

## SPF Value On Nanoemulsion of Suruhan Extract (*Peperomia pellucida*)

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**Abstract.** *Suruhan plants are traditionally often used by Kalimantan people as cold powder . This plant contains secondary metabolites flavonoids, alkaloids, and phenolics that have high antioxidant activity. Suruhan extract as active ingredient chosen Because its potential as a sunscreen, this research aims for know the activity of nanoemulsion with suruhan extract as a sunscreen by resulting of SPF value . manufacturing process use low energy nanoemulsion method. With the constituent ingredient of Tween 80, Propylene glycol , VCO, Phenoxyethanol, and Aquadest. From the optimization results the highest % transmittance of the formula was 98.23% with a tween concentration of 11%. Test results of SPF value is obtained that nanoemulsion suruhan extract have a activity as a UV protection by category medium protection and high protection.*

**Keywords:** *Suruhan (Peperomia pellucida), Nanoemulsion , SPF*

### INTRODUCTION

Indonesia is a tropical country where the sun shines will Keep going shine throughout year . Radiance ultraviolet (UV) light can causes sunburn or redness of the skin as irritation skin consequence UV light , deep long period of emission UV light can causes a burning sensation on the skin , decreases skin elasticity , emergence wrinkles on the skin and can causes DNA damage to cells skin until cause planting cell cancer especially skin cancer (Isfardiyana, S.H, & Sita R.S, 2014).

Form possible prevention done For avoid risk happen damage skin consequence UV light, with using UV protection or screen sun, UV light can holded and filtered by using sunscreen ( Ningsih MAL et al. 2022).

One of plants that can use UV protection is Suruhan, this plant is usually used traditional cold powder in Kalimantan (Ahmad et al., 2019). Secondary metabolic such as alkaloids, phenolics , many flavonoids contained in Suruhan plants including acacetin, apigenin, isovitexin and pellucidatin , phytosterol, namely campesterol , stigmasterol and arylpropanoids and content some of oil essential (Dr. Nurhayati , et al. 2020). Flavonoids content in this plants have high activity as antioxidant so that can increase proliferation Fibroblast cells and production fiber collagen ( Mulyani T. et al, 2018).

Form preparation nanoemulsion still seldom utilized in use preparation topically, nanoemulsion form can increase bioavailability, minimize side effect that ( Sari AI & Herdiana Y, 2018). Form this preparation was selected because nanoemulsion stable in a way

thermodynamic, has a small droplet size range, high acceptability and doesn't cause problems in topical form preparations such as inherent creaming, flocculation, sedimentation, and coalescence (Arianto A, & Cindy C, 2019 & Sari AI and Herdiana Y, 2018).

## METHODOLOGY

### Tools

Tools used in this research includes Beaker glass, measuring glass, dropper pipette, analytical balance, magnetic stirrer hotplate, pH meter, stopwatch, UV-Vis Spectrophotometry.

### Materials

The active ingredients used in this research are ethanol extract of suruhan, with other additional ingredients are tween 80, propylene glycol, virgin coconut oil (VCO), phenoxy ethano, and aquadest, which is later formulated in form preparation nanoemulsion in 5 variations of nanoemulsion formulas.

### Formulation of Nanoemulsion

Nanoemulsion formulated with concentration extract 1%, 2%, 3%, 4%, and 5% w/v. Phase oil consisting of Tween 80, Propylene glycol, VCO, and phenoxy ethanol mixed, then mix water phase consisting of distilled water and extract, phase The oil and water phases are heated in a zinc hotplate temperature 100 °C for 30 minutes, then insert deep water phase phase the oil in a way slowly and stir using a magnetic stirrer at a speed of 1000 rpm for 60 minutes at a temperature of 100 °C.

Table 1. Base optimization Formulas

Material Name	F1 (%)	F2 (%)	F3 (%)	F4 (%)	F5 (%)
Tween 80	10.5	11	11.5	12	12.5
Propylene glycol	5	5	5	5	5
VCO	2	2	2	2	2
Phenoxyethanol	0.8	0.8	0.8	0.8	0.8
Aquadest	Ad 100	Ad 100	Ad 100	Ad 100	Ad 100

Table 2. Nanoemulsion with suruhan extract formulas

Material Name	F1 (%)	F2 (%)	F3 (%)	F4 (%)	F5 (%)
Extract Suruhans	1	2	3	4	5
Tween 80	11	11	11	11	11
Propylene glycol	5	5	5	5	5
VCO	2	2	2	2	2
Phenoxyethanol	0.8	0.8	0.8	0.8	0.8
Aquadest	Ad 100	Ad 100	Ad 100	Ad 100	Ad 100

## Evaluation

### 1. Organoleptic Test

Observation organoleptic nanoemulsion carried out by visual observation with parameters that include color, clarity, and odor.

### 2. pH measurement

pH measurements for each formula were carried out using a pH meter, with an indicator achievements yng expected ie pH value of the preparation according to the pH of the skin, namely pH range 5-5.9 (Nurhidayati et al., 2020).

### 3. In vitro Sun Protecting Factor (SPF) testing

The SPF value is determined using a UV-Vis spectrophotometry instrument to measure absorbance from each samples with a wavelength of 290-320 nm (290 nm, 295 nm, 300 nm, 305 nm, 310 nm, 3015 nm, dam 320 nm), the SPF value is calculated use formula (Arianto A., and Cindy C., 2019).

$$SPF = CF \times \sum_{290}^{320} EE(\lambda) \times I(\lambda) \times Abs(\lambda)$$

Description :

CF = Correction Factor (10)

EE = Erythemal Effect of Radiation

I = Solar Intensity Spectrum

Abs = Absorbance Sample

Table 3. Normalized product function used in SPF data calculations

Panjang Gelombang	EE x I (Normalization)
290	0,0150
295	0,0817
300	0,2874
305	0,3278
310	0,1864
315	0,0839
320	0,0180
<b>Total</b>	<b>1</b>

Interpretation results obtained \_ from results calculation can done based on the following parameters (Lioetti and Rigano, 2017).

Table 4. SPF Value Category

No	SPF	Category
1	6, 10	Protection low
2	15, 20, 25	Protection currently
3	30, 40	Protection tall
4	50+	Protection very tall

#### 4. Statistical testing

Statistical testing using the One Way ANOVA method . Previous data analyzed statistics Normality test was carried out with Sig value results . (P value) > 0.05, which means the data is distributed normal, Then the homogeneity test was carried out with a Sig value . (P value) > 0.005 which means homogeneous data variance ( homogeneous test fulfilled ). One way ANOVA test if p value > 0.05 means it doesn't exist difference significant between variables, if the p value < 0.05 indicates exists difference significant between variables.

## RESULTS

By nanoemulsi base optimization get result that the nenoemulsion is meet the requirements of nanoemulsion there ae transparant, not rancid, and homogent.

Table 5. Organoleptic Test

	F1	F2	F3	F4	F5
Clarity	Clear	clear	clear	Clear to yellow	Clear to yellow
Smell	Not rancid	Not rancid	Not rancid	Not rancid	Not rancid
Homogeneity	Homogeneous	Homogeneous	Homogeneous	Homogeneous	Homogeneous

The transmittance presentage show that the formulation 2 have the highest transmittance presentage compared to othe formulas.

Table 6. Percent Of Transmittance

Replication	% Transmittance				
	F1	F2	F3	F4	F5
1	96.4	99.4	97.3	95.3	95.1
2	95.1	96.3	96.6	92.3	98.3
3	96.1	99.0	96.0	96.9	94.1
Average	95.53	98.23	96.63	94.83	95.88

Table 7. pH Value

Concentration	pH value	Average pH Value
1%	5.66	5,657
	5.66	
	5.65	
2%	5.57	5,557
	5.55	
	5.55	
3%	5.50	5,517
	5.53	
	5.52	
4%	5.51	5,520
	5.52	
	5.53	
5%	5.48	5,483
	5.48	
	5.49	

Table 8. The Absorbance of Nanoemulsion with suruhan extract

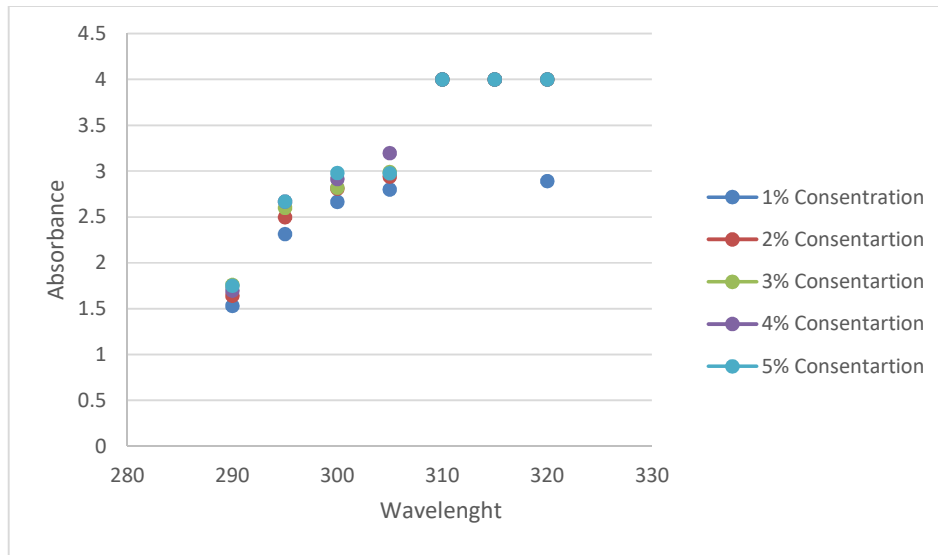


Table 9. The Absorbance Of Nanoemulsion With Extract

Wavelength (nm)	Absorbance				
	F1 (1%)	F2 (2%)	F3 (3%)	F4 (4%)	F5 (5%)
290	1,355	1,693	1,114	1,530	1,540
295	2,176	2,084	2,296	2,399	2,585
300	2,605	2,444	2,709	2,694	2,769
310	4,000	4,000	4,000	4,000	4,000
315	4,000	4,000	4,000	4,000	4,000
320	2,462	4,000	4,000	4,000	4,000
<b>averange</b>	2,772	3,019	2,997	3,068	3,117

Table 10.SPf Value

SPF Value				
F1	F2	F3	F4	F5
28.72	30.64	31.62	31.38	31.90

## DISCUSSION

In this research carried out formulation of nanoemulsion sunscreen using suruhan extract as a active ingredients in 5 formulas with different concentrations extracts, before the formulation of nanoemulsion suruhan extract we do base optimization and then done inspection physically by looking organoleptic preparations, as well percentage transmittance for see clarity of the nanoemulsion base. The results of organoleptic observations on the basis were obtained results that meet the requirements preparation nanoemulsion is clear , odorless rancid, and homogent. This is proven by testing percentage transmittance, value percentage transmittance of 90-100% shows the visual preparation transparent and clear nanoemulsion, from all of five formulas are satisfactory requirements ( Lina N . W. M, et al, 2017).

Based on the table, formula 2 was chosen as the nanoemulsion base selected because own percent transmittan highest, preparation that has transmittance score like the transmittance score of Aquadest is 100% shows transparency similar to aquadest. So the nanoemulsion has a very small globule size ( Ardian G., et al., 2018). After the optimization, we make nanoemulsion with Suruhan extract concentrations of 1%, 2%, 3%, 4%, and 5%. Testing the SPF value is carried out at a wavelength of 290-320 nm with an interval of 5 nm. Testing pH value is obtained pH value that according to pH value range of 4-6 so prepared that the nanoemulsion is savety used for skin and does not cause irritation ( Ardian G., et al., 2018).

SPF value testing shows mark highest in formula 5, statistical data shows distributed data norm, homogeneity fulfilled, as well one way ANOVA test shows the Sig value. (P value) < 0.05 so it doesn't exist difference in a way significant between long concentration and the wavelength. The SPF value for each concentration is not indicated significant difference.

## **CONCLUSIONS AND RECOMMENDATIONS**

The nanoemulsion formula requirements, there are clear and doesn't have a rancid odor. Optimization of the nanoemulsion base for formulas 1-5 showed that formula 2 had the highest transmittan percentage value that is 98.23%. Then, optimization of the recommended extract concentration of 1-5% in formula 2 showed that there was no significant difference in each concentration. The pH value of all 1-5% ordered extract nanoemulsion optimization shows that the pH value of the nanoemulsion corresponds to the skin's pH that is 4-6.

## **FURTHER STUDY**

After carrying out this research, we will carry out in vivo testing to prove the activity of suruhan extract as a sunscreen and safety for use on the skin.

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