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Detection of Microscale Mass-Transport Regimes in Supercritical Fluid Extraction

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Abstract

© 2017 WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim The problem of detecting supercritical fluid extraction regimes on the particle-scale level is discussed by using a generalized multiparameter model, which includes the shrinking-core (SC) and broken-and-intact-cells (BIC) approaches as its limiting cases. The model accounts for two internal mass-transfer resistances attributed to cell membranes and transport channels. A wide spectrum of particle-scale extraction regimes, described by the model, agree with available up-to-date relatively short laboratory experiments. Simplified concepts (like SC or BIC) could only be used for available experimental data correlation, and do not allow a reliable extension to long process times. The experimental methodology was suggested to detect limiting internal mass-transfer mechanisms.

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Keywords

Broken-and-intact-cells model, Cell membrane permeability, Extraction curves, Mass transfer, Shrinking core model

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