Proceedings of the International Conference on Nursing and Health Sciences, Volume 3 No 1, May 2022, Page 229 – 240
e-ISSN 2774 – 5104, Global Health Science Group
http://jurnal.globalhealthsciencegroup.com/index.php/PICNHS

OPTIMIZATION OF MORINGA LEAF (MORINGA OLEIFERA LAMK) ETHANOL EXTRACT WITH SPAN 80 AND TWEEN 80 EMULSIFIER

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ABSTRACT

Moringa plant (Moringa Oleifera Lamk) contains various free radical inhibitory molecules, such as phenolic compounds (phenolic acids, flavonoids, quinones, coumarins, lignans, stilbenes, tannins), nitrogen compounds (alkaloids, amines, betalains), vitamins, terpenoids (including carotenoids) and several other endogenous metabolites rich in antioxidant activity. When span 80 and tween 80 are mixed in a suitable composition and in their manufacture the aqueous phase is dispersed into the oil, span 80 and tween 80 will be arranged alternately at the interface of the oil phase and water phase forming a monolayer that surrounds the droplets so as to produce good emulsifying properties. and form a stable O/A type emulsion. Determine the optimum concentration of span 80 and tween 80 in the formulation of ethanol extract cream of Moringa leaves (Moringa oleifera Lamk) by testing the physical properties and cream of the cream In this study, concentration variations of span 80 and tween 80 to see the best physical properties. The statistical analysis using the Simplex Lattice Design versi 11 method with the parameters of adhesion, dispersion, pH, viscosity, and protective power. The optimum formula is in formula 2 with a ratio of span 80: tween 80 is 0:1 which indicates a desirability value of 0.986. Conclusions. The optimum formula is formula 2 with a ratio of span 80 and tween 80 0:1, where the results of the stability test by cycling test have relatively better physical stability in terms of organoleptic, homogeneity, disperersion, adhesion, pH, viscosity.

Keywords: moringa leaf; optimum formula; simplex lattice design; span 80; tween 80

INTRODUCTION

Moringa plant (Moringa oleifera Lamk) is a plant that originally came from the area around the Himalayas and India, then spread to the continents of Asia, America, Africa, and New Zealand. Moringa is a vegetable plant that is very nutritious and has various benefits (Luthfiyah, 2012). Moringa plants contain many free radical inhibitory molecules, such as phenolic compounds (phenolic acids, flavonoids, quinones, coumarins, lignans, stilbenes, tannins), nitrogen compounds (alkaloids, amines, betalains), vitamins, terpenoids (including carotenoids), and some other endogenous metabolites that are rich in antioxidant activity (Karyadi, 2004). The ability of flavonoids as antioxidants has been widely studied in recent years, where flavonoids have the ability to change or reduce free radicals and also as anti-free radicals (Pietta, 2000).

Moringa leaf extraction was carried out by maceration method with 96% ethanol as solvent. The use of 96% ethanol as a solvent because it is a universal solvent that can dissolve polar, nonpolar and semi-polar compounds so that by using 96% ethanol the active substance needed can be completely attracted (Febriani, 2014). Cream is a semi-solid dosage form in the form of a thick emulsion containing not less than 60% water, intended for external use by applying it to the affected skin. There are two types of cream, cream type oil in water (W/A) and type water in oil (W/W) (Anief, 2005). Emulsifiers are surfactants that reduce the interfacial surface tension between the oil phase and the water phase, as well as minimize the surface energy of the droplets formed (Allen, 2002). The choice of emulsifier in the emulsion system is the key to the physical properties and stability of an emulsion.

METHOD

Maceration extraction was used in this study because the active substance in simplicia is not resistant to overheating. cream formulation using 5 formulas with different cream concentrations.

Table 1.
Formulation of cream ethanol leaf ethanol extract

Materials	F1 %	F2%	F3%	F4%	F5%
Ekstrak etanol daun kelor	10	10	10	10	10
Tween 80	0,75	1	0,5	0,25	0
Span 80	0,25	0	0,5	0,75	1
Asam stearat	10	10	10	10	10
Gliserin	7,5	7,5	7,5	7,5	7,5
Parafin cair	2	2	2	2	2
Nipagin	0,18	0,18	0,18	0,18	0,18
Nipasol	0,02	0,02	0,02	0,02	0,02
Oleum rosae	15 tetes	15 tetes	15 tetes	15 tetes	15 tetes
Titan dioksida	0,7	0,7	0,7	0,7	0,7
Aqua-dest	Ad 50	Ad 50	Ad 50	Ad 50	Ad 50

Cream will be made as much as 200 grams per formula. Each formula will be carried out 3 times replication.

Ways of making

Oil phase (stearic acid, alcohol, liquid paraffin, 80 span and nipasol) are heated to the water bath until it melts perfectly. Insert the resulting results into the hot mortar and stir. The water phase (glycerin, tween 80, nipagin and aquadest) are dissolved above the water bath and then added into the oil phase, stir until cold mortar and form emulsions. Enter the Ethanol extract of Moringa leaves of Moringa Mortir, stir until homogeneous, add titan dioxide that has been dissolved in water little by little and finally add oleum rosae. Cream is put into an ointment pot.

Testing of physical properties

Oganoleptis test

Organoleptic examination is carried out to describe the color, smell, and concentration of the cream preparations that have been mixed with several bases, the preparations that have been produced ongoing, choose interesting colors, pleasant odors and sufficient viscosity to be comfortable in use (Voigt 1994).

Homogeneity test

Creams are applied to three glass objects to observe homogeneity. If there is no rough granules above the three glass of the object, the cream tested homogeneous (AnieF 1988).

Spread power test

The cream of 0.5 grams was placed between two glass plates, where the upper plate in the interval of 1 minute at Berk by placing the scale child on it and left for 1 minute. The resulting surface of

the resulting deployment is recorded in the diameter of the cream from various sides then with the increase in the burden, each addition of the load is left 1 minute then recorded and so on (Voigt 1994).

Lekan Power Test

Two glass objects, stopwatch, gram scales and carried out by attaching a cream of approximately 0.5 grams above the other glass object, above the cream then placed with a load of 0.5 kg for 5 minutes, then the Glass object is installed on the tool The test, after that release the load weighing 500 grams and noted the time until the two objects were released (Anief 1988).

Test PH.

PH evaluation is done using a tool called ph meter.

Viscosity test

Viscosity measurement is done using the VISCOMETER RION VT 04-F 04-F. The cream preparation is inserted into the container until it is submerged by the rotor. Then determine the appropriate rotor and read the value of the viscosity.

Cream type test

The method used to observe the type of emulsion is a dilution method, namely by dissolving the cream in water and oil (Voigt, 1984). If the cream can dissolve in water, then the cream is a cream o/w. Conversely, if the cream dissolves in oil, then the cream is a / m cream.

Protection power test

The protection test was carried out by cutting filter paper with a size (10x10 cm), then moistened with the Fenolftalein (PP) solution as an indicator. After that the paper is dried. The paper is smeared with a 0.5 g cream on the surface side as it is usually people using cream (1). Create an area of 2.5x2.5 cm as many as 3 places on other filter paper, apply solid paraffin which has been melted on the edge of the filter paper area that has been created (2). Paper (2) affixed on paper (1). Areas dripped using Dilute P (4%) NaOH. Observe the emergence of redness stains on the paper that has been moistened by PP solution. Recorded the time needed started when the paper was dripped with dilute NaOH (P) until the red appearance (Saryanti et al., 2019).

Stability test

The Cycling Test test is carried out as many as 6 cycles. The cream preparation is stored at a cold temperature of ± 4 ° C for 24 hours then it is located at a temperature of ± 40 ° C, this process is calculated 1 cycle (Dewi, 2010).

Data analysis

The data from the physical stability test was analyzed using the Design Expert software to get the optimum formula. After that it is tested for conformity / normality. Normal distributed data continued with One Sample T-Test Sample with a 95% confidence level. Comparison of the physical properties of the preparation between the beginning of the manufacture and after the storage of optimum formulas was carried out by analysis using one-way ANOVA test with a 95%

registry level.

RESULTS AND DISCUSSION

The viscous extract obtained from the maceration was 84.960 grams with a yield percentage of 16.882%. The drying shrinkage of dried simplicia using a moisture balance tool showed a result of 20.11%, this was due to the drying process using direct sunlight during the rainy season which caused the simplicia to be moist and not dry perfectly. The ethanol-free viscous extract was tested by thin layer chromatography and yielded almost the same Rf values. The design of the cream formula for Moringa leaf ethanol extract in this study used Design Expert software. The factors studied were span 80 as factor A and tween 80 as factor B.

Cream Physical Properties Testing

Organoleptic test

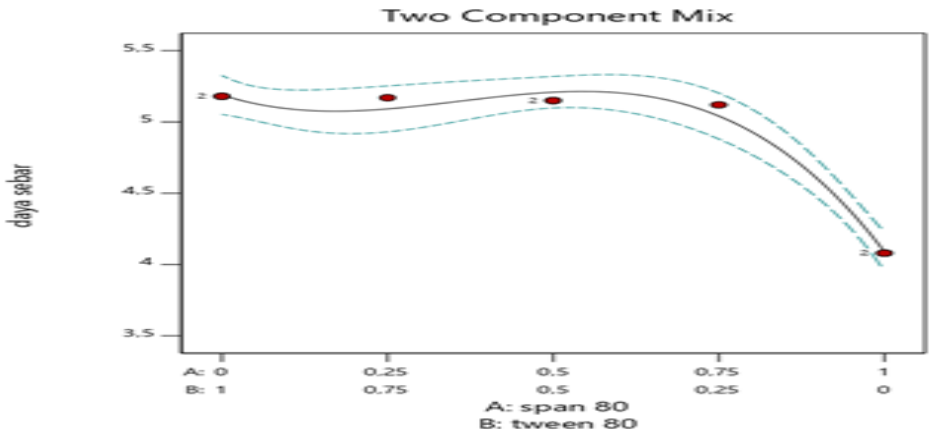
Organopletis test was carried out to describe the color, smell, and shape of the cream preparation. Apart from being a parameter, the organoleptic test also includes factors that affect the physical and chemical changes of cream preparations, as well as being a comfort parameter that is acceptable or not by consumers. All cream formulas are green in color and come in semi-solid cream form. The preparation of Moringa leaf extract cream has a rosea smell because in its manufacture it is added with fragrance, this is used to eliminate unpleasant odors in the cream, which can reduce comfort when used.

Homogeneity test

Homogeneity test aims to determine the content of the active substance in the cream preparation is completely or immediately dispersed with other ingredients or not. In this formulation all creams are said to be homogeneous because there are no visible coarse granules.

Dispersion test

The dispersion test aims to determine the ability of the cream to spread quickly on the skin when under pressure. Gradually increasing the load on the cream is intended when it is applied accompanied by emphasis, it will provide better dispersion so that it is more optimal. Spreadability can be influenced by the viscosity of the resulting cream preparation. The softer the cream preparation, the higher the dispersion produced. Cream preparations that can spread well on the skin indicate that the active substances in the resulting preparation are more evenly and optimally dispersed. The cream is declared to meet the requirements of the spreadability test, if it has a diameter between 5cm-7cm (Garg et al., 2002: 90).



Picture 1. Model Graphs Span 80 and Tween 80 on the Dispersion

The resulting curve decreases, meaning that the higher the concentration of span 80, the lower the spreadability. Tween 80 has hydrophilic properties, so it will attract more water molecules which causes the spread of cream to be wider (devi et al, 2019).

The equation obtained from the curve above:

Y = 4.09 (A) + 5.18 (B) + 2.67 (AB) Explanation

Y = scatter power response

(A) = span 80

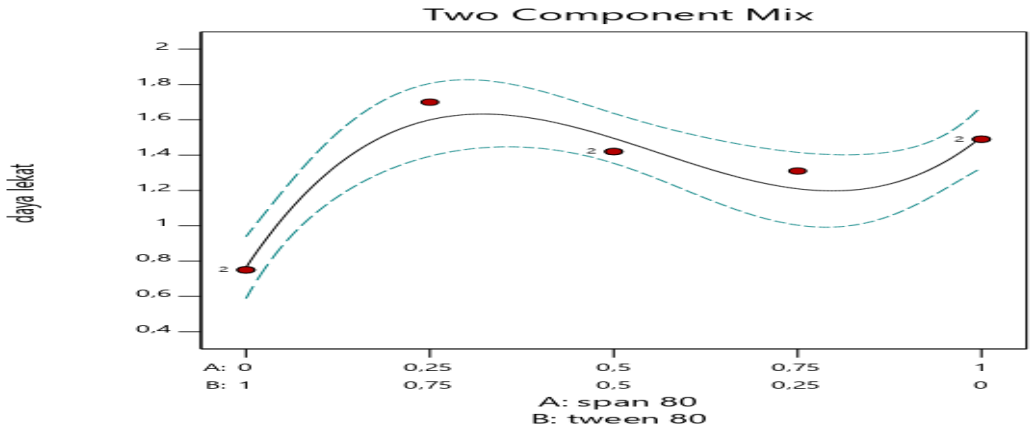
(B) = tween 80

(AB) = span 80 : tween 80

From the equation obtained, the coefficient value of tween 80 is greater than the value of the coefficient of span 80, this indicates that tween 80 is more influential in increasing the spreadability of cream. The concentration of the mixture shows a positive value, this indicates that the mixture of span 80 and tween 80 can increase the dispersion.

Adhesion test

The stickiness test aims to determine the ability of the cream to adhere to the ethanol extract of Moringa leaves on the skin. Good adhesion is able to coat the skin thoroughly, does not interfere with the physiological functions of the skin and clog pores (Voight, 1994).



Picture 2. Model Graphs Span 80 and Tween 80 on the Adhesion

The resulting curve is curved upwards, which indicates the effect of emulsifier concentration on adhesion. From the results of the dya combination test between span 80 and tween 80, the equation is obtained:

Y = 1.50 (A) + 0.7625 (B) – 4.05 (AB)

Information

Y = adhesive response

(A) = span 80

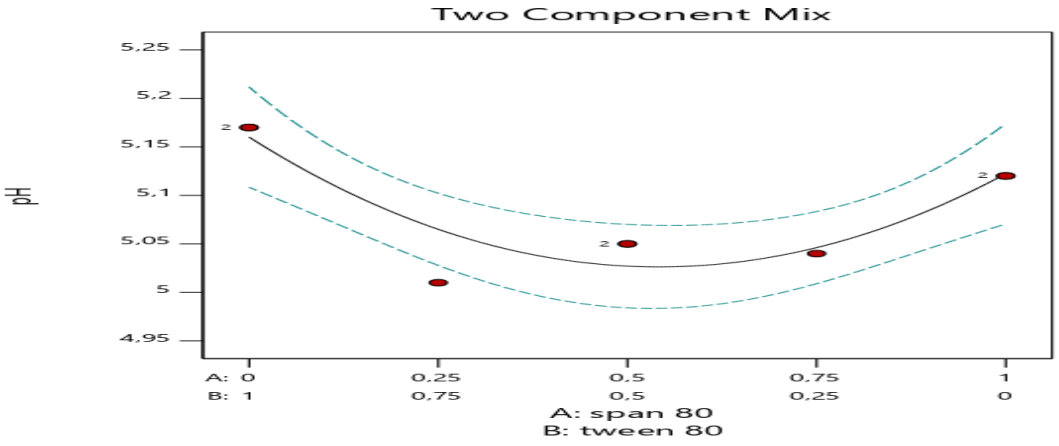
(B) = tween 80

(AB) = span 80 : tween 80

Based on the above equation, the coefficient of span 80 is greater than the value of the tween coefficient of 80, this indicates that span 80 is more influential in increasing adhesion. Cream with a higher concentration of span 80 means that the adhesive power also increases, while the concentration of tween 80 decreases the stickiness of the cream. The concentration of the mixture is negative, this indicates that the mixture of span 80 and tween 80 can reduce the stickiness of the resulting cream.

pH test

The pH test aims to determine the level of acid or base in the cream preparation that is made, whether it is in accordance with the pH of the skin or not so that it does not irritate the skin. Changes in the pH of cream preparations can occur if the cream made undergoes chemical changes in the active substance or additional substances that make up the cream preparation, due to the influence of the carrier or the environment. A pH check is carried out, because if the pH of the preparation is too acidic (too low) it can cause the skin to become scaly, thereby reducing the aesthetic value of the skin (Arisanty, 2013). The skin pH range is 4.5-6.5 (Deasy, 2013).



Picture 3. Model Graphs Span 80 and Tween 80 on the pH

The resulting curve is curved downwards and then rises again, meaning that there is an interaction that occurs in the combination of span 80 and tween 80. The pH produced in the cream preparation of Moringa leaf ethanol extract varies, this is because the concentrations of span 80 and tween 80

in each formula are different. different. The equation obtained is:

Y = 5.12 (A) + 5.16 (B) – 0.4565 (AB)

Information

Y = pH response

(A) = span 80

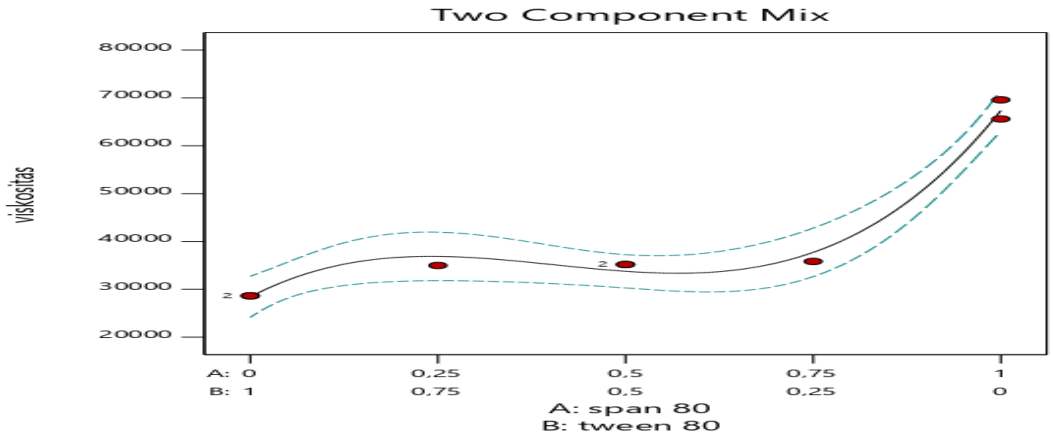
(B) = tween 80

(AB) = span 80 : tween 80

Based on the above equation, the coefficient value of tween 80 is greater so that tween 80 has a greater influence on pH. The concentration of the mixture obtained is negative, which means that the mixture of span 80 and tween 80 can lower the pH of the resulting cream preparation.

Viscosity test

Viscosity is a parameter to measure the thickness that states the large or small friction in the fluid. The viscosity test was conducted to determine the amount of viscosity of a preparation, where the value of the viscosity stated that the amount of detention was a liquid to flow. The higher the value of viscosity, the greater the power to flow. A good viscosity requirement in a semi-solid preparation is 4,000-40,000 CPS (Pratasik,atc, 2019).



Picture 4. Model Graphs Span 80 and Tween 80 on the viscosity

The curve is increasingly rising. This means that the increasing concentration of span 80 and the decline in the concentration of Tween 80 causes the value of the viscosity of the grade to increase. From the results of the viscosity test to the equation:

Y = 67362.57 (a) + 28414.57 (b) - 99360.00 (AB)

Information

Y = viscosity response

(A) = span 80

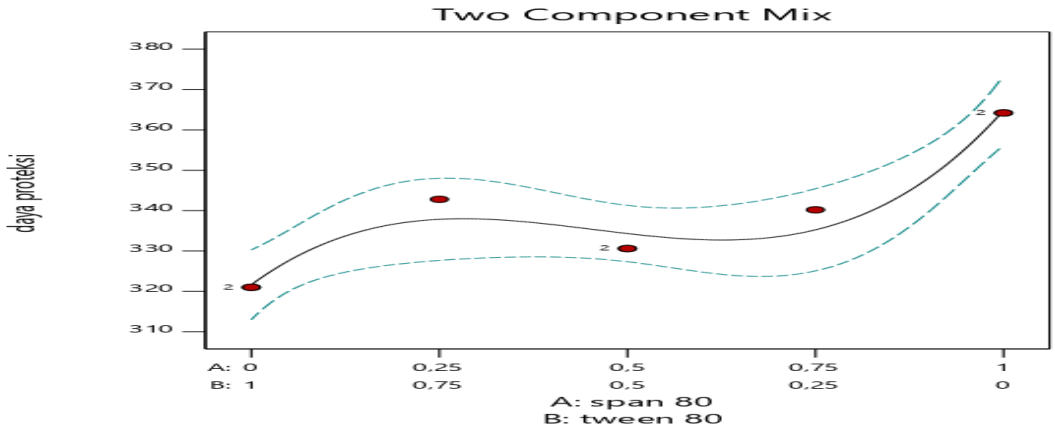
(B) = Tween 80

(AB) = Span 80: Tween 80

Based on the equation above the 80 span coefficient value is greater than the Tween 80 coefficient value, this shows that span 80 is more influential in increasing viscosity. The mixed value is negative, this shows that the mixture of span 80 and tween 80 can reduce viscosity.

Protection power test

The protective power test was carried out to determine the ability of the preparation to protect the skin from external influences such as dust, pollution and sunlight.



Picture 5. Model Graphs Span 80 and Tween 80 on the protection power test

It can be seen that the curve is increasing which indicates span 80 affects the value of the protective power of the resulting kim preparation. The equation for the protective power test obtained is

Y = 364.82 (A) + 321.62 (B) – 129.07 (AB)

Information

Y = protection response

(A) = span 80

(B) = tween 80

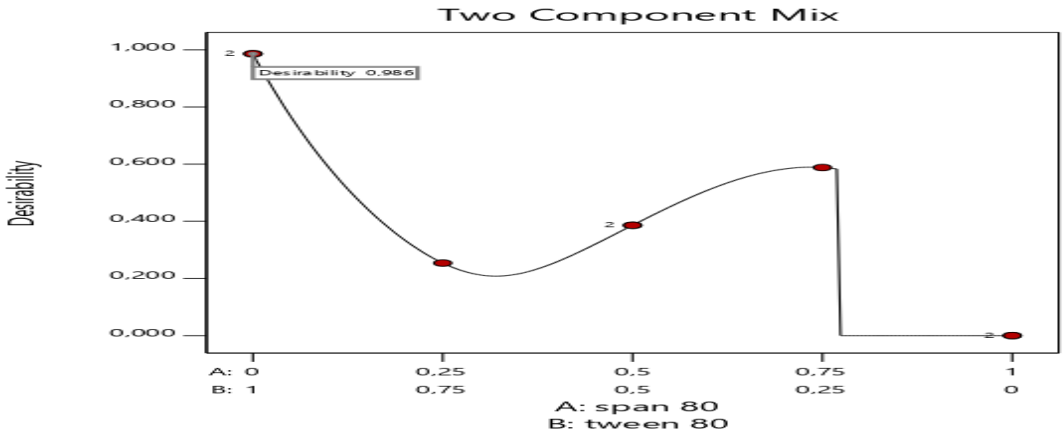
(AB) = span 80 : tween 80

From the above equation the coefficient value of span 80 is higher than tween 80, this confirms that span 80 has the ability to increase the protective power of cream compared to tween 80. The combination produces a negative value which means that the combination of span 80 and tween 80 will decrease the protective power of cream. resulting from.

Cream type test

The cream type test aims to determine the type of cream, including O/A or A/O cream. The results of the test for the type of cream formula 1-5, all formulas have an M/A type of cream, this can be seen from the cream that can blend with the added methyleneblue.

Determination of Optimum Formula



Picture 6. Model Graphs Optimum Formula with Simplex Lattice Design

Based on the picture above, there are 5 points, where the optimum formula is found in a concentration ratio of span 80: tween 80 (0:1). The desirability value obtained is 0.986, where the desirability value is a value between 1 to 0 which is used in the comparison of components. The closer the desirability value to 1, the higher the desired response. From the desirability value, it can be stated that according to the SLD method, formula 2 is the optimum formula with a desirability of 0.986.

Optimum Formula Verification

Table 2.
Signification of Prediction and Optimal Formula Test Results

Parameter	Prediction	Test result	Signifikasi	Interpretasi
Dispersion	5,21	4,94	0,017	significantly different
Adhesion	1,50	1,33	0,038	significantly different
pH	5,03	5,08	0,003	significantly different
Viskosity	33654,8	40852,2	0,061	Not significantly different
The power protection	334,32	339,76	0,005	Not significantly different

The results of the SPSS test showed that the results obtained were significantly different for dispersion, adhesion, and pH. This difference is still within the range for topical preparations, so it can be said that the Simplex Lattice Design method can be used to determine the optimum formula for creams with spans of 80 and tween 80.

CONCLUSION

The combination of span 80 and tween 80 produces a cream that meets the requirements of the dosage of the dedictation of the toilet, affecting the physical properties of the cream reass. The optimum formula of the most optimum ethanol ethanol cream extract is formula 3 with a ratio of 80: tween 80 0: 1, desire value is 0.986.

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