



## Green Ultra-High Pressure Extraction of Bioactive Compounds from Microalgae

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There is an increasing demand for natural bioactive compounds able to provide health benefits. In this regard, microalgae are promising microorganisms that can play a key role in bio-based economy, since they may serve as a continuous and reliable source of safe natural products thanks to their variety of valuable bioactive compounds such as proteins, carotenoids or polyunsaturated fatty acids, among others. These bioactive compounds have health promoting properties such as immunomodulatory, anti-cancer, antioxidant or anti-diabetic, which indicates their potential in food, cosmetic and pharmaceutical industries.

Nevertheless, sometimes the strong cell wall of microalgae hamper to a certain extent the efficiency of extraction. For this reason the use of pretreatments, such as enzyme treatments, could provide better results in terms of recovery of bioactive compounds. However, the use of compressed fluids-based extraction approaches may be a useful tool to produce in a single step cell disruption and extraction. In this regard, ultra-high pressure extraction (UHPE), reaching pressures up to 600 MPa, is proposed as the most convenient technique.

Furthermore, in order to improve the sustainability and economic feasibility of the microalgae biomass production process, it is necessary to obtain their high value compounds following a biorefinery-like approach, in which the residue of each extraction step is used as raw material for the next step.

In this context, the present study describes the extraction of bioactive compounds from different microalgae using UHPE with GRAS –generally recognized as safe– solvents. In addition, a biorefinery approach was carried out for the recovery of bioactive compounds of interest of *Porphyridium cruentum* and *Nannochloropsis oceanica*.

**Keywords:** ultra-high pressure extraction, microalgae, bioactives, carotenoids, biorefinery.