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ELECTROCOAGULATION FOR D-PINITOL ENRICHMENT FROM CAROB EXTRACT: PLATE SELECTION

Yuksel Alper Kutuk[1], Hatice Reyhan Oziyci[2*], Mustafa Karhan[1]

[1]Department of Food Engineering, Faculty of Engineering, Akdeniz University, Dumlupinar Boulevard nn, 07070 Antalya, Turkiye
[2]Department of Gastronomy and Culinary Arts, School of Tourism, Antalya Bilim University, Ciplakli District, Akdeniz Boulevard 290/A, 07190 Antalya, Turkiye

[*]e-mail: hatice.oziyci@antalya.edu.tr

Abstract

D-Pinitol (3-O-methyl-D-chiro-inositol), a bioactive compound holds promise for its anti-diabetic properties. However, synthesizing D-pinitol in laboratory settings is prohibitively expensive, prompting research to focus on extracting and purifying it from natural sources. This study introduces electrocoagulation (EC) as an innovative technique not previously explored for D-pinitol extraction from carob extract. EC facilitates the removal of charged compounds in colloidal suspensions by inducing collisions and neutralization with ions of opposite charges. The efficiency of this process largely depends on the types of plates used, as they vary in effectiveness based on the colloidal compounds in the solution.

In this context, this study evaluated aluminum (Al) and stainless-steel (SS) plates, commonly employed in EC research, to ascertain their effectiveness in the extraction process. Four distinct trials were designed, positioning each plate type at the anode and cathode ends within the EC system. The experiments maintained fixed operational parameters (Electrode interval: 3 cm, current density: 60 mA/cm^2, voltage: 30 V, and time: 60 min) in the carob extract produced from cultivated carob fruits grown in Antalya, Türkiye. The effectiveness of EC was assessed by determination of D-pinitol content (using HPLC separation and refractive index detection), colorimetric analysis of total phenolic content (using a spectrophotometer), color measurement (using a colorimeter), and turbidity measurement (using a turbidimeter) in the post-treatment

The study found that the Al (-) and SS (+) plate combination significantly enhanced D-Pinitol yield by 23%, increasing it from 17 to 42.36 g/100 g dry matter. Additionally, there were reductions in total phenolic content and turbidity, along with an improvement in color (L value).

The results indicate the success of EC as an intermediate process for D-Pinitol purification.

***Key words**: Carob, D-Pinitol, Electrocoagulation, Purification.*