



národní
úložiště
šedé
literatury

Kinetics of Supercritical Fluid Extraction of Lipids and Pigments from Microalgae

Sovová, Helena
2014

Dostupný z <http://www.nusl.cz/ntk/nusl-174999>

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

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

Datum stažení: 30.07.2024

Další dokumenty můžete najít prostřednictvím vyhledávacího rozhraní [nusl.cz](http://www.nusl.cz) .

Kinetics of supercritical fluid extraction of lipids and pigments from microalgae

H. Sovová

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

In the last decade, attention has been focused on the extraction of lipids from algal biomass as a source of third generation biofuels. Supercritical fluid extraction (SFE) is one of the examined separation methods. The economic feasibility of extraction of lipids from dry algae with supercritical CO₂ and successive transesterification to biodiesel remains an open question; more promising seems to be a direct transesterification of wet algae with supercritical alcohol. On the other hand, food supplements containing lipids rich in polyunsaturated acids and carotenoids as strong antioxidants are successfully produced from microalgae by the extraction with supercritical CO₂. The kinetics of their SFE from microalgae has been studied and quantified using the first-order model [1], desorption model [2], and broken and intact cells (BIC) model [3]. The aim of this presentation was to collect the published kinetic data, synthesize them using the BIC model, and compare the model parameters for different microalgae.

The effect of microalgae pre-treatment, composition of solute and solvent, and extraction pressure and temperature on the mass transfer resistance and phase equilibrium is evaluated from experimental data on the kinetics of SFE of more than 10 microalgae strains including those frequently cultivated as *Spirulina (Arthrospira) sp.*, *Chlorella sp.*, *Schizochytrium limacinum* and *Haemathococcus pluvialis*. In most cases, the microalgae cell wall is of very low permeability and thus it must be disrupted before the extraction. Besides, polar pigments and lipids are not soluble in CO₂. To extract them, CO₂ should be modified with a smaller amount of polar solvent, usually ethanol. Finally, the modifier can enhance even the extraction of neutral lipids as the algae matrix is a good adsorbent for compounds to be extracted with CO₂ and keeps bound at least a part of the solute, unless it is released by the modifier.

Acknowledgments:

The financial support from the Technology Agency of the Czech Republic via grant TE01020080 is gratefully acknowledged.

References

1. A.P.R.F. Canela, P.T.V. Rosa, M.O.M. Marques, M.A.A. Meireles, Ind. Eng. Chem. Res. 41 (2002) 3012–3018.
2. J.O. Valderrama, M. Perrut, W. Majewski, J. Chem. Eng. Data 48 (2003) 827–830.
3. A. Mouahid, C. Crampon, S.A.A. Toudji, E. Badens, J. Supercrit. Fluids 77 (2013) 7–16.