

Title Mass transfer of water and volatile fatty acids in cocoa beans during drying

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Abstract

In order to elucidate the phenomena involved in the remnant acidity of cocoa beans dried artificially, the diffusivities of water, and volatile fatty acids (VFAs: acetic, propionic, butyric and iso-butyric acids) in cocoa beans during drying were evaluated. Experimental drying kinetics of the acids were conducted at 40–60 °C with and without shell. Samples were taken at different drying times for moisture and acids content evaluation. VFAs content was evaluated by GC in a methanolic extract, and moisture content by a vacuum oven. Mass diffusivity was estimated from the fitting of experimental kinetics to a theoretical model that takes into consideration the beans' shape. Acetic, propionic and butyric acids diffusivities were significantly ($p < 0.05$) smaller than water diffusivities both with and without shell. VFAs diffusivities were between 1/6 and 1/22 diffusivities values for water. Iso-butyric acid diffusivity was not statistically significant but the value was smaller than for the other VFAs. The diffusivities of VFAs may explain the remnant acidity in artificially dried cocoa beans.