

Encapsulation of caffeine into starch matrices: Bitterness evaluation and suppression mechanism

ABSTRACT

In this study, caffeine (CA) was encapsulated into food-grade starch matrices, including swelled starch (SS), porous starch (PS), and V-type starch (VS). The bitterness of the microcapsules and suppression mechanisms were investigated using an electronic tongue, molecular dynamics (MD) simulation and the *in vitro* release kinetics of CA. All the CA-loaded microcapsules showed a lower bitterness intensity than the control. The MD results proved that the weak interactions between starch and CA resulted in a moderate CA release rate for SS-CA microcapsules. The PS-CA microcapsule presented the longest CA release, up to 40 min, whereas the VS-CA microcapsule completely released CA in 9 min. The CA release rate was found to be related to the microcapsule structure and rehydration properties. A low CA bitterness intensity could be attributed to a delay in the CA release rate and resistance to erosion of the microcapsules. The results of this work are valuable for improving starch-based microcapsules (oral-targeted drug-delivery systems) by suppressing the bitterness of alkaloid compounds.

Keyword: Caffeine; Bitter evaluation; Modified starch