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"Potential Application of UF PSA Membrane in Degumming of Crude Canola Oil"

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Potential application of UF PSA membrane in degumming of crude canola oil

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Abstract

Membrane processing of edible oils is one of the most modern separation techniques in the non aqueous phase systems. Reduction of energy costs, oil quality and waste disposal are major concerns for many oil refiners who are looking for alternative methods to improve conventional refining, and during the last decade, energy efficient membrane separation technology has evolved dramatically. Membranes can be used in many areas of the vegetable oil industry. The aim of this work was to study the removal of phospholipids from canola oil miscella by using a cross flow PSA UF membrane with MWCO 20 kDa in a pilot-plant scale. Hexane/canola oil micella in 25% (w/w) was used as a feed and under different process parameters which include pressure 1.5 and 2 bar, temperature 30, 40 50 °C and time intervals 15 and 30 minutes was passed through the membrane. The effects of operating conditions on membrane effectiveness such as permeate flux; membrane resistance and fouling as well as percent of phospholipids rejection were studied. The results showed that removal of impurities, particularly phospholipids was so considerable and the rejection was about 96%, although the permeate flux due to membrane fouling was little.

Key words: canola oil; degumming; membrane resistance; polysulfone amide membrane; fouling

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Numerical simulation of freezing time of individual food

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Abstract

A one-dimensional unsteady state mathematical model with variable physical property parameters is developed to simulate the freezing time of individual food in freezing process. The phase-change problem in the freezing process is solved with apparent heat capacity approach. The numerical method was developed using the Crank-Nicolson scheme which is programmed with MATLAB 7, and compared with approximate analytical solution (Pham method) as well as with experimental data. The predicted freezing times of spherical, cylindrical and tabulate foodstuffs showed that the accuracies of freezing times predicted by the numerical model are all better than that of Pham method based on the same experimental data. Also, the Results showed that the numerical model could be used to predict the freezing time and the temperature history of spherical, cylindrical and tabulate food with various physical properties at different cooling medium temperatures. So it could be used to give a guideline for freezing experiments, freezing equipment design and frozen-food production.

Keywords: Freezing time; Mathematical model; Apparent heat capacity; Crank-Nicolson; Individual food