

P-247 - ELECTRIC FIELDS EFFECTS ON CAROTENOIDS FROM TOMATO BY-PRODUCTS

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Background

Ohmic heating, also called electro-heating is an innovative thermal technology. Heat is generated inside the food and it is proportional to the square of the electric field strength and the electrical conductivity of the matrix. This technique may cause an electrochemical degradation due to number of reactions, including heat, electrode reactions and electrolysis of the solution. This study aimed to study the effects of electric fields on polyphenols and carotenoids from tomato by-products.

Method

Industrial tomato by-products were used in this study.

Different times (0, 15 and 30 min), temperatures (40, 55 and 70 °C), electrode fields (4, 6 and 11 V/cm) and percentage of ethanol:water ratio (0, 35 and 70 %) were applied.

Extracts were obtained with ethanol:water and after centrifugation. Total antioxidant, total phenolics and carotenoids content were assessed by the 2,2'-azino-bis(3-ethylbenzothiazoline-6-sulphonic acid (ABTS), Folin Ciocalteu's and spectrophotometric methods, respectively. Individual carotenoids were analyzed by High-Performance Liquid Chromatography with Diode-Array Detection (HPLC-DAD).

Results & Conclusions

The results showed that total polyphenols content were of 151.48 µg/gFW at the optimum extraction conditions – i.e. 15 min, 70 °C and 70% of ethanol at 6 V/cm. Nevertheless, the same was not shown to the carotenoids, since their optimum extraction conditions were 30 min, 55 °C and 35% of ethanol at 6 V/cm. The individual carotenoids identified in tomato by-products were lutein, lycopene and β-carotene. β-carotene was not extracted through the application of ohmic heating, as opposed to the organic solvents extraction. However, lycopene was found in samples submitted to fast heating treatment (few seconds until it reaches 70 °C) coupled with moderated electric fields of 6 V/cm and 4 V/cm with a concentration of 5.0 and 3.8 µg/mL, respectively.

Results suggested that depending on combination of temperature and electric field carotenoids and polyphenols can be selectively extracted. Higher temperatures (70 °C) at 4 V/cm are good to extract polyphenols but degrade carotenoids. Further studies are necessary to understand the influence of electrical variables on extraction profile of bioactive compounds.

References & Acknowledgments

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