2nd National Congress on Medicinal Plants
15, 16 May 2013
Tehran- Iran

MATHEMATICAL STUDY OF DOREMA AUCHERI EXTRACTION WITH SUPERCRITICAL CARBON DIOXIDE

Marjan Haghayegh,[1,*] Seyed Ali Vaziri Yazdi,[1] Fatemeh Zabihi, [2] M.H Eikani[3]

[1]Department of Chemical Engineering, Science and Research Branch, Islamic Azad University, Tehran, Iran
[2]Department of Chemical Engineering, Ayatollah Amoli Science and Research Branch, Islamic Azad University, Amol, Iran
[3]Department of Chemical Technologies, Iranian Research Organization for science and Technology (IROST) Tehran, Iran
E-mail: marjan.hagh@yahoo.com

Supercritical technology is promisingly suggested for the separation purposes, especially for extracting the solutes from dense botanical palnts parts. This process abundant advantages such as reduction of extraction time and less consumption of organic solvents make it adequate for the thermo-sensitive substances, production of cleaner extracts and environmental benignity [1, 2]. Modeling and simulation are the fundamental tools for prediction of dynamic and equilibrium behavior, optimization of operating conditions, and scaling up of chemical plants [3]. In the current paper a novel general model is utilized to estimate the efficiency and mass transfer parameters for the supercritical extraction of flavonoid compounds from Dorema aucheri Boiss (an Iranian native plant with medicinal properties).

Flavonoids compounds exist in several kinds of fruits and vegetables that have diverse beneficial biochemical and antioxidant effects [4]. The natural materials to be extracted like seeds, leaves, are usually pretreated like grinding or milling before loaded into the extraction bed. Therefore, the concept of broken and intact cells, which is proposed by Sovova [5], mathematically describes the extraction process of natural materials. The first and second part of the extraction curve is obtained by this model, are governed by phase equilibrium and internal diffusion in particles, respectively [5]. The fluid and solid phases equilibrium for the broken cells is dominated by the discontinuous equilibrium function suggesting by Perrut et al. [6]. Model equations were integrated numerically using Runge-Kutta method with Matlab software. Finally the ability of the model to correlate the experimental data (Kamyab Moghadas et al., 2012) [4], and the effect of some parameters was successfully investigated.

References

[1] Ajchariyapagorn, A; Kumhom, Th; Pongamphai, S; Douglas, S; Douglas, P; Teppaitoon, W. *J. Supercrit. Fluids* **2009**, *51, 36-42*.
[2] Huanga, Z; Yang, M.J; Liu, S.F; Ma, Q. *J. Supercrit. Fluids* ***2011****, 58, 31– 39.*
[3] Domingues, R.M.A; de Melo, M.M.R; Neto, C.P; Silvestre, A.J.D; Silva, C.M. *J. Supercrit. Fluids* ***2012****, 72, 176-185.*
[4] Kamyab Moghadas, B; Safekordi, A.A; Honarvar, B.; Fathi Kaljahi, J.; Vaziri, Yazdi S.A. *Asian J. of Chemistry* ***2012****, 24, 3691-3694.*
[5] H. Sovova. *J. Supercrit. Fluids* ***2005****, 33, 35-52*