Characterization of the influence of main emulsion components on the physicochemical properties of orange beverage emulsion using response surface methodology.

ABSTRACT

The present work was conducted to investigate the influence of main emulsion components, namely Arabic gum (7–13% w/w), xanthan gum (0.1–0.3% w/w) and orange oil (6–10% w/w) contents on physical stability, viscosity, cloudiness and conductivity of orange beverage emulsion. In this study, 20 orange beverage emulsions were established based on a three-factor central composite design (CCD) involving 8 factorial points, 6 axial points and 6 center points. The main objective of the present study was to determine an optimal concentration level of main emulsion components leading to an optimum orange beverage emulsion with desirable physicochemical properties. In general, all response surface models were significantly ($p<0.05$) fitted for describing the variability of physical stability, viscosity, conductivity and cloudiness as a nonlinear function of the content of main emulsion components. More than 84% of the variation of physicochemical properties of orange beverage emulsion could be explained as a function of the content of the main beverage emulsion components. In general, the orange oil content appeared to be the most significant ($p<0.05$) factor influencing all emulsion characteristics studied except for conductivity. From the optimization procedure, the overall optimal region leading to the desirable orange beverage emulsion was predicted to be achieved by the combined level of 13% (w/w) Arabic gum, 0.22% (w/w) xanthan gum and 10% (w/w) orange oil.

Keyword: Arabic gum; Xanthan gum; Physical stability; Viscosity; Cloudiness; Conductivity; Beverage emulsion; Central composite design.