Degradation kinetics of ascorbic acid in acerola pulp and pulp serum during ohmic heating: effect of electric field frequency

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Acerola (Malpighia emarginata D.C.) is known for its nutritional value, especially because of its high content of vitamin C. Food processing generally includes heat treatments that affect ascorbic acid levels in fruit products and vegetables. Ohmic heating is one alternative to thermal processing that allows high-temperature/short-time processing, thus avoiding excessive thermal damage to labile substances. The objective of this work was to evaluate the effect of frequency (from 10 to $10^4$ Hz) on the degradation kinetics of ascorbic acid in acerola pulp and pulp serum during ohmic heating. Samples were treated in a jacketed ohmic treatment vessel wherein the samples were held at 85°C for up to 2 hours, using 30 V and 75°C water in the jacket simultaneously. Samples were withdrawn at various heating times and a UV-HPLC method was used to quantify ascorbic acid levels. For acerola pulp, the rate constant for the ohmic heating process at 10 Hz was higher than those for all other treatments. However, the increase of the field frequency (above 100 Hz) did not affect the degradation kinetics of ascorbic acid. The pulp serum showed a different behavior: the rate constant for the process at 10 Hz was higher than those at 100 and 1000 Hz; the latest in turn presented higher rate constant than the process at 10 kHz. These results suggest that the effect of frequency on degradation kinetics of ascorbic acid in acerola pulp is influenced by the presence of solid particles that might affect the heating rates in the surrounding medium.