

Natural deep eutectic solvents combined with cyclodextrins: A novel strategy for chokeberry anthocyanins extraction

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Innovative eco-friendly methods based on natural deep eutectic solvents (NaDES) coupled with ultrasound-assisted extraction were employed for chokeberry anthocyanins extractions. Nine different NaDES composed of choline chloride as a hydrogen bond acceptor and organic acids (lactic, citric, malic), sugars (glucose, fructose), polyols (glycerol, 1,2-propanediol, sorbitol), and an amide (urea) as hydrogen bond donors were screened. Malic acid-containing NaDES was selected for optimization extraction conditions (time, temperature, water in NaDES) by response surface methodology. Optimal conditions for simultaneously maximizing the anthocyanins extraction (cyanidin-3-*O*-glucoside, cyanidin-3-*O*-galactoside, cyanidin-3-*O*-arabinoside, total anthocyanins) were 42.7 °C, 90 min, and 40 % (w/w) water in NaDES. In the next stage of this study, the possibility to improve anthocyanins extraction at elevated temperatures by incorporating different concentrations of hydroxypropyl- β -cyclodextrin into selected NaDES was investigated. The extraction was improved at hydroxypropyl- β -cyclodextrin concentrations up to 3 % (w/w). To clarify the interaction of NaDES components and anthocyanins, a molecular dynamic simulation was conducted.