

The kinetics of supercritical CO₂ extraction with co-solvent of fat-containing materials from melon seeds

© Karim Kh. Gafurov, Shokhista U. Mirzaeva,*⁺ and Bakhodir T. Mukhammadiev

Department of Information and Communication Control System of the Technological Process.

Bukhara Engineering-Technological Institute. K. Murtazoeva St., 15. Bukhara, 200100.

Republic of Uzbekistan. Phone: +7 (998) 914 017 905. E-mail: shohista.m@rambler.ru

*Supervising author; ⁺Corresponding author

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Abstract

The study of the processes to extractions lipids from fat contents vegetable material by means of fluids (for instance, dioxide of carbon in fluid condition) presents scientific and practical interest. For intensification of the process of the extraction lipids from vegetable material are used different physical-chemical acceptance: variation degree pulverizing, moisture, precipitate, hydro dynamic of the condition and others. Besides, possible use not only clean fluid, but its form modified by polar solvents (for instance, ethyl alcohol).

They are considered theoretical aspects and experimental studies of the kinetics extractions by supercritical carbon dioxide (with the ethyl alcohol as co-solvent) vegetable material (on example milled melons seeds). The calculation of the kinetics of the process on the bases of experimental data and theoretical aspects has shown the identical description by their model. Lipids (fats) of the vegetable origin have the important since are an ingredients make-up and pharmaceutical industry. So important to study of the kinetics their extractions from vegetable material, in particular, milled seeds melons. Vegetable ingredients in the first place differ between from each other on solubility in supercritical fluid and abilities diffusion in interface space. Solubility in supercritical fluids and in mixture its in ethyl alcohol and diffusion ingredients in vegetable matrix present itself complex physical-chemical process, which follows to describe by means of mathematical models, and then to check the correspondence to models experimental data.

The main parameter of the process extraction (SK-CO₂ with co-solvent – the ethanol) lipids vegetable origin, having kinetic nature, are ranking along real units of the carrying number Sherwood and factor to internal diffusion.

Using got parameters $D_{in} = 3.802 \cdot 10^{-10} \text{ m}^2/\text{s}$ and $C_{sat} = 0.288\%$ experimental data has produced the calculation of the kinetics to extractions have built the graph, which shows the identical description model by experimental data.

The model to nonlinear diffusion with exponential concentration dependency of diffusions coefficient adequately describes the kinetics of extractions.

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