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Kinetics of Nonenzymatic Browning Reaction in Citrus Juice Concentrates during Storage

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Abstract: The kinetics of nonenzymatic browning in citrus juice concentrates (orange, lemon, grapefruit and tangerine) during 8 weeks of storage at 28, 37 and 45 ºC were investigated. Browning development was followed by measuring absorbance at 420 nm (A_{420}) and using CIE-Lab color system. Analysis of kinetic data from A_{420} values suggested a zero-order reaction for nonenzymatic browning, while changes in L* and b* parameters followed a first-order reaction. Activation energy for nonenzymatic browning determined by A_{420} values ranged from 17.60 to 35.27 kcal mol^{-1}, while those for L* and b* parameters were 6.67-28.99 kcal mol^{-1} and 15.38-34.2 kcal mol^{-1}, respectively. Activation energies were higher in orange (28.99-35.27 kcal mol^{-1}) and tangerine (27.84-33.1 kcal mol^{-1}) juice concentrates than those in grapefruit (6.74-27.81 kcal mol^{-1}) and lemon (6.67-17.6 kcal mol^{-1}) juice concentrates. The lower activation energies determined for grapefruit and lemon juice concentrates indicated that nonenzymatic browning reactions are favored in these samples.

Key Words: Citrus juice concentrate, nonenzymatic browning, color, storage, kinetic

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