

Optimization of Ultrasound - Assisted Extraction (UAE) of Lycopene from Tomato Skins

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Lycopene is part of the carotenoid family and has been of interest in the last period, having a strong antioxidant activity due to its structure [1-3].

Lycopene can be found in various vegetable resources such as watermelon, pink grapefruit, guava, etc., but the richest source is tomatoes [4]. Lycopene can be extracted from fresh tomatoes, but it is more appropriate to extract them from waste resulting from their processing (skins).

The extraction of lycopene from tomato waste is an intensely studied subject that includes a wide variety of different extraction methods, from conventional extraction with various organic solvents [5-7], to innovative non-conventional techniques involving ultrasonic [8], ultrasonic - microwave assisted extraction [9], or extraction with supercritical fluids [10].

An experimental program (2³) was carried out based on the software Design Expert 11. The independent variables were chosen on the basis of experiments carried out before the experimental matrix was constructed and the significant ones were found to be the size of the plant particle, the extraction temperature and the ultrasonic amplitude (US power). The dependent variables (responses) that are expected to be estimated and maximized using the model were chosen as the following three important parameters in the assessment of the performance of the extractions: Lycopene - the specific amount extracted (mg lycopene/100 g dry vegetal material); Betacarotene - the specific amount extracted (mg betacarotene/100g dry vegetal material) and, respectively, the ratio of Lycopene/Betacarotene concentrations.

From the analysis of variance significant factorial patterns have been establish.

Using optimization module, a desirability function is obtained. The criteria used were maximization of lycopene and carotene concentrations and different ratio for lycopene / carotene. The optimum conditions were thus established.

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