



PHYSICAL PROPERTIES AND SENSORY ATTRIBUTE OF COCONUT MOISTURIZER WITH VITAMIN E

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UNDERGRADUATE RESEARCH

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RESEARCH BACKGROUND

The *increased* of environmental awareness and health concern in the world community *drove a trend toward* the preference of cosmoceuticals and natural ingredients in cosmetic [S.Kumar, 2005].

Our country *rich* with natural resources that can *contribute* to the cosmoceutical and natural ingredients for cosmetic industry

***ex: coconut oil* from coconut palm kernel.**

[Coconut oil *identified* as a vegetable oil with high lauric acid content and *believed* have some beneficial effects on skin.]

- **antibacterial**
- **antioxidant**
- **moisturizer**

[Therefore,

The *objective* of this research is:

- To *formulate coconut moisturizer with vitamin E*
- To evaluate the physical properties and sensory attribute of coconut moisturizer

This due to the fact :

- **the *world trend* toward the preference of cosmoceuticals and natural ingredients in cosmetic.**
- **the *growth of cosmetic market in Malaysia* with the increase in per capita income.**
- **the effort to *utilize our own* country resources in industry.**
- **the *beneficial effect* of coconut oil to skin**

HOW??

Formulation of moisturizer

(Experimental design using Response Surface Modelling by Design Expert)

Product evaluation

Product stability
(Physical properties analysis)

Statistical
analysis
using
ANOVA

Sensory analysis

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RESEARCH METHODOLOGY

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preliminary phase

(FORMULATION BASED ON LITERATURE REVIEW)



optimization phase



(EXPERIMENTAL DESIGN USING RESPONSE SURFACE MODELLING applied 3 factors and 2 response variables)



verification phase

(PRODUCT EVALUATION)

PRODUCT EVALUATION

Physical properties analysis

Determination of pH and Viscosity and comparison to a commercial product

Statistical analysis using ANOVA

Predict the relationship between physical properties and formulation composition.

Sensory analysis

4 basic sensory characteristics with comparison to commercial product

Visual appearance in the container	Feel of the cream in the jar	Skin feels during the adsorption	Skin feels after absorption
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Predict the product acceptance

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EXPERIMENT APPARATUS

- **Homogenizer**
- **Stirrer**
- **pH meter**
- **Viscometer**
- **Weighing machine**
- **Hot plat**

Ingredients of the formulation of moisturizer.

Ingredient	Range of formulation composition (%)
Distilled Water	70-75
Coconut oil	10-15
Glycerin ,(humectant)	5
Palm stearic acid (thickener)	3
Xanthan gum (enhance the stability)	1-2
Gliceryl monostearat (emulsifier)	5
Metylparaben, (preservative)	0.2
Essential oil (Rose)	A few drops
Vitamin E	1



RESULT

AND

DISCUSSION



STATISTICAL ANALYSIS

Viscosity

- From the ANOVA analysis

$$R^2 = 1.55$$

$$\text{Lack of fit} = 0.44$$

so the model used is fit.

[pH]

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VISCOSITY ANALYSIS

- High amount of water with low coconut oil's amount will lead to low value of product's viscosity when the amount of xanthan gum was constant.

DESIGN-EXPERT Plot

Viscosity

X = A: Water

Y = B: coconut oil

Actual Factor

C: xantan gum = 1.00

Viscosity

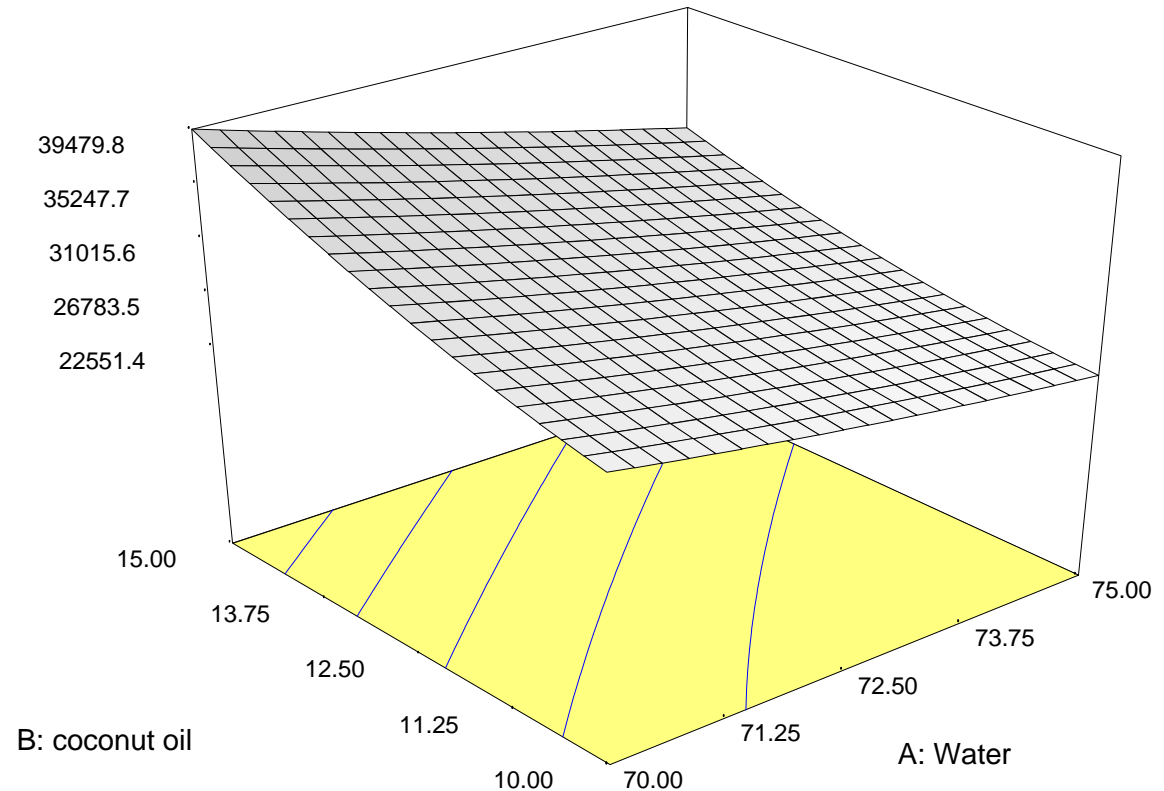


Fig1: 3-D Graph of coconut oil and water amount when the amount of Xanthan gum constant.

High amount of water with low xanthan gum's amount will lead to low value of viscosity when the amount of coconut oil was constant.

DESIGN-EXPERT Plot

Viscosity

X = A: Water

Y = C: xanthan gum

Actual Factor

B: coconut oil = 10.00

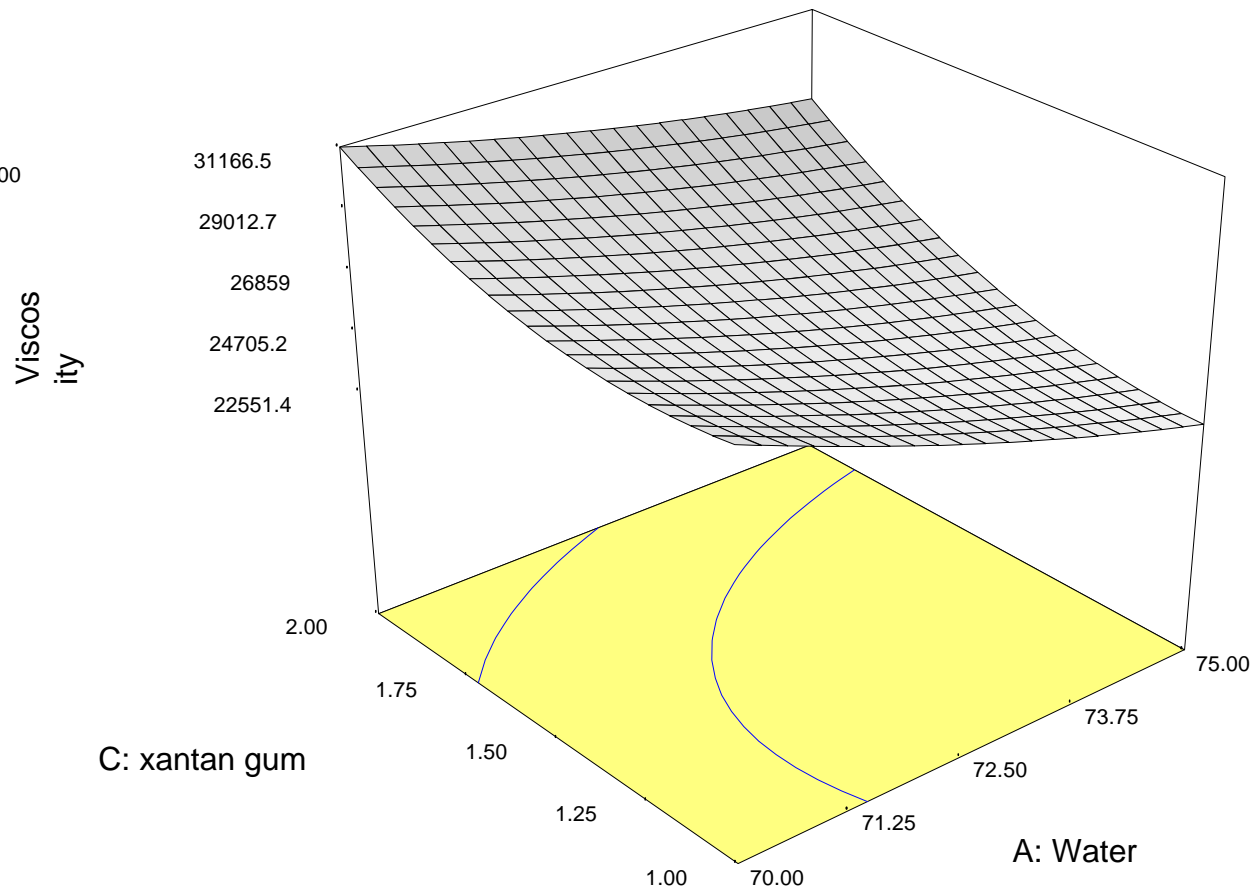


Fig2: 3-D Graph of xanthan gum and water amount when the amount of coconut oil constant.

High amount of water with low xanthan gum's amount will lead to low value of viscosity when the amount of coconut oil was constant.

DESIGN-EXPERT Plot

Viscosity
X = B: coconut oil
Y = C: xanthan gum

Actual Factor
A: Water = 70.00

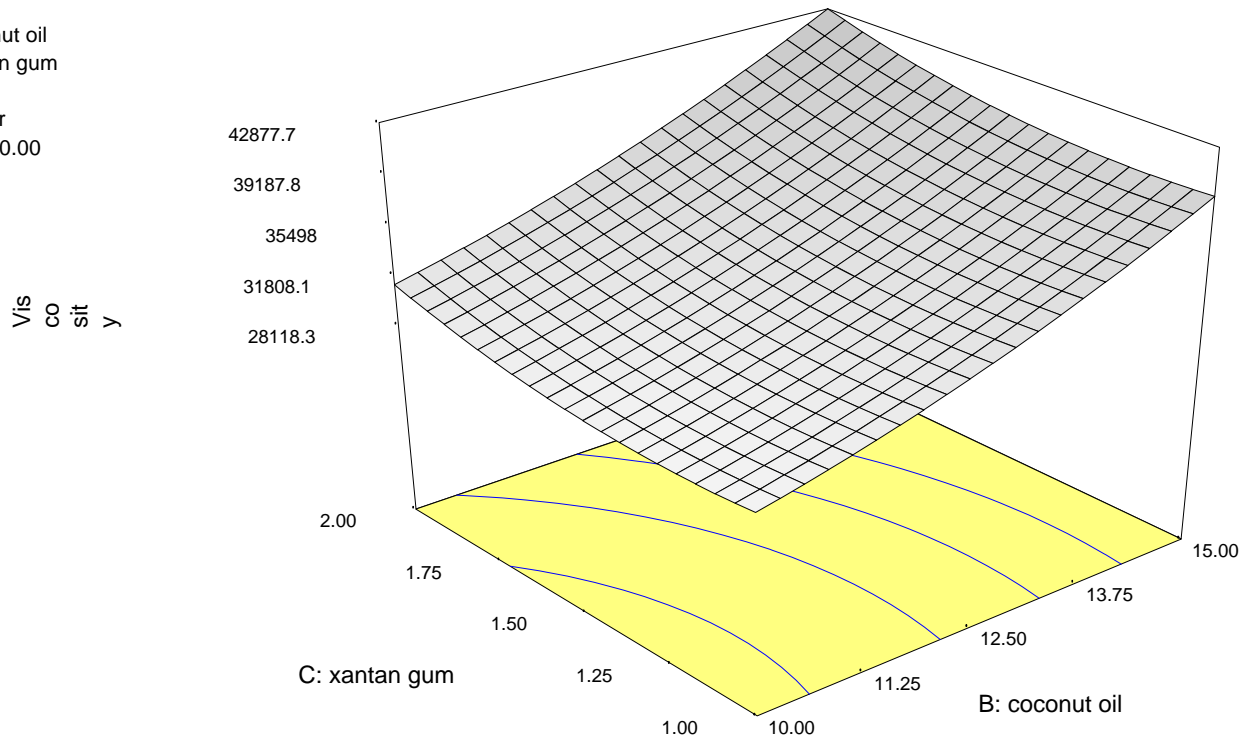


Fig3: 3-D Graph of xanthan gum and coconut oil amount when the amount of water constant.

Discussion of viscosity analysis.

- **The amount of xanthan gum is the most influential factor of viscosity, followed by water and oil.**
- **Xanthan gum is a biopolymer that use to increase the stability of emulsion by stabilize the dispersed oil droplet by increase the viscosity of continuous phase of emulsion[N.Moulai Mostefa et al, 2006]**
- **Water diluted the emulsion emulsion[N.Moulai Mostefa et al, 2006]**
- **Oil has little influenced in the viscosity of emulsion but the decreases of oil also decrease the viscosity.[N.Moulai Mostefa et al, 2006]**



pH Analysis

The pH value increase when the amount of water increase but overall of the pH value for the whole formulation are Quiet consistent.

DESIGN-EXPERT Plot

pH

X = A: Water

Y = B: coconut oil

Actual Factor

C: xantan gum = 1.00

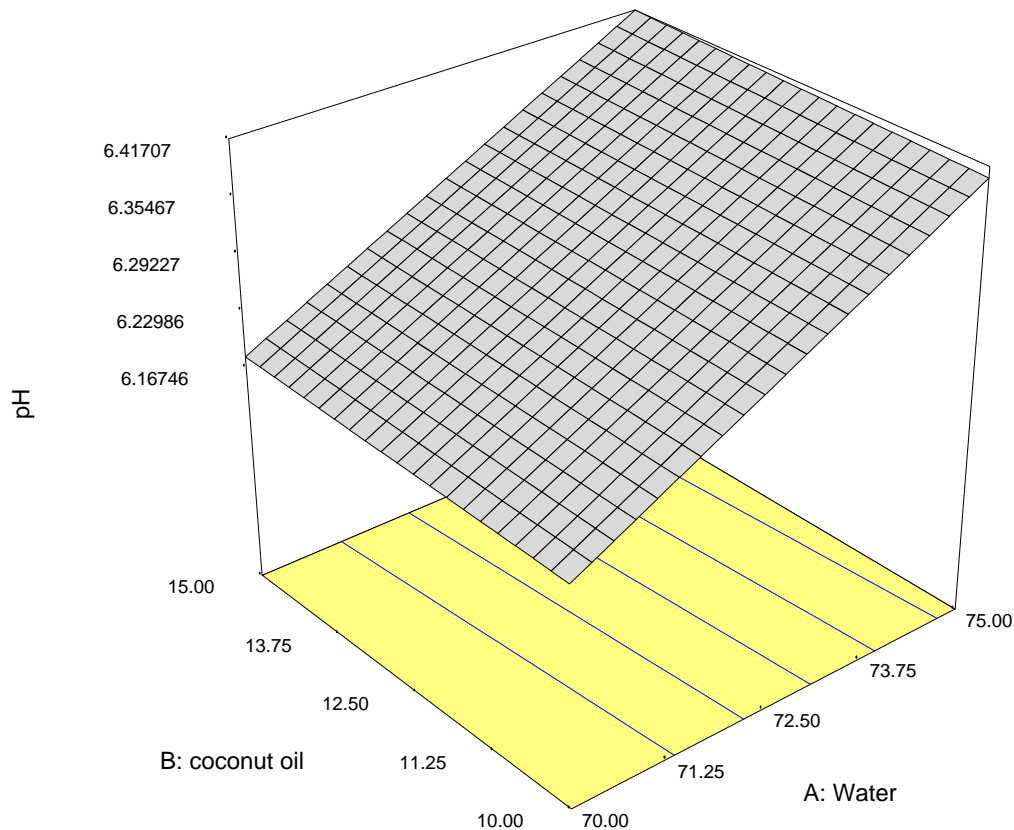


Fig3: 3-D Graph of xanthan gum and water amount when the amount of coconut oil constant.

Formulation of moisturizer

- **The best formulation that satisfies the sensory evaluation.**

72% water, 13% oil and 2%

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Sensory analysis

■ Respondents criteria.

20 peoples

Female around age 20-30

Race = 5 Malays, 10 Chinese, 5 others

■ Visual appearance of the cream in container.

White and milky colour

■ Condition of the cream in the container

Stick and firm in the container.

■ Skin feels during the adsorptions.

Cooling effect and gloss and ease to spread.

- Skin feels after absorption.

Gloss and feel silky

- Preferences of respondent toward the product?

Positive response.

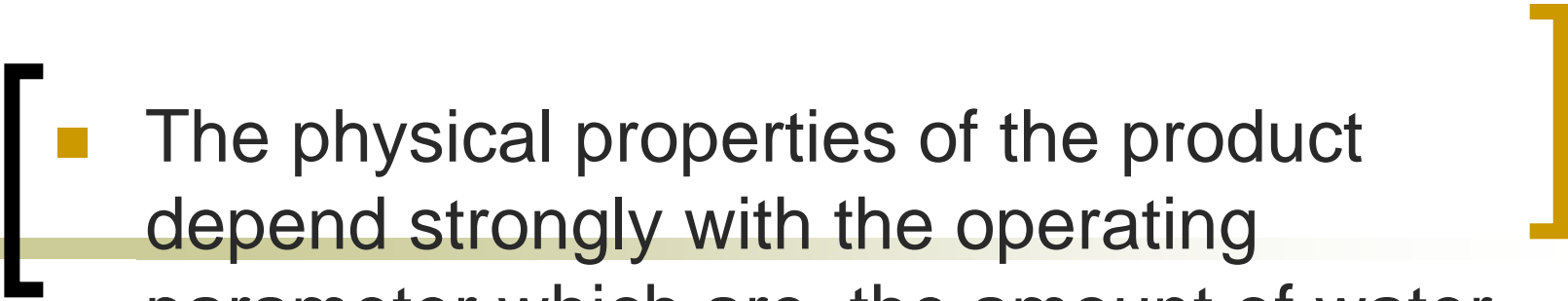
- Comparison of the product with commercial product?

The odour and the thickness of the cream, the commercial product thicker.

- Conclusion: the formulation can be a benchmark for another formulation because the composition is quite simple but applicable.



CONCLUSION

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- A large black left bracket and a yellow right bracket are positioned on the top left and top right of the slide, respectively. A horizontal line, colored light green on the left and yellow on the right, spans across the top of the slide, partially overlapping the brackets.
- The physical properties of the product depend strongly with the operating parameter which are the amount of water, coconut oil and xanthan gum. An optimal composition important to produce product with desired characteristic.
 - The formulation developed can be a benchmark for more complicated formulation and study of emulsion. The best formulation chosen from this study contain 72% water, 13% oil and 2% of xanthan gum.

RECOMMENDATIONS

- Use longer time doing the preliminary study to get a better range of operating parameter so the optimal formulation can be obtain.
- More operating parameters chosen as factors so a better formulation can be obtain.
- conduct stability test for the formulation to determine the stability of product.



THANK YOU.

PREPARATION PROCESS

Carried out according to direct emulsification process.

- The oil phase and water phase will be heated to 75°C.
- The water phase will be pour into oil phase to produce oil in water emulsion and homogenize at 20000 rpm for 3 minutes and then stir at 300 rpm for 20 minutes.
- Preservative, glycerin and essential oil will be added at 30°C. stir for 5 minute at room temperature.

Let the emulsion stable at room temperature for 24 hour before analyze the physical properties.

SENSORY ANALYSIS

Product evaluation by some volunteers based on four basic sensory characteristics

- Visual appearance of the formulation in the container (gloss, lightness, transparency, and water like appearance).
- Feel of the cream in the jar (firmness, slipperiness, peaking and stickiness).
- Skin feels during the adsorptions (ease of spreading, cooling effect, absorbency, thickness, feel rich and wetness).
- Skin feels after absorption (gloss, silkiness, slipperiness, film residue, rich feel and stickiness).