

OPTIMIZATION OF A GREEN METHOD FOR THE RECOVERY OF NATURAL COLORANTS FROM ONION SOLID WASTES: APPLICATION IN A YOGURT PRODUCT

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The valorization of onion (*Allium cepa*) wastes, a 450,000 tonnes/year waste in Europe, by a non-conventional method is presented. The outer dry layers of the onion bulb, which constitute the main waste of onion, is a source of valuable polyphenols such as flavonoids and anthocyanins. Polyphenols of onion leaves were extracted using eco-friendly solvents, such as water and glycerol. 2-hydroxypropyl- β -cyclodextrin was also used as a co-solvent for the augmentation of the extraction, as cyclodextrins (CD's) are known to enhance the extraction of polyphenols in water by forming water-soluble inclusion complexes. The process was optimized by implementing a central composite (Box-Behnken) experimental design and response surface methodology (RSM), taking into consideration the following independent variables: glycerol concentration (C_{gl}), CD concentration (C_{CD}) and temperature (T). The assessment of the extraction model was based on two responses: the total pigment yield (Y_{TPm}) and the antiradical activity (A_{AR}). LC-MS analysis was also employed in order to identify biophenols and colourants of the obtained extracts. The main biophenols found were quercetin and quercetin derivatives and the main colorant was cyanidin 3-O-glucoside. The extract was also tested as a food colourant in a yogurt matrix. The chemical stability of the extract was determined by measuring the absorbance at 523nm at different pH, time and thermal treatments. Changes in the colour of extract solutions and yogurt product were also monitored using a colorimeter. Onion leaf extract was found to be a stable colourant and can be proposed as an alternative to synthetic coloring agents.