SUSTAINABLE EXTRACTION OF BIOCOMPOUNDS FROM THE GREEN SEAWEED ULVA RIGIDA USING OHMIC HEATING

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Body

The development of new green and sustainable extraction technologies with low environmental impact and providing high nutritional functionalities, safety and applicability, has become relevant. Ohmic heating (OH) has emerged as a novel electric-based technology which allows high heating rates, higher selectivity of interest compounds, less energy and solvent consumption and energetically more efficient.[1,2] *Ulva rigida* is a green seaweed with high exploitation potential for commercial application. Its major compound of interest is ulvan, a sulfated polysaccharide present in the cell wall that has a wide range of possible applications in nutraceuticals, functional foods, agriculture and biomaterials.[3] The aim of this work was to access the feasibility of OH assisted extraction as an alternative extraction technology in the recovery of biocompounds (e.g.: polysaccharides, proteins, phenolic compounds and pigments) from *Ulva rigida* using different ratios of water/ethanol in different times of extraction. Extractions were made using a solid:solvent ratio of 1:30 and water/ethanol mixtures ranging from 0 to 75 % ethanol to extract different seaweeds fractions. The extractions were performed at 82 °C during 1 h, 2 h and 3 h, and the frequency was set at 25 kHz. Control extractions were made using a water bath (conventional extraction) with the same conditions, but without the presence of an electric field. Different parameters were assessed including extraction yield, lipids, ashes, moisture, total polysaccharides, protein, total phenolic compounds and pigments (chlorophylls and carotenoids) content, antioxidant activity and gelling ability. Higher extraction and ulvan-fraction yields, as well as total polysaccharides were obtained after 3 h of extraction for aqueous extracts. Total phenolic compounds, proteins and pigments content and antioxidant activity were higher for mixtures with higher amounts of ethanol. For antioxidant activity and total phenolic compounds, the 50:50 H_2O/EtOH mixture under OH proved to be more efficient, with an increase up to 10 %, when compared to conventional extraction. Also, for pigments and protein content, the 25:75 H_2O/EtOH mixture allowed promising results for 1 h of extraction. Gelling ability was identical in all produced extracts. As conclusion, these results showed that OH is a good alternative for a low cost and environmental-friendly extraction technology, for the recovery of bioactive compounds from green seaweeds.

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Palavras-chave : Ulva, Ohmic heating, Extraction, Biocompounds