PHYSICAL PROPERTIES AND STABILITY OF MODEL SALAD DRESSING AS AFFECTED BY POLYSACCHARIDE MIXTURES

CHEONG WAI CHING

FACULTY OF AGROTECHNOLOGY AND FOOD SCIENCE
UNIVERSITI MALAYSIA TERENGGANU

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Lihat Sebelah

PHYSICAL PROPERTIES AND STABILITY OF MODEL SALAD DRESSING AS AFFECTED BY POLYSACCHARIDE MIXTURES

By
Cheong Wai Ching

Research Report submitted in partial fulfilment of
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ENDORSEMENT

The project report entitled **Physical Properties and Stability of Model Salad Dressing as Affected by Polysaccharide Mixtures** by **Cheong Wai Ching**, Matric No. **UK 16822** has been reviewed and corrections have been made according to the recommendations by examiners. This report is submitted to the Department of Food Science in partial fulfilment of the requirement of the degree of Food Science (Food Technology), Faculty of Agrotechnology and Food Science, University Malaysia Terengganu.

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(DR. NOR HAYATI BT IBRAHIM)

Main supervisor

DR. NOR HAYATI IBRAHIM
Lecturer
Department of Food Science
Faculty of Agrotechnology and Food Science
Universiti Malaysia Terengganu
21030 Kuala Terengganu

Date: 30 JAN 2012

DR. MOHD ZUL HELMI BIN ROZAINI
Senior Lecturer
Department of Chemical Sciences
Faculty of Science and Technology
Universiti Malaysia Terengganu

.....

(DR. MOHD ZUL HELMI BIN ROZAINI)

Co-supervisor

Date: 30 JAN 2012

DECLARATION

I hereby declare that the work in this thesis is my own except for quotations and summaries which have been duly acknowledged.

Signature : .....

Name : Cheong Wai Ching

Matric No. : UK 16822

Date : 30 Jan 2012

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ABSTRACT

This research studied the effects of xanthan gum (XG), guar gum (GG) and carboxymethyl cellulose (CMC) combinations on physical properties and stability of model salad dressings (emulsions). The experimental domain used consisted of different proportions of XG, GG and CMC components according to simplex-centroid mixture design (7 points) and used at 0.5 % (wt/wt) in the emulsion formulations. Results revealed that emulsion with ternary XG:GG:CMC mixture showed better physical properties and higher stability compared to other emulsions. Hence, an occurrence of synergistic interactions between XG, GG and CMC was proposed. These interactions were found to increase the viscosity and yield stress of ternary the emulsion, consequently resulted in increase of emulsion stability. However, these interactions were also found to limit the binding availability of XG, GG and CMC molecules towards metal ions which led to higher tendency for lipid oxidation. For flow behaviour of model salad dressing, an appropriate mathematical model was fitted to express each flow response as a function of the proportions of the blend components that are able to empirically predict the response to any blend of combination of the components. Result of analysis showed that yield stress and apparent viscosity responses were successfully fitted with a special cubic model while flow consistency coefficient was fitted with a quadratic model (R^2 adjusted $\geq$ 0.94). The equation together with contour and surface plots suggested that yield stress and apparent viscosity of the prepared emulsions were strongly affected by synergistic effect from ternary mixtures with higher GG level whereas the strongest synergistic effect on consistency coefficient was contributed by a binary interaction of XG-GG at higher GG level. The mathematical model derived from the mixture design in this study can be used to predict the effect of interaction between XG, GG and CMC of different proportion levels on the properties of model salad dressings.

ABSTRAK

Kajian ini dilakukan untuk mengkaji kesan kombinasi antara gum xanthan (XG), gum guar (GG) dan selulosa carboxymethyl (CMC) atas sifat-sifat fizikal dan kestablilan model sos salad (emulsi). Domain eksperimen kajian ini terdiri daripada perkadaran yang berbeza daripada komponen XG, GG dan CMC mengikut rekabentuk percampuran 'simplex-centroid' (7 titik) dan digunakan pada kadar 0.5 % (berat/berat) dalam formulasi emulsi. Hasilnya, emulsi dengan campuran pertigaan XG:GG:CMC dalam kajian ini menunjukkan sifat-sifat fizikal dan kestabilan yang lebih baik berbanding dengan emulsi-emulsi lain. Oleh itu, interaksi sinergi antara XG, GG dan CMC telah dicadangkan. Interaksi ini meningkatkan kelikatan dan 'yield stress' emulsi campuran pertigaan, dan seterusnya mengakibatkan peningkatan kestabilan emulsi. Walau bagaimanapun, interaksi ini juga didapati menghadkan keupayaan pengikatan molekul XG, GG dan CMC terhadap ion logam, akibatnya meningkatkan kecenderungan pengoksidaan lipid. Untuk kelakuan aliran model sos salad, model matematik yang spesifik telah dipadankan untuk menggambarkan setiap tindak balas aliran sebagai fungsi nisbah komponen campuran yang boleh meramalkan tindak balas terhadap gabungan mana-mana kombinasi komponen. Analisis menunjukkan bahawa 'yield stress' dan kelikatan ketara berjaya dipadankan dengan model kubik khas manakala pekali 'flow consistency' telah dipadankan dengan model kuadratik (R^2 diselaraskan $\geq$ 0.94). Persamaan matematik bersama dengan plot kontur dan permukaan mencadangkan bahawa 'yield stress' dan kelikatan emulsi sangat dipengaruhi oleh kesan sinergi daripada campuran pertigaan dengan peringkat GG yang lebih tinggi, sedangkan kesan sinergi yang kuat ke atas pekali 'flow consistency' disumbangkan oleh interaksi perduaan XG-GG di peringkat GG yang lebih tinggi. Model matematik yang diperolehi daripada rekabentuk percampuran dalam kajian ini boleh digunakan untuk meramalkan kesan interaksi antara XG, GG dan CMC pada nisbah percampuran yang berlainan terhadap cirri-ciri model sos salad.