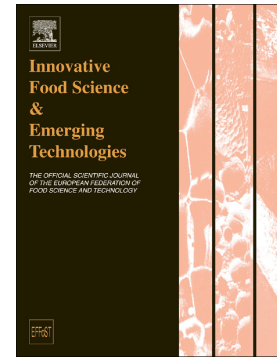


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The inactivation kinetics of polyphenol oxidase and peroxidase in bayberry  
juice during thermal and ultrasound treatments

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**Abstract:** Ultrasound is recognized as a non-conventional processing technology for food preservation and quality improvement. Effects of thermal and ultrasound treatment on the inactivation kinetics of polyphenol oxidase (PPO) and peroxidase (POD) in bayberry juice were studied. Whether cooling with ice bath during ultrasound treatment was conducted to separate effects of heat and cavitation effects. In all processes, the inactivation kinetics of PPO and POD followed a first-order model ( $R^2 = 0.864-0.997$ ). The  $D_T$  value during thermal inactivation varied from 151.99 to 6.23 min for PPO and the corresponding  $Z_T$  values and activation energy ( $E_a$ ) were 13.16 °C and 166.77 kJ/mol, while those parameters of POD were 298.26-7.08 min, 14.25 °C and 153.49 kJ/mol, respectively. The ultrasound (US) inactivation rate constants (k) for PPO ranged from 0.0556 min<sup>-1</sup> to 0.8878 min<sup>-1</sup> with the corresponding D values of 41.44-2.59 min and  $Z_{UI}$  values of 312.50 W/cm<sup>2</sup>. However, the k value of PPO during ultrasound with cooling (USC) decreased to 0.0412-0.3268 min<sup>-1</sup>, while the D and  $Z_{UI}$  values increased to 55.92-7.05 min and 432.90 W/cm<sup>2</sup>, indicating that the heat brought out during ultrasound treatment significantly enhanced the inactivation kinetics of PPO. The

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