Title:

Impact of Ohmic Heating on Coconut Water Volatile Compounds

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Abstract:

Immature coconut water (CW) is a low acid fruit juice mainly composed of sugars and minerals. Beside its healthy feature, it can also be a pleasant refreshing drink especially when coming from aromatic coconut varieties. Unlike conventional thermal processes, ohmic heating is an innovative technology using volumetric heating technique to pasteurize or sterilize food products. As such, it is known to overcome the overheating problem in fruit juices and to improve aroma preservation. This work aimed at obtaining a commercially safe CW beverage by ohmic heating while looking at the volatile compounds kinetic evolution.

Coconut water from an aromatic Thailand Green Dwarf variety was submitted to different ohmic heating time-temperature treatments ranging from 100°C to 140°C and from 0 to 600 seconds. Volatile compounds from the fresh and heated samples were extracted by headspace-solid phase microextraction before being identified by gas chromatography coupled to mass spectrum analysis. Volatile compounds variations were described thanks to principal component analysis and chemical kinetics.

Sixty volatile compounds were identified. Even after high temperature ohmic heating treatment, flavor compounds responsible for the typical CW aroma remained in samples headspace. None of the Strecker degradation molecules was detected in the GC analysis of CW after a 5s or 10s treatment at 140°C. The variations of the volatile compounds composition and levels during ohmic treatment confirmed that the higher the temperature is, the less the impact on the chemical reactions thus on flavor quality. At least two volatile molecules were apparently good indicators of the heating treatment level: 3-penten-2-one and ethyloctanoate. During the isothermal stage, the kinetic approach lead to E_a=67.7 kJ.mol^{-1} for the 3-penten-2-one increase. These results proved that ohmic HT-ST treatments could ensure a commercially safe high quality beverage thanks to a better retention of the original volatile compounds of immature coconut water.

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