

Abstract

Reusing Food Waste: Ascorbic Acid Extraction from Orange Peel Using Ultrasound-Assisted Extraction and Natural Deep Eutectic Solvents [†]

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Abstract: The food industry generates a huge amount of waste from the production of food and processed products. There is a need to find a different fate to this waste, use or reuse, to minimize this problem (1). Regarding citrus fruits, the waste of this cultivar has a significant amount of bioactive compounds, like ascorbic acid (AA) (2). The extraction of these compounds can also contribute to environmental pollution due to energy usage and polluting organic solvent by-products (3). Non-conventional extraction techniques and less polluting solvents to recover these compounds from citrus waste would be a better and less pollutant choice. In this study, six hydrophilic Natural Deep Eutectic Solvents (NADES) were prepared to extract AA from orange peel (Navel cultivar). EtOH 50% was used as control. The extraction was done with the aid of Ultrasound-Assisted Extraction (UAE). The UAE parameters: extraction time (5, 10 and, 15 min), intensity (100 W, 200 W and, 400 W), and the magnetic stirring time after UAE (0, 20, 30 and, 45 min) were optimized. The determination of AA was made by HPLC-UV/VIS. Mobile phase A: Milli-Q water/formic acid (95:5) and mobile phase B: acetonitrile/A (60:40), the injection volume was 1 µl at a flow rate of 0.5 ml/min were used. A standard calibration curve was constructed using the same conditions as the samples (R = 0.9998). The selected optimal conditions were 10 min of extraction, 100 W of intensity (no statistical differences found among intensities), and 45 min of magnetic stirring after treatment. The NADES that presented the highest extraction yield was Malic Acid: Glucose (11.76 mg/100 ml) followed by L-Proline: Malic Acid (7.44 mg/100 ml). NADES provided higher extraction yields than EtOH 50% (5.41 mg/100 ml). In conclusion, two of the studied NADES extracted more AA than EtOH 50% from orange peel.

Keywords: natural deep eutectic solvents; ultrasound-assisted extraction; orange peel

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