

Optimization of the Forward Extraction of Jacalin from Jackfruit Seed by AOT Reverse Micelles

¹Sharifah Fathiyah Sy Mohamad*, ¹Farhan Mohd Said, ²Mimi Sakinah Abdul Munaim, ¹Shahril Mohamad and ³Wan Mohd. Azizi Wan Sulaiman

¹Faculty of Chemical & Natural Resources Engineering, Universiti Malaysia Pahang, Lebuhraya Tun Razak, 26300 Gambang, Kuantan, Pahang, Malaysia

²Faculty of Engineering Technology, Universiti Malaysia Pahang, Lebuhraya Tun Razak, 26300 Gambang, Kuantan, Pahang, Malaysia

³Department of Basic Medical Science, Faculty of Pharmacy, International Islamic University Malaysia, Jalan Sultan Ahmad Shah, 25200 Kuantan, Pahang, Malaysia

Abstract: Jacalin is the major protein contained in the crude extract of jackfruit seed that specifically recognizes and binds reversibly to galactose. Conventionally, purification of jacalin is carried out using the tedious and costly chromatographic techniques. In this study, we optimized the main parameters influencing the extraction of jacalin from the crude extract of jackfruit seed using the sodium bis(2-ethylhexyl) sulfosuccinate (AOT)-based reverse micellar system. Reverse micellar extraction is an attractive alternative for downstream processing of various proteins. A successful reverse micellar extraction consists of two basic steps: forward and backward extraction. Forward extraction transfers a target protein from an aqueous solution into the reverse micellar solution, while backward extraction releases the protein from the reverse micelles structure into a new aqueous solution. The effects of the aqueous phase pH, NaCl concentration and AOT concentration on the forward extraction efficiency (FEE) are investigated using the response surface methodology (Box-Behnken Design). The adequacy of the Box–Behnken response surface model for predicting the FEE is verified using regression analysis. The main effects and interactions of the significant parameters are analyzed through the 3D surface plots. The optimum forward extraction conditions were determined as follows: aqueous phase pH 4.58, 125 mM NaCl and 40 mM AOT. Under the optimal conditions, the FEE reached 88.04±1.30%, closer to 87.99 % predicted by the model. The results indicated that AOT/isooctane reverse micelle system is effective in extracting jacalin from the jackfruit seed crude extract and verified the practicability of the BBD for optimizing the main parameters in the forward extraction of jacalin.

Keywords: Optimization; Reverse micelles; Forward extraction; Jacalin; sodium bis(2-ethylhexyl) sulfosuccinate (AOT)

*Corresponding author: fathiyah@ump.edu.my