PIGMENTS EXTRACTION FROM CYANOBIUM SP. – A COMPARISON BETWEEN PRESSURE-BASED AND ELECTRIC FIELDS-BASED TECHNOLOGIES

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Body

Pigments from cyanobacteria, in special carotenoids and phycobiliproteins, have been seen with considerable interest for industrial applications due to their bioactive properties and their natural product characteristics. The extraction of these compounds is focused on the methodologies of cell disruption and on the chemical solubility of the compounds.

In this study, two different methods were optimised and evaluated in terms of pigments´ extraction from the marine cyanobacterium *Cyanobium* sp.: a continuous pressurized solvent extraction (CPSE) system, and an electric fields-assisted extraction system based in ohmic heating (OH). For each method, a Central Composite Design (2^3) was performed. Optimal conditions for each extraction method were then compared to determine the best method for the extraction of pigments from *Cyanobium* sp. In both optimisation and comparison steps, two extracts were obtained from the same biomass: an ethanolic extract (carotenoids-targeted) and a successive water extract (phycobiliproteins-targeted). The content and profile of carotenoids and phycobiliproteins and the respective antioxidant capacity of extracts were evaluated.

OH provided the best ethanolic extract, with a carotenoids content of 41.6 ± 1.7 mg g_{DW}^{-1}, and total antioxidant capacity of 8.0 ± 0.3 mg_{TE} g_{DW}^{-1}, representing an increase of 1.3-fold and 2.5-fold respectively, when compared to CPSE. Regarding the aqueous extract, both methods led to the same content of phycobiliprotein (135 ± 10.0 mg g_{DW}^{-1}), although OH led to an antioxidant capacity of this extract of 8.3 ± 0.3 mg_{TE} g_{DW}^{-1}, 3.6-fold higher when compared to CPSE. In terms of profile, no major variation was found between extraction methods, being lutein, zeaxanthin, echinenone and β-carotene the major carotenoids (>60 % of total carotenoids), and phycocyanin and allophycocyanin the only present phycobiliproteins (in a 1:2 ratio).

In addition to the productivity and composition of the extracts, the design and applicability of the system must be considered. Once again, OH overtook the other methods due to the scalability and possible continuous operation. Overall, OH proved to be the best of the two methodologies for pigments co-extraction from *Cyanobium* sp..**Acknowledgements**

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Palavras-chave : carotenoids, phycobiliproteins, antioxidant capacity, ethanolic extract, aqueous extract, successive extraction