMP were

	75℃,96.2℃,96.4℃ and 93.5℃, respectively. Presence of Tg of the original components in the S-LMP showed that the TNuS19 rice starch and LMP is incompatible. The Tg of IMP was no longer appeared in the S-IMP sample, instead, a newly-generated Tg at 87.8℃ was shown. In the S-HMP, only a new Tg appeared at 86.2℃. Therefore, above evidence revealed the fact that degree of compatibility between the TNuS19 rice starch and pectin was as follows: HMP>IMP>LMP. Tg of the TNuS19 rice starch and HMP were further analyzed by DMA. In addition to the new Tg shown in the S-HMP, the Tg of HMP still existed. This may be resulted from an inappropriate mixing ratio of the TNuS19 rice starch and HMP, which leads to the presence of Tg of HMP in the S-HMP. Both viscosity and water holding ability of the compatible mixing gel of S-HMP were significantly higher than those of the TNuS19 rice starch gel, the S-IMP gel and the S-LMP gel. And the pseudoplasticity of S-HMP was significantly lower than that of S-LMP. Above facts imply that HMP and the TNuS19 rice starch are compatible and both form intermolecular interaction, which leads to an increase of the gel viscosity. Thus, compatibility between two components was positively correlated with the gel viscosity and the water holding ability. The gel viscosity and water holding ability of the TNuS19 rice starch-pectin gel were as follows: S-HMP>S-IMP>S-LMP.
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