Artificial Neural Networks as Tool for SFE Process Optimization

Bran**imir Pavlić** [a,*], **Oskar Bera** [a], **Zoran Zeković** [a]
[a] University of Novi Sad, Faculty of Technology, Bulevar Cara Lazara 1, 21000 Novi Sad, Serbia
* bpavlic@uns.ac.rs

Modeling and optimization of industrial process is crucial step for improving its efficiency and profitability. Several mathematical procedures and approaches such as kinetics modeling based on Fick's law, empirical mathematical models, response surface methodology (RSM), models based on the Gibbs free energy and computational fluid dynamics (CFD) could be used for modeling of extraction processes. Artificial neural networks (ANN) have been widely and successfully used for modeling and prediction of variables influence on different outputs in various fields of chemical engineering. Recently, this optimization technique has found its application in supercritical fluid extraction (SFE) of bioactive compounds from natural resources. The aim of this work is to review the current state-of-the-art in potential application of ANN for process modeling, simulation and optimization within SFE of natural resources. Crucial steps of ANN analysis will be explained on two SFE case studies: 1) extraction of bioactive compounds from coriander seeds and 2) recovery of terpenoids from sage by-product from filter tea factory. Furthermore, hyphenated optimization procedure with extraction kinetics modeling and determination of initial slope, which is further used as response variable for ANN optimization will be explained in detail and benefits of this approach as optimization tool for SFE processes will be highlighted.

Keywords: Supercritical fluid extraction (SFE), Artificial neural networks (ANN), Modeling, Optimization