Title: Supercritical carbon dioxide extraction of bioactive compounds from microalgae and volatile oils from aromatic plants

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Abstract: A discussion of the most interesting results obtained in our laboratories, during the supercritical CO(2) extraction of bioactive compounds from microalgae and volatile oils from aromatic plants, was carried out. Concerning the microalgae, the studies on Botryococcus braunii and Chlorella vulgaris were selected. Hydrocarbons from the first microalgae, which are mainly linear alkadienes (C(23)-C(31)) with an odd number of carbon atoms, were selectively extracted at 313 K increasing the pressure up to 30.0 MPa. These hydrocarbons are easily extracted at this pressure, since they are located outside the cellular walls. The extraction of carotenoids, mainly canthaxanthin and astaxanthin, from C. vulgaris is more difficult. The extraction yield of these components at 313 K and 35.0 MPa increased with the degree of crushing of the microalga, since they are not extracellular. On the other hand, for the extraction of volatile oils from aromatic plants, studies on Mentha pulegium and Satureja montana L were chosen. For the first aromatic plant, the composition of the volatile and essential oils was similar, the main components being the pulegone and menthone. However, this volatile oil contained small amounts of waxes, which content decreased with decreasing particle size of the plant matrix. For S. montana L it was also observed that both oils have a similar composition, the main components being carvacrol and thymol. The main difference is the relative amount of thymoquinone, which content can be 15 times higher in volatile oil. This oxygenated monoterpene has important biological activities. Moreover, experimental studies on anticholinesterase activity of supercritical extracts of S. montana were also carried out. The supercritical nonvolatile fraction, which presented the highest content of the protocatechuic, vanilic, chlorogenic and (+)-catechin acids, is the most promising inhibitor of the enzyme butyrylcholinesterase. In contrast, the Soxhlet acetone extract did not affect the activity of this enzyme at the concentrations tested.

Author Keywords: Supercritical Carbon Dioxide; Microalgae; Aromatic Plants; Volatile Oils; Alzheimer's Disease

KeyWords Plus: CO2 Extration; Botryococcus-Braunii; Fluis Extraction; Chlorella-Vulgaris; Green-Alga; Thymoquinone; Hydrodistillation; Astaxanthin; Carotenoids; Lipids

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