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, x1), xanthan gum content (0.3–0.5%, w/w, x2) and orange oil content (10–14%, w/w, x3) 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 (R2) 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