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Effect of Cyclodextrins on the Thermal Epimerization of Tea Catechins

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The epimerization reaction of tea catechins was investigated at pH 5.5 and 120 °C in the absence/presence of cyclodextrins (CDs). In the absence of CDs, a considerable quantity (~20%) of products originating from reactions other than the epimerization ("other products") was formed during the epimerization of gallated catechins. In the case of (-)-EGCg, addition of β-CD to the reaction solution reduced the quantity of these other products to just a few percent, but other CDs with different cavity sizes had little effect. Generally, the addition of β-CD increased the ratio of non-epi type catechins, that is, [non-epi type catechin] / ([epi type catechin]+[non-epi type catechin]). Molecular orbital (MO) calculations using the PM3 method suggested that non-epi type catechins are more thermodynamically stable than their epitype counterparts, moving the equilibrium position in favor of non-epi type catechins in the epimerization process.

Keywords: tea catechins, thermal epimerization, cyclodextrin, epi type catechins, non-epi type catechins

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