

Effect of Arabic gum, xanthan gum and orange oil contents on ζ -potential, conductivity, stability, size index and pH of orange beverage emulsion

ABSTRACT

The main and interaction effects of main emulsion components namely Arabic gum content (13–20%, w/w, x_1), xanthan gum content (0.3–0.5%, w/w, x_2) and orange oil content (10–14%, w/w, x_3) on beverage emulsion characteristics were studied using the response surface methodology (RSM). The physicochemical properties considered as response variables were: ζ -potential (Y1), conductivity (Y2), emulsion stability (Y3), size index (Y4) and pH (Y5). The results indicated that the response surface models were significantly ($p < 0.05$) fitted for all response variables studied. In contrast with ζ -potential and pH, the independent variables had the most significant ($p < 0.05$) effect on size index. Regression models describing the variations of the responses variables showed high coefficient of determination (R^2) values ranging from 0.866 to 0.960. The main effect of Arabic gum followed by its interaction with orange oil was observed to be significant ($p < 0.05$) in most of response surface models. Therefore, the concentration of Arabic gum should be considered as a critical variable for the formulation of orange beverage emulsion in terms of the emulsion characteristics studied. The overall optimum region resulted in a desirable orange beverage emulsion was predicted to be obtained by combined level of 10.78% (w/w) Arabic gum, 0.24% (w/w) xanthan gum and 12.43% (w/w) orange oil. No significant ($p > 0.05$) difference was found between the experimental and predicted values, thus ensuring the adequacy of the response surface models employed for describing the changes in physicochemical properties as a function of main emulsion component contents.

Keyword: Arabic gum, Xanthan gum, Beverage emulsion, ζ -Potential, Conductivity, Emulsion stability