NMR转折点温度对食品储存过程中Maillard反应速率影响

Effects of NMR transition point temperature on Maillard reaction rate in model food storage systems

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英文关键词：Glass transition　Maillard reaction　NMR state diagram　transition point temperature

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中文摘要：

采用核磁共振(NMR)技术对以葡萄糖、海藻糖、蔗糖、赖氨酸构成的模型食品进行磁共振实验，绘制体系NMR状态图并计算转折点温度，同时在不同温度下进行储藏实验，考察体系中葡萄糖的变化，评估不同储藏温度下的Maillard反应速率。结果表明：模型食品体系含水量不同、非反应组分含量不同，其NMR转折点温度有所不同。低水分含量的体系具有相对高的NMR转折点温度。即使在相同的储藏温度下，含水量相同而非反应组分含量不同的情况下，体系的Maillard反应速率也有所不同。储藏温度处于体系的NMR转折点之下时，体系的Maillard反应速率明显要比在NMR转折点温度之上要慢。由此，可以通过改变食品的配方、含水量等改变体系的NMR转折点温度，可以有效地延长食品的货架期。因此，核磁共振状态图对于评估最佳的储藏温度，以及通过配方设计来延长食品的货价期具有指导意义。

英文摘要：

Functional nuclear magnetic resonance (NMR) was used to study the effect of NMR state diagram and transition point temperature (Tp) on Maillard reaction rate in model food systems. All systems had the same concentration of reactants, lysine and glucose, but different moisture and inert components, trehalose and sucrose. Carr-Purcell-Meiboom-Gill(CPMG) sequence was used to acquire the sample’s NMR relaxation data at different temperatures. High performance liquid chromatography (HPLC) was used to detect the consumption of reactants in the model food systems during stored in different temperatures. A trend of Tp temperatures change in the NMR state diagram was observed in the model matrixes with different moistures and sugar contents. A relative higher Tp temperature was observed in the low moisture sugar matrix and a relative slow reaction velocity in the identical matrix during storage at the same time. There were obvious reaction velocity differences on the temperatures above and below the Tp temperatures during storage at different temperatures. Different reaction velocities were observed in the samples having different sugar contents with same moisture during storage under an identical temperature. It was concluded that NMR state diagram and Tp temperature is available in accessing the better storage temperature, and an ingredient design would be helpful for the extension of shelf-life by decreasing the relative chemical reaction velocity during storage

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