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Optimisation of the maillard reaction of bovine gelatine-xylose model using response surface methodology
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Abstract
The Maillard reaction is known as an amino-carbonyl reaction or non-enzymatic browning reaction which has an essential role in food processing to improve the appearance, taste and functional properties of food. In halal authentication, results could be used to differentiate the sources of gelatine based on the colour and flavour. Since many factors can influence the reaction, it is important to study and optimize the Maillard reaction in a gelatine model system using response surface method, applied to optimize the processing of bovine gelatine-xylose to improve the Maillard reaction products. In this study, the effects of initial pH, temperature, and heating time to browning intensity of melanoidin were evaluated. The increasing of initial pH, temperature and heating time were associated with an enhanced browning intensity of Maillard reaction products. This study demonstrated that the coefficient of determination 0.8429 reveals the response surface reduced linear model is an adequate model for browning intensity of Maillard reaction of the bovine gelatine-xylose system. For a system with 5% of gelatine solution and 0.75 g of xylose, the optimum condition for the browning process obtained was initial of pH 10.92, temperature of 140°C and heating time of 37.28 mins. The predicted results at optimum conditions coincided well with the experimental value with the relative error of less than 5%. © 2019 The Authors.

Author Keywords
Browning intensity; Central composite design; Maillard reaction; Melanoidins

Index Keywords
gelatin, xylose; Article, experimental design, glycation, heating time, mathematical model, nonhuman, pH, predictive value, process optimization, reaction optimization, reaction time, response surface method, statistical analysis, temperature, three-dimensional imaging, validation process

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