FRACTIONATION OF MARINE MICROALGAE EXTRACT USING SUPERCRITICAL CO2 WITH PROGRESSIVE ADDITION OF CO-SOLVENT FOR THE RECOVERING OF HIGH-VALUABLE COMPOUNDS

Cejudo Bastante Cristina, Ramírez Tizón Sonia, Casas Cardoso Lourdes, Macías Sánchez María Dolores, Mantell Serrano Casimiro, Martínez De La Ossa Fernández Enrique José

Abstract

Microalgae biotechnology is of great interest in the nutraceutical, food, energy, cosmetics, and pharmaceutical industries. The composition of lipids, pigments, and bioactive substances of microalgae depends on the species and especially on the culture conditions. The extraction of these substances of interest is carried out conventionally using organic solvents that are highly toxic and not very selective. The conventional method negatively affects the environment and eventually forces the incorporation of purification steps that make the process more complex and expensive. Supercritical carbon dioxide offers many advantages over organic solvents, especially for its high selectivity for lipophilic substances. Its gaseous state at ambient pressure makes it easy to eliminate the residual solvent and subsequently be reused in other extractions. Although the selectivity for the obtaining of polar substances is limited, the addition of low amounts of co-solvent overcome this limitation. The result is a reduction of solvent amounts compared to conventional extraction techniques. In this way, the progressive addition of the co-solvent offers a new strategy in the fractioning and purification of bioactive compounds of different nature by exhausting the sample, which supposes a high economic impact in the recovery of bioactive compounds from microalgae at an industrial scale for its further use. In this work, a fractionation with consecutive supercritical extractions increasing the percentage of ethanol as cosolvent, from two microalgae spices, Nannopclorosis gaditana and Tetraselmis chuii. The total carotenoid, chlorophyll, and polyphenol content of each fraction as well as their antioxidant activity by DPPH and ABTS methods was evaluated.