



národní
úložiště
šedé
literatury

Kinetics of Supercritical Fluid Extraction of Carotenoids from Microalgae and Plants.

Sovová, Helena
2018

Dostupný z <http://www.nusl.cz/ntk/nusl-387472>

Dílo je chráněno podle autorského zákona č. 121/2000 Sb.

Tento dokument byl stažen z Národního úložiště šedé literatury (NUŠL).

Datum stažení: 25.04.2024

Další dokumenty můžete najít prostřednictvím vyhledávacího rozhraní nusl.cz.

Kinetics of supercritical fluid extraction of carotenoids from microalgae and plants

H. Sovová

Inst. Chem. Process Fundamentals CAS, Rozvojová 135, 16502 Prague, Czech Republic; tel. +420 220390234, e-mail: sovova@icpf.cas.cz.

Microalgae are regarded today as promising source of third generation of biofuels. However, a more appropriate utilization of microalgae which synthesize substances of high value in human nutrition as oil rich ω -3 and ω -6 unsaturated fatty acids and oil-soluble carotenoids is evident. Particularly suitable for the production of food supplements is the extraction with supercritical CO₂ because it preserves thermolabile bioactive substances and does not leave any traces of organic solvents in the product. The CO₂ extraction has been applied in industrial scale to obtain carotenoid astaxanthin from microalga *Haematococcus pluvialis*, cultivated to an extremely high content of carotenoids. To extract economically carotenoids from other microalgae, very high pressures have to be applied (> 50 MPa).

Many studies can be found in the literature on the CO₂ extraction of carotenoids from microalgae. Their mutual comparison offers opportunity to better understanding the process. We have shown that at least a part of oil extracted with CO₂ from microalgae is adsorbed on the matrix, and a consequence of increasing extraction pressure (and, above the cross-over pressure, also increasing the temperature) is not only an increase in oil solubility in supercritical CO₂ but also a release of the extract from the matrix [1]. Then, the mathematical model for the extraction of oil from microalgae was extended to include the extraction of carotenoids [2]. The model includes phase equilibrium and mass transfer resistance. The solubility of carotenoids in CO₂ is related to the solubility of oil *via* S , the pressure- and temperature-dependent selectivity. Symbols in the figure represent experimental extraction yields from microalga [3] and lines the results of modelling. A comparison with a larger set of literature data confirms the increase of the carotenoids-to-oil selectivity with increasing pressure and temperature.

This contribution summarizes previous results of our analysis of data on the supercritical fluid extraction of carotenoids from microalgae, adds comparison of the mathematical model with newly available experimental data, and applies the model on CO₂ extraction of carotenoids from different plants, where equivalent extraction mechanisms are supposed to be valid.

References

1. H. Sovová et al., *Materials* 9 (2016) 423.
2. H. Sovová, CHISA 2017, 23.-26. October 2017, Se, Czech Republic, V54.
3. S. Millao, E. Uquiche, *J. Supercrit. Fluids* 116 (2016) 223.