

FORMULATION OF EYESHADOW CREAM COMBINATION OF EXTRACT SPISSUM BUTTERFLY PEA FLOWER (*Clitoria ternatea* L.) WITH SECANG WOOD (*Caesalpinia sappan* L.) AS A NATURAL COLOR

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ABSTRACT

Eye shadow is one of the decorative cosmetic that contains color that is applied to the eyelids. Eye shadows were generally blue, pink, dark red, silver, green, and brown. Natural dyes are derived from plants, animals, and microorganisms. Butterfly pea flower (*Clitoria ternatea* L.) and secang wood (*Caesalpinia sappan* L.) are plants that contain natural dyes that can be used as dyes. The two plants were removed by maceration in 70% ethanol. Eye shadow preparation using a combination of extract spissum of butterfly pea flower and secang wood produces eye shadow with a purple color in 3 formulations, namely F3 extract spissum butterfly pea flower and secang wood (3:2), F4 extract spissum butterfly pea flower and secang wood (2:3), F5 extract spissum butterfly pea flower and secang wood (1:4). In the hedonic test, there was no significant difference >0.05% among F3, F4, and F5. Thus, the results of the irritation test showed that the eye shadow cream preparation produced an irritation index of 1.00, namely, mild irritation.

Keywords: Eye shadow, butterfly pea flower, Secang wood.

INTRODUCTION

Cosmetics are preparations that are used outside the body to clean, increase attractiveness, and improve body odor, but not to treat diseases. The main purpose of cosmetics in modern society is to increase attractiveness through makeup, which can increase self-confidence. One of them is the eye shadow, which is included in the decorative cosmetics section which is used to cause an effect on the surface and is used temporarily (Latifah F, 2017).

One of the most attractive parts of the face is the eyes. The eyelids have the thinnest epidermis, which is 0.04 mm, while on other parts of the body the thickness of the epidermis is 0.1 mm (Elna Kartawiguna, 2011). Eye shadow (eyeshade) is a decorative cosmetic that contains color applied to the eyelids. Eye shadows are generally blue, pink, dark red, silver, green, or brown (Barus Bunga, 2018; Amalullia Diana, 2016).

In this study, eye shadow preparations were made in cream formulation because they have the advantage of being able to stick to the surface where they are used for quite a long time before this preparation is washed off or removed. The cream formulation can give a glossy, greasy, moisturizing effect, easily spread evenly, easily rubbed off, and easily removed by washing with water (Ulfa Maria, 2017). The results of this study used the butterfly pea flower (*Clitoria ternatea* L.) with a combination of secang wood (*Caesalpinia sappan* L.) with a color ratio concentration of F1 (1% extract spissum butterfly pea flower), F2 (4% extract spissum butterfly pea flower : 1% extract spissum secang wood), F3 (3% extract spissum butterfly pea flower : 2% extract spissum secang wood), F4 (2% extract spissum butterfly pea flower : 3% extract spissum secang wood), F5 (1% extract spissum butterfly pea flower : 4% extract spissum secang wood), F6 (1% extract spissum secang

wood). The purpose of this study was to determine the effect of the color ratio that can form a purple color with the concentration of this combination on the results of physical, chemical, microbiological, and safety quality tests.

RESEARCH METHODS

Equipment and Materials

Materials

The butterfly pea flower (*Clitoria ternatea L.*) used in this study was obtained from the Martini Karangmojo garden, Kalasan, Sleman Regency, Special Region of Yogyakarta and the secang wood (*Caesalpinia sappan L.*) used in this study was obtained from the Spice and Medicinal Plants Research Institute (Balitro); ethanol 70% (E. Merck) and stearic acid (E. Merck); cetyl alcohol (E. Merck) and triethanolamine (E. Merck); propylene glycol (E. Merck) and mineral oil (E. Merck), and butyl hydroxytoluene (E. Merck), and methylparaben (E. Merck); propyl paraben (E. Merck); tween 80s; spans 80; titanium dioxide, talcum, and aqua dest (E. Merck), a solution of pH 1-14 includes: 11 M HCl (E. Merck), and NaOH Crystals (E. Merck), and aqua dest (E. Merck).

Equipment

Water baths (Mettler); incubators (Mettler); universal indicator paper, Brookfield viscometer (BioBase); ovens (Mettler); refrigerator; 210-LC type analytical balance (PT. Altraman); thermometer (PT. Elmecon); ruler; spreadability meter with a load weight of 50 grams; 100 ml volumetric flask (Pyrex); 25 ml volumetric flask (Pyrex); test tubes (Pyrex); glass stirring rods; measuring pipette 10 ml (Pyrex); glass; parchment paper; biuret 25 ml (Pyrex); magnifying glass; petri dish.

Research Procedure

1. Determination of Plants and Collection of Research Materials.

Determination was carried out to ensure the correctness of the plant used. Plant determination was performed at the Bogoriense Herbarium, LIPI Biology Research Center, Cibinong. Step II research, etc.

2. Simplicia extraction

Simplicia butterfly pea flower and secang wood were extracted with 70% ethanol using the kinetic maceration method. The resulting extract was used to test the quality parameters of the extract, test the pH ratio of the combination of peacock flower extract and secang wood, formulation, stability test with the cycle test method, and skin irritation test of male albino rabbits.

3. Identification of extract spissum

Phytochemical screening of extract spissum butterfly pea flowers (*Clitoria ternatea L.*) and extract spissum of secang wood (*Caesalpinia sappan L.*) carried out specific test parameter tests, including organoleptic tests of extracts for color, smell, shape, and taste, as well as phytochemical screening tests (Vimal Nair, 2015).

- Identification of alkaloids
- Identification of flavonoids
- Identification of saponins
- Identification of steroids and terpenoids
- Identification of tannins.

These five senses are used to describe shape, color, smell, and taste. Non-specific quality parameters include tests for total ash content, water content, ethanol soluble extract content, and residual solvent content (Depkes RI, 2000).

4. formulation of eyeshadow cream

Table I. Formulation of Eyeshadow Cream

Ingredients	Amount (%)						
	F0	F1	F2	F3	F4	F5	F6
Extract spissum of butterfly pea flower	0	1	4	3	2	1	0
Extract spissum of secang wood	0	0	1	2	3	4	1
Oil Base							
Setyl Alcohol	0,2	0,2	0,2	0,2	0,2	0,2	0,2
Stearic Acid	0,1	0,1	0,1	0,10	0,1	0,1	0,1
Petrolatum	0,75	0,75	0,75	0,75	0,75	0,75	0,75
Polawax	0,5	0,5	0,5	0,5	0,5	0,5	0,5
Polysorbate 80	0,18	0,18	0,18	0,18	0,18	0,18	0,18
Sorbitan Monooleat 80	0,07	0,07	0,07	0,07	0,07	0,07	0,07
Mineral Oil	0,75	0,75	0,75	0,75	0,75	0,75	0,75
Butylate Hydroxy Toluen	0,01	0,01	0,01	0,01	0,01	0,01	0,01
Water Base							
Trietanolamine	0,1	0,1	0,1	0,1	0,1	0,1	0,1
Propilen Glikol	0,25	0,25	0,25	0,25	0,25	0,25	0,25
Methyl Paraben	0,01	0,01	0,01	0,01	0,01	0,01	0,01
Prophyl Paraben	0,01	0,01	0,01	0,01	0,01	0,01	0,01
Destillate Water	5	5	5	5	5	5	5
Dry Ingredients							
Talcum	0,2	0,2	0,2	0,2	0,2	0,2	0,2
Titanii Dioxydum	0,1	0,1	0,1	0,1	0,1	0,1	0,1

5. Process of Making Eye Shadow

All the oil and water phase ingredients were weighed and placed in a water bath at 90 °C until they melted. The surfactant was then weighed and added to the oil base and stirred in a water bath until it became homogeneous. When it was homogeneous, the butterfly pea extract and secang wood extract were weighed and stirred in a lump using a mortar until homogeneous, then transferred to a pot and covered.

6. Evaluation of Eye Shadow Cream Preparations

Quality tests of eye shadow cream preparation included organoleptic, homogeneity, pH, viscosity, spreadability, cream washability, microbial contamination, hedonic, acute dermal irritation, and stability tests.

a. Organoleptic Test

Organoleptic was carried out by visual observation of the preparation, which was assessed based on the physical form of the preparation, namely changes in color, shape, and cream smell.

b. Homogeneity Test

Homogeneous examination was carried out by weighing a sample of 0.1 g of the preparation smeared on a piece of transparent glass that must show a homogeneous arrangement, and no speckled particles can be seen.

c. pH check

Samples were prepared at a concentration of 1%, namely, 1 g of sample dissolved in 10 ml of distilled water, dipped in universal pH paper into the solution. A color change was observed in the universal pH paper. The color change on the pH paper was adjusted with the indicator color printed on the pH paper container.

The pH was determined three times for each concentration of eye shadow cream (Dwicahyani Ulfi *etc*, 2019).

d. Viscosity measurement

Viscosity measurements were carried out using a *Brokfield* Viscometer, namely by installing spindle 4 and then dipping it into the preparation to a certain extent. The tool was turned on at a speed of 6 rpm. Each measurement was recorded on a scale when the moving red needle had stabilized. The value of viscosity (η) in *centipiose* (cps) was obtained by multiplying the dial reading by a special correction factor for each *spendel* speed. The flow properties can be obtained by plotting the pressure and shear (shear stress (F/A) to the shear velocity (rate of shear (dv/dr).

e. Spreadability test

The cream is weighed as much as 0.5 grams, then placed on a round glass underneath accompanied by a millimeter scale, then covered using another glass that has been weighed and left for 1 minute, then the diameter of the spread is measured, after 1 minute, a 50 gram load is added and allowed to stand. 1 minute, then the spreading diameter was measured. The same thing every 1 minute with the addition of 50 grams of load continuously until the diameter was obtained to observe the effect of the load on the diameter of the cream spread. The parameter of good spreadability of cream preparation is 5-7 cm (Hendrik Setia Budi, *etc*, 2022).

f. Test the cream's washability

The preparation weighed as much as 1 g, rubbed on the palms of the hands, and then washed with a volume of water while rinsing the hands. Water was passed from the burette slowly and visually observed until there was no residual cream left on the palms, and the volume of water used was recorded (Ulfa Maria, 2017).

g. Microbial contamination test

- 1) An eye shadow dilution of 1 g was dissolved in 10 ml distilled water, stirred until homogeneous, and made into 3 dilutions. Then, 1 ml of the dilution was diluted with pipettes and placed in a test tube with 10 ml of aqua dest ad (dilution 2). The mixture was taken back as much as 1 ml put into a test tube, and distilled water was added (dilution 3).
- 2) Media preparation for Nutrien Agar Media (ALT testing); Potato Dextrose Agar (mushroom test); Chromocult Coliform Agar (Coliform assay); Mannitol Salt Agar (testing *Staphylococcus aureus*); Pseudomonas Isolation Agar (testing *Pseudomonas aeruginosa*), which had been dissolved in distilled water, was heated in a water bath while stirring until dissolved, poured 15-20 ml into a sterile petri dish, and allowed to solidify.
- 3) Total Plate Number 0.1 ml of the 10^{-2} dilution solution was taken using a micropipette that had been sterilized and then put into a petri dish that already contained *Nutrilent* Agar and then shaken so that it was evenly distributed. The medium was incubated for 24 hours at 36 °C.
- 4) *Candida Albicans* 0,1 ml of 10^{-2} dilution solution is taken using a micropipette that has been sterilized then put it into a petri dish that already contains PDA and then shaken so that it is evenly distributed. The medium was incubated for 24 hours at 36 °C.
- 5) *Staphylococcus aureus* 0.1 ml of 10^{-2} dilution solution was taken using a micropipette that had been sterilized and then put into a petri dish that already contained MSA and shaken so that it was evenly distributed. The medium was incubated for 24 hours at 36 °C.
- 6) *Pseudomonas aeruginosa* (0.1 ml of 10^{-2} dilution solution was taken using a micropipette that had been sterilized and then placed into 50 Petri dishes that already contained PIA and shaken so that it was evenly distributed. The media was incubated for 24 hours at 36°C.

- 7) *Coliform* 0,1 ml dilution solution of 10^{-2} was taken using a micropipette poured over the MSA agar media, which had solidified and leveled. The media was incubated for 24 hours in an incubator.
- h. Hedonic Test
The preference test was performed visually by 20 panelists. Each panelist chose which variation of the formula they liked the most from the eye shadow cream preparations that were considered attractive, moderately attractive, and unattractive by filling out a questionnaire. The percentage preference for each preparation was calculated.
- i. Preparation Stability Test
Eyeshadow cream stored at room temperature (25°C - 30°C) and 40°C in an oven for 2 months and evaluated at weeks 2, 4, 6 and 8 included organoleptic, homogeneity, pH, and spreadability tests.
- j. Dermal Acute Irritation Test
An irritation test was performed on male albino rabbits (*Oryctolagus cuniculus*) using the Driza test method. The rabbits used were adult, healthy-bodied albino rabbits, with a body weight of 1.5 – 2 kg.

Table II. Test Areas on Rabbit Skin

A : No treatment (control)	A1 : No treatment (control)
B : Preparations with a combination of butterfly pea flower extract and secang wood	B1 : Preparations with a combination of butterfly pea flower extract and secang wood
C : Preparations with a combination of butterfly pea flower extract and secang wood	C1 : Preparations with a combination of butterfly pea flower extract and secang wood

The test substance was administered by smearing it in test areas B and C, whereas area A was used as a control. After applying the test material, the test area was covered with non-reactive gauze and left for 24 hours, the bandage was opened, and the test area was cleaned with water to remove any remaining test material. At 24, 48, and 72 hours after administration of the test substance, the test area was examined and observed for changes in the skin reaction to the test material and assessed by assigning a value of 0 to 4 depending on the severity of the observed skin reaction.

RESULTS AND DISCUSSION

Based on the results of the phytochemical screening test, it was found that 70% ethanol extract of butterfly pea flowers with a yield of 44.09%, water content of 29.28%, ash content of 5.36%, and ethanol-soluble extract content of 43.53% contained flavonoids, tannins, and saponins. The non-specific quality parameter test results showed that the water content in the extract was more than 10%, namely 29.28%, while the 70% ethanol extract spissum of secang wood positively contained flavonoids, tannins, saponins, and quinones and had a yield of 15.08%, water content of 30.54 %, total ash content of 1.54%, ethanol soluble essence content of 55.43%, and water content of the two extracts spissum of butterfly pea flower and secang wood did not meet the requirements of the BPOM Regulation concerning the quality requirements of traditional medicines; the water content of the extract was $\leq 10\%$. The water content in the extract must meet these requirements because a large water content can be a good medium for microbial growth. The results of the total ash content showed the total minerals contained in 5.36% extract spissum of butterfly pea flowers and 1.54% of secang wood. Organic materials (Hg, Pb, Silicate, K, Mg, Ca) in the combustion process are burned, but the inorganic components are not burned, which is why it is referred to as ash (*Sembiring Bagem, dkk, 2014*).

Stability of the combination of peacock flower viscous extract and secang wood at pH 4-7 using a pH indicator paper. The color stability of anthocyanin compounds can be affected by pH or acidity and is more stable in a low-acidity environment. This is because it is equal to the pH of the skin (*Afendy Moh. Azhar, dkk, 2017*).



Figure 1. Observation of Stability Test Combination of Extract Spissum of Butterfly Pea Flower and Secang Wood Against pH 4-7

After the stability test was carried out using pH, it was made into the formulation and obtained as the color shown in *Figure 2*. An organoleptic examination was carried out, which included checking the color, smell, and shape of *Table II*.



Figure 2. Preparation of eye shadow using a combination of extract spissum of butterfly pea flower and secang wood

Table III. Organoleptic examination of eye shadow cream preparations

Formulation	Identification of Organoleptic		
	Preparation	Color	Smell
F0	Cream	White	No smell
F1	Cream	Green	Special of Extract
F2	Cream	Green to brown	Special of Extract
F3	Cream	Puc Light purple	Special of Extract
F4	Cream	Light purple	Special of Extract
F5	Cream	Violet	Special of Extract
F6	Cream	Purple to red	Special of Extract

Examination of the pH of the preparation was carried out to determine the safety of the preparation when used, so that it did not irritate the skin. Discrepancies in the pH of the skin can cause irritation, resulting in discomfort (*Azzahra Fara, dkk, 2019*).

Table IV. Examination of the pH of eye shadow preparations combination of Extract spisum butterfly pea flower with secang wood

Formulation	Parameters of pH
F0	6
F1	6
F2	6
F3	6
F4	6
F5	6
F6	6

The results of the pH test on eye shadow cream combined with peacock flower extract and secang wood produced a pH that met the requirements of 4-7 according to the skin pH. If the pH of the preparation is too acidic, it is feared that it can cause irritation to the skin, whereas if the pH is too alkaline, it will cause the skin to become scaly. Therefore, the pH check for the preparation of eye shadow cream is in accordance with predetermined requirements (*pratasik Meyla, dkk, 2019*).

Table V. Results of viscosity test of eye shadow preparations combination of Extract spisum butterfly pea flower with secang wood

Formulation	Parameter of Viskositas (cps) \pm SD
F0	$40000 \pm 1 \leq 2$
F1	$26000 \pm 1,5 \leq 2$
F2	$26500 \pm 1,5 \leq 2$
F3	$36500 \pm 1,09 \leq 2$
F4	$38500 \pm 1,03 \leq 2$
F5	$40000 \pm 1 \leq 2$
F6	$40000 \pm 1 \leq 2$

Viscosity check The viscosity test was carried out using spindle no. 4, with a speed of 6. Good viscosity requirements for semi-solid preparations are 4000-40,000 cps. Based on these results, 81 cream preparations showed a yield of 4000-40,000cps. F0, F1, F2, F3, F4, F5, and F6 showed good results and met requirements. The formulation had \pm SD ≤ 2 .

Good cream spread between 5 cm and 7 cm. The spreadability of eye shadow cream preparations at F0, F1, F2, F3, F4, and F5; F6 had a diameter of 5 cm. The results obtained indicate that the formulation prepared in this study meets the requirements for a good cream, namely, 5–7 cm (*Roosevelt Afred. Etc*).

Table VI. The result of spreadability test eye shadow preparations combination of Extract spisum butterfly pea flower with secang wood

Formulation	Parameter of Diameters (cm) \pm SD
F0	$5 \pm 1 \leq 2$
F1	$5 \pm 1 \leq 2$
F2	$5 \pm 1 \leq 2$
F3	$5 \pm 1 \leq 2$
F4	$5 \pm 1 \leq 2$
F5	$5 \pm 1 \leq 2$
F6	$5 \pm 1 \leq 2$

Checking the washability of the cream aimed to determine whether it could be easily washed off after use. The results showed that a base with a volume of 22 ml could wash off the cream, while F0, F1, F2, F3, F4, F5, and F6 had a washing volume of 22 ml of water. The ability of a cream to be washed off can be affected by the physical and chemical properties of the active ingredients, the type and nature of the cream as a carrier, the area of application, and the nature and condition of the wearer's skin (*Fatmawaty etc, 2016*).

Table VII. The washability test of eye shadow preparations combination of Extract spissum butterfly pea flower with secang wood

Formulation	Parameters Volume (ml) \pm SD
F0	$5 \pm 1 \leq 2$
F1	$5 \pm 1 \leq 2$
F2	$5 \pm 1 \leq 2$
F3	$5 \pm 1 \leq 2$
F4	$5 \pm 1 \leq 2$
F5	$5 \pm 1 \leq 2$
F6	$5 \pm 1 \leq 2$

The microbial contamination test aims to see the presence of microbes that are contaminated when making eye shadow cream preparations, in Regulation of the Head of the Drug and Food Control Agency No. 17 of 2014, eye shadow is a mucous membrane cosmetic that must meet microbial requirements. The results of microbial testing on eye shadow cream preparations with a variety of thick extract of butterfly pea flower and thick extract of secang wood showed that there was *Pseudomonas aeruginosa*, *Staphylococcus aureus*, *Candida albicans* except for the eye shadow cream preparation on F5, there was *Candida albicans* in the formula. The parameters of total plate number and mold number of eye shadow cream preparations showed the presence of bacteria, mold, and yeast during testing, which is not in accordance with PERKA BPOM requirements. Because the total water content in the extract is more than 10%, it can cause the growth of bacteria, fungi and yeast (*PERKA BPOM RI, 2014*).

The hedonic test examination was carried out on 20 panelists as an assessment, including the aroma, color, and texture of the eye shadow preparation, and the results showed that the three products were F3; F4; Respondents rated F5 as good with a significant value above 0.05%; therefore, no further preference test was needed for the three formulas. Therefore, acute dermal irritation was immediately tested in rabbits. The degree of irritation was determined by comparing the irritation index obtained using the following scores:

Category :

1. Not irritating = 0.00
2. Slightly irritating = 0.04-0.99
3. Mild irritation = 1.00-2.99
4. Moderate irritation = 3.00-5.99
5. Severe irritation = 5.00-8.00

Table VIII. Primary irritation score on rabbit skin

Formulation	Periode Parameter (Hour)	Rabbit 1		Rabbit 2		Rabbit 3		Average
F3	24	I	U	I	U	I	U	1,00
	48	0	0	0	0	0	0	
	72	1	0	1	0	1	0	
F4	24	2	0	2	0	2	0	1,00
	48	0	0	0	0	0	0	
	72	1	0	1	0	1	0	
F5	24	2	0	2	0	2	0	1,00
	48	0	0	0	0	0	0	
	72	1	0	1	0	1	0	
Indeks Irritation is 1,00								

Note:

I = Irritation

U = Udemia

The result of stability Test of preparation eyeshadow cream :

1. Organoleptic Test**Table IX.** Organoleptic Test

Formulation	Save time (weeks)	Temperature (25-30 °C)			Temperature (40 °C)		
		Color	Smell	Texture	Color	Smell	Texture
F3	2	Puc Light purple	Special of Extract	Cream	Puc Light purple	Special of Extract	Cream
	4						
	6						
	8						
F4	2	Light purple	Special of Extract	Cream	Light purple	Special of Extract	Cream
	4						
	6						
	8						
F5	2	Violet	Special of Extract	Cream	Violet	Special of Extract	Cream
	4						
	6						
	8						

2. Homogeneity Test**Table X.** Homogeneity Test

Formulation	Save time (weeks)	Temperature (25-30 °C)	Temperature (40 °C)
F3	2	Homogeneity	Homogeneity
	4	Homogeneity	Homogeneity
	6	Homogeneity	Homogeneity
	8	Homogeneity	Homogeneity
F4	2	Homogeneity	Homogeneity
	4	Homogeneity	Homogeneity
	6	Homogeneity	Homogeneity
	8	Homogeneity	Homogeneity
F5	2	Homogeneity	Homogeneity

4	Homogeneity	Homogeneity
6	Homogeneity	Homogeneity
8	Homogeneity	Homogeneity

3. Spreadability Test

Table XI. Spreadability Test

Formulation	Save time (weeks)	Temperature (25-30 °C) ±SD 1 ≤ 2	Temperature (40 °C) ±SD 1 ≤ 2
F3	2	5	5
	4	5	5
	6	5	5
	8	5	5
F4	2	5	5
	4	5	5
	6	5	5
	8	5	5
F5	2	5	5
	4	5	5
	6	5	5
	8	5	5

4. pH Check

Table XII. pH Check

Formulation	Save time (weeks)	Temperature (25-30 °C)	Temperature (40 °C)
F3	2	6	6
	4	6	6
	6	6	6
	8	6	6
F4	2	6	6
	4	6	6
	6	6	6
	8	6	6
F5	2	6	6
	4	6	6
	6	6	6
	8	6	6

The stability test is an accelerated test that takes only 2 months at room temperature (25-30 degrees Celsius) and a temperature of 40 °C to determine the physical and chemical stability of each formula, including organoleptic tests, pH tests, tests, power spread, and homogeneity. The results showed that the examination was still in a stable condition, there was no change in color and shape, and it showed linearity.

CONCLUSION

The results showed that the combination of the thick extract spissum of butterfly pea flowers with secang wood was a natural dye that could be used as a decorative cosmetic. Mean while, the eye shadow combined with the extract spissum of sea butterfly pea flower and secang wood gave a stable color for 2 cycles in the formulas F0, F1, F2, F3, F4, F5, and

F6 organoleptic in terms of color, shape, smell, and texture. The combination extract spissum of butterfly pea flowers with secang wood used in eye shadow preparations can cause allergic reactions when applied to the skin of male albino rabbits. In this case, it is necessary to reformulate the preparation of eye shadow with natural dyes, a combination extract spissum of butterfly pea flower, and secang wood as a natural dye so that the results are more stable and long-lasting.

SUGGESTION

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