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Formulation Of Coenzyme Q10 Liquid Foundation With a Variations Olive Oil as The Oil Phase

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Abstract

Coenzyme Q10 contains antioxidants that can protect the skin from damage caused by harmful molecules, which are usually called free radicals. Moisturizer Liquid Foundation formulation with variations of olive oil as the oil phase can produce good physical stability of Moisturizer Liquid Foundation preparations during physical testing. The Moisturizer Liquid Foundation formulation was made using various concentrations of the olive oil phase, namely FI (3%), FII (5%), and FIII (7%). The Moisturizer Liquid Foundation formulation was made using the Emulsion evaporation method, and physical characteristics tests were carried out, including organoleptic tests, pH tests, viscosity tests, dispersibility tests, adhesion tests, and hedonic tests. The results showed that the organoleptic test of the three formulas had the same color and aroma, but the texture of the preparations was different due to variations in concentration. The higher the concentration of olive oil, the more viscosity will increase according to the data, namely F1:5200 Cpas, F2: 6400: Cpas, F3: 8400 Cpas. The higher the concentration of olive oil, the more acidic the pH value will be according to the data, namely F1: 6.17; F2: 6.11; and F3: 5.99. The results of the F1 dispersion test: 6,6; F2: 6.4; and F3: 6.2. The results of the F1 adhesion test: 6,11; F2: 6.25; and F3: 6.51. The most preferred hedonic test result is F2.

Keywords: *Coenzyme Q10, Moisturizer Liquid Foundation, Olive oil*

INTRODUCTION

The aging process on the skin is an unavoidable process, but the use of proper skin care will slow down and prevent the onset of skin aging. Basic skincare consists of 4 main basic functions, namely cleaning the skin, maintaining the skin, moisturizing the skin, and protecting the skin (Damayanti, 2017).

The use of various types of skincare does not provide satisfaction and efficiency in use, so women today want multifunctional cosmetic products. That is, it does not only function as decorative cosmetics but also as skincare products (Bowles et al., 2014).

One of the main types of decorative cosmetics is a foundation. Foundation has many types, one of which is Liquid foundation. Liquid foundation is used on top of moisturizer so that the pigments contained in the dye do not come into direct contact with the skin (Kustanti, 2008). And the use of antioxidants can protect cells from skin damage due to free radicals that cause the aging process

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of the skin (Andarina and Djauhari, 2017). So the formula for a suitable cosmetic product is a liquid foundation moisturizer with the addition of antioxidants.

Coenzyme Q10 is one of the non-enzymatic endogenous antioxidants, which is also known as Ubiquinone (Bhagavana, 2006). Coenzyme Q10 has drawbacks to be formulated in topical dosage forms, namely high lipophilicity (log P>10) so that Coenzyme Q10 is retained in the stratum corneum and causes a low release of Coenzyme Q10 in the skin (Lucangioli and Tripodi, 2012).
Seeing from the lack of Coenzyme Q10, it can be improved by using olive oil as the oil phase to increase the release of coenzyme Q10 (Deapsari, 2017). Olive oil with a concentration of 12% containing non-essential monounsaturated omega-9 fatty acids was used to increase the release of coenzyme Q10 into the skin (Tou et al., 2019). Research (Shoviantari et al., 2017), using olive oil with a concentration of 1.8% as the oil phase, resulted in the solubility and release of coenzyme Q10 in the skin after 6 hours. So that in this study, variations in the concentration of olive oil 3, 5, 7% were used for the formulation of coenzyme Q10 liquid foundation moisturizer.

LITERATURE REVIEW

Coenzyme Q10 is the only natural antioxidant that is lipid-soluble and has strong antioxidant activity. Coenzyme Q10, as an antioxidant, works by inhibiting lipid and protein peroxidase, and plays a role in scavenging free radicals, and works centrally in oxidative phosphorylation in mitochondria. Coenzyme Q10 has the disadvantage that it is unstable because it is very easily oxidized, so the activity of coenzyme Q10 decreases (Yamada Shao et al., 2015).
Moisturizer Liquid foundation is a type of foundation that is liquid and thick. This type of foundation is easy to spread and easily absorbs into the skin. A liquid foundation is the lightest foundation. The end result of using this foundation, makeup will look more natural. Liquid foundation is also suitable for use on normal, oily, and dry skin types (Fairuz, 2016).
To get a Moisturizer liquid foundation with good characteristics, it must be tested for its physical and chemical properties before proceeding with other tests. The tests that were carried out for the first time were physical evaluation or physical characteristics, physical characteristics testing of the liquid foundation moisturizer preparation, namely organoleptic test, pH test, viscosity test, spreadability test, adhesion test, and hedonic test.

RESEARCH METHODOLOGY

The materials used were then weighed with coenzyme Q10 with PVP 100 mg dissolved in 5 mL 96% ethanol, and then stirred using a magnetic stirrer at a speed of 500 rpm for 10 minutes. The oil phase ingredients were melted on a water bath at 70oC. Furthermore, titanium dioxide is mixed with glycerin until homogeneous. The water phase ingredients are combined into distilled water which has been heated at a temperature of 70oC while stirring on a water bath with the temperature being maintained at 70o. Then the oil phase was mixed into the water phase and stirred for 5 minutes. Then removed from the water bath and mixed with a mixture of glycerin and titanium dioxide. Then added Coenzyme Q10 and the rest of

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the aquadest and then carried out constant stirring with, add 3 drops of vanilla and stir again until homogeneous. Liquid foundation moisturizer preparations can be packaged and evaluated for characteristics.

Table I. Coenzyme Q1 moisturizer liquid foundation formula

Ingredients	F I (% b/v)	F II (% b/v)	F III (% b/v)
COQ10	0,5	0,5	0,5
Olive oil	3	5	7
BHT	0,1	0,1	0,1
Veegum	2	2	2
Titanium dioxide	5	5	5
Kaolin	5	5	5
Red iron oxides	0,2	0,2	0,2
Yellow iron oxides	0,8	0,8	0,8
Propylene glycol	10	10	10
Glycerine	10	10	10
Tween 80	3,5	3,5	3,5
Benzalkonium Chloride	0,1	0,1	0,1
Citric Acid	0,8	0,8	0,8
Stearic acid	3	3	3
Cetyl alcohol	4	4	4
Span 80	1,2	1,2	1,2
Vanilia	3 gtt	3 gtt	3 gtt
Purified Water Ad	100	100	100

ISSN 2828-1500 (Online) | 2828-1985(Print)

The data from the evaluation of the physical characteristics of the liquid foundation coenzyme Q10 moisturizer included organoleptic and hedonic tests descriptively, while the pH test, viscosity test, spreadability test, and adhesion test were statistically analyzed using linear regression with a 95% confidence level if there was a difference. meaning

FINDINGS AND DISCUSSION

The development of pharmaceutical preparations using coenzyme Q10 is formulated into a liquid foundation moisturizer with varying concentrations of olive oil as the oil phase to increase the solubility of coenzyme Q10 ingredients, which are difficult to dissolve in water (Bank et al., 2011). The concentration of olive oil was varied to determine the best liquid foundation moisturizer formula. The preparation of coenzyme Q10 liquid foundation moisturizer with various concentrations of olive oil that has been made is evaluated for physical characteristics by organoleptic tests, ph tests, viscosity tests, spreadability tests, adhesion tests, and hedonic tests. Olive oil concentrations from formulas 1, 2 and 3 were 3%, 5%, and 7% respectively. Organoleptic tests include shape, aroma, color, and texture. The following organoleptic test results are shown in the table below.

Figure I. Preparation of moisturizer liquid foundation from formulas F1, F2, and F3

ISSN 2828-1500 (Online) | 2828-1985(Print)

Tabel 2. Table of Organoleptic Test Results for Moisturizer Liquid Foundation Coenzyme Q10

Formula	Texture	color	Scent
F1	less thick	Ivory	Vanilla
F2	thick enough	Ivory	Vanilla
F3	thick	Ivory	Vanilla

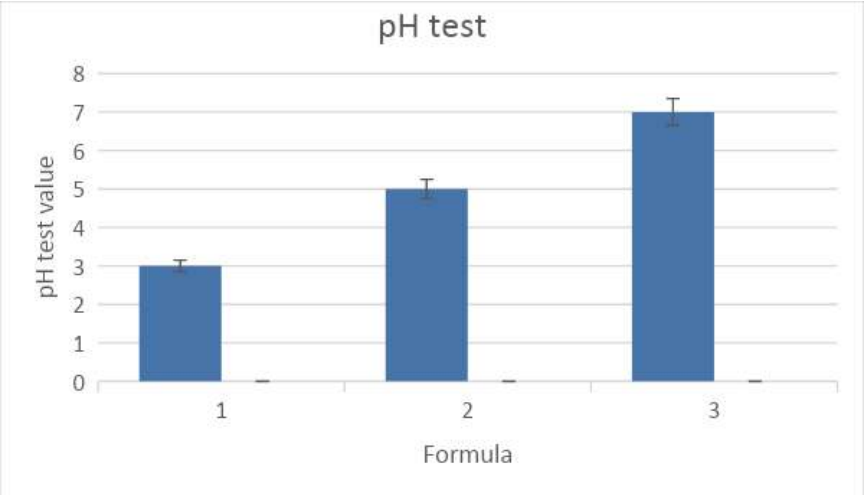

Figure II. Histogram average pH moisturizer liquid foundation from formula F1, F2, and F3 data is an average of 3 times of replication

There was no difference in the preparation of liquid foundation moisturizer after organoleptic testing for color and aroma, while the texture of the preparation had differences in each formula. Factors that influence the differences in the texture of these preparations are variations in the concentration of olive oil added to each formula. Concentrations of olive oil formulas 1 to 3 are 3%, 5%, and 7%. From the organoleptic test results, F3 showed a thicker consistency than F1 and F2 because the concentration of olive oil used was greater than F1 and F2, which was 7%. The vanilla aroma is due to the addition of vanilla essential oil. The following are the results of the pH test below.

Tabel 3. Table of pH Test Results for Moisturizer Liquid Foundation Coenzyme Q10

Formula	**R1**	**R2**	**R3**	**x±SD**
F1	6.00	6.25	6.25	6.17±0.14
F2	6.00	6.16	6.18	6.11±0.09
F3	5.84	5.95	6.18	5.99±0.17

ISSN 2828-1500 (Online) | 2828-1985(Print)

The pH test of each formula can be seen in table 3. The results of the pH measurement of the moisturizer liquid foundation obtained from the three formulas are F1: 6.17; F2: 6.11; and F3: 5.99. This pH value meets the skin pH requirements of 4.5-6.5 (Tranggono, 2007). Then from these results, it can be seen that variations in olive oil concentration have an effect on the acquisition of pH values. Where based on the results obtained from the pH test, it is known that if the concentration of olive oil is increased, the pH of the liquid foundation moisturizer will be more acidic. This is influenced because olive oil is included in acidic ingredients (Anonymous, 2013). In addition, olive oil contains triacylglycerol, which is mostly in the form of monounsaturated fatty acids of the oleic type. Oleic acid content reaches 55-80% of the total fatty acids in acidic olive oil (Yunina, 2010). The statistical results of the pH value are 0.017 <0.05 (significant effect) Linear Regression. The following are the results of the viscosity test shown below.

Tabel 4. Table of Viscosity test results for Moisturizer Liquid Foundation Coenzyme Q10

Formula	R1 (cPas)	R2 (cPas)	R3 (cPas)	x±SD
F1	5100	5200	5400	5233±152.75
F2	6400	6400	6500	6433±57.73
F3	8300	8400	8500	8400±100

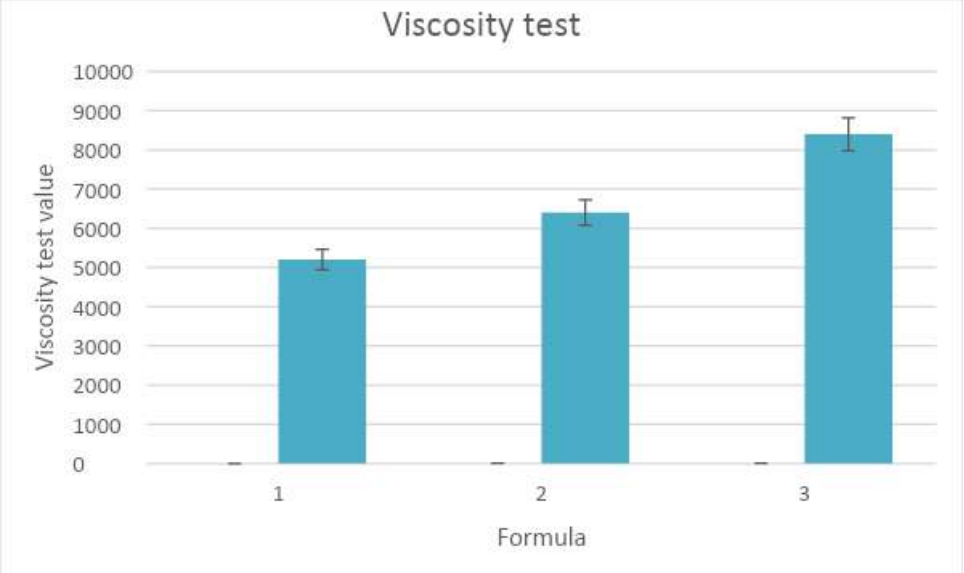

Figure II. The histogram of the average viscosity of the moisturizer liquid foundation from formulas F1, F2, and F3 data is an average of 3 times of replication

ISSN 2828-1500 (Online) | 2828-1985(Print)

Viscosity testing from the table above shows the viscosity value for F1 = 5233 cPs; F2 = 6433 cPs; F3 = 8400 cPs. This viscosity value meets the quality requirements of topical preparations, which have a viscosity value range of 2000-50,000 cPs (Rasydy et al., 2011). From the results above, it can be seen that variations in the concentration of olive oil cause an increase in the viscosity of liquid foundation moisturizer preparations because olive oil has a very large unsaturated fatty acid content of 86% (Boyle & Anderson, 2007). Viscosity is directly proportional to adhesion but inversely proportional to spreadability. The higher the viscosity value, the higher the stickiness and the less dispersion. In statistical testing, the significance value of 0.000 means that there is an influence between variations in the concentration of olive oil on the viscosity value. The following are the results of the viscosity test shown below.

Tabel 5. Table of Spreadability test results for Moisturizer Liquid Foundation Coenzyme Q10

Formula	R1 (cm)	R2 (cm)	R3 (cm)	x±SD
F1	6.8	6.7	6.7	6.7 cm±0.05
F2	6.4	6.6	6.0	6.3 cm±0.31
F3	6.5	6.0	5.9	6.1 cm±0.32

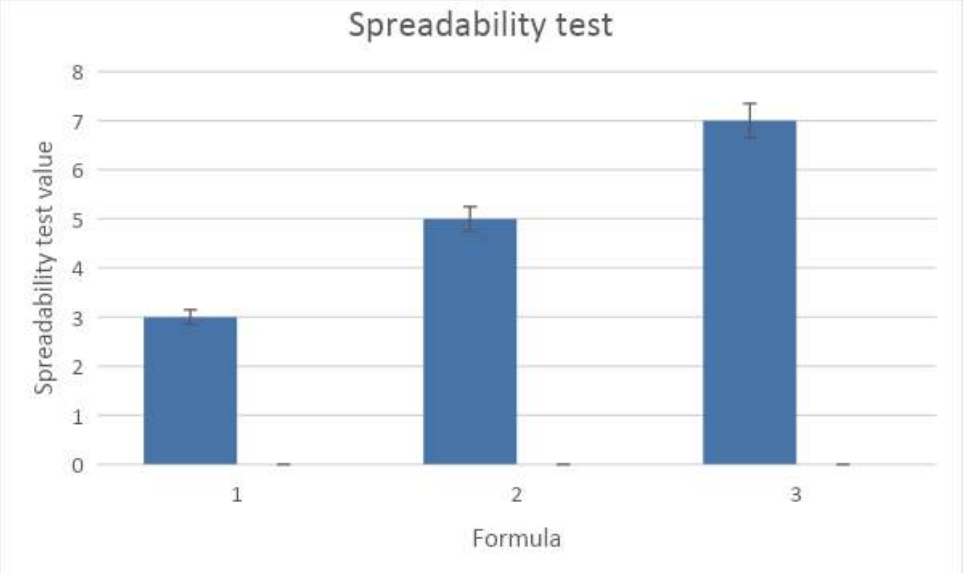

Figure III. Histogram of average dispersion power of moisturizer liquid foundation from formulas F1, F2, and F3 data is an average of 3 times of replication

ISSN 2828-1500 (Online) | 2828-1985(Print)

Testing the spreadability of the liquid foundation moisturizer obtained the results of F1: 6.7; F2: 6.3; F3: 6.1. This shows that variations in olive oil concentration cause a decrease in the value of dispersion, related to the viscosity test obtained previously, where the higher the viscosity, the smaller the diameter of the dispersion power of the preparation. In statistical testing, the significance value of 0.020 means that there is an influence between variations in olive oil concentration on the spreadability value. The following are the results of the viscosity test shown below. The spreadability test describes the spread of a liquid foundation moisturizer on the skin when used. To be able to determine the ability to spread liquid moisturizer foundation on the skin, it must meet the requirements for spreadability if the spreadability enters the measurement value range of 5-7 cm. The preparation of a liquid foundation moisturizer that has good spreadability will make it easier to apply to the skin. Factors that can affect the diameter of the spreadability of preparation, namely the amount of extract used in each formula, this statement refers to the fact that the lower the consistency of a liquid foundation moisturizer with a lower sticking time, the easier it is to spread the liquid foundation moisturizer. (Dominica, 2019). The statistical results of the pH value are 0.020 <0.05 (significant effect) Linear Regression. The following are the results of the viscosity test shown below. The following are the results of the viscosity test shown below.

Tabel 6. Table of Adhesion test results for Moisturizer Liquid Foundation Coenzyme Q10

Formula	R1 (Second)	R2 (Second)	R3 (Second)	x±SD
F1	5.87	6.00	6.45	6.1 second±0.30
F2	5.92	6.37	6.46	6.3 second±0.29
F3	5.83	6.84	6.85	6.5 second±0.59

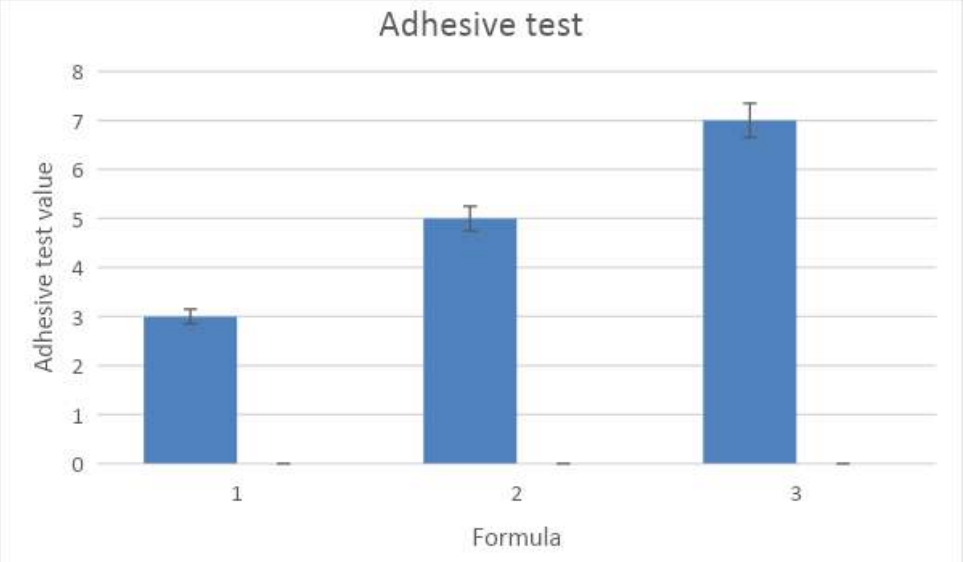

Figure IV. The histogram of the average test stickiness of the moisturizer liquid foundation from formulas F1, F2, and F3 data is an average of 3 times of replication

ISSN 2828-1500 (Online) | 2828-1985(Print)

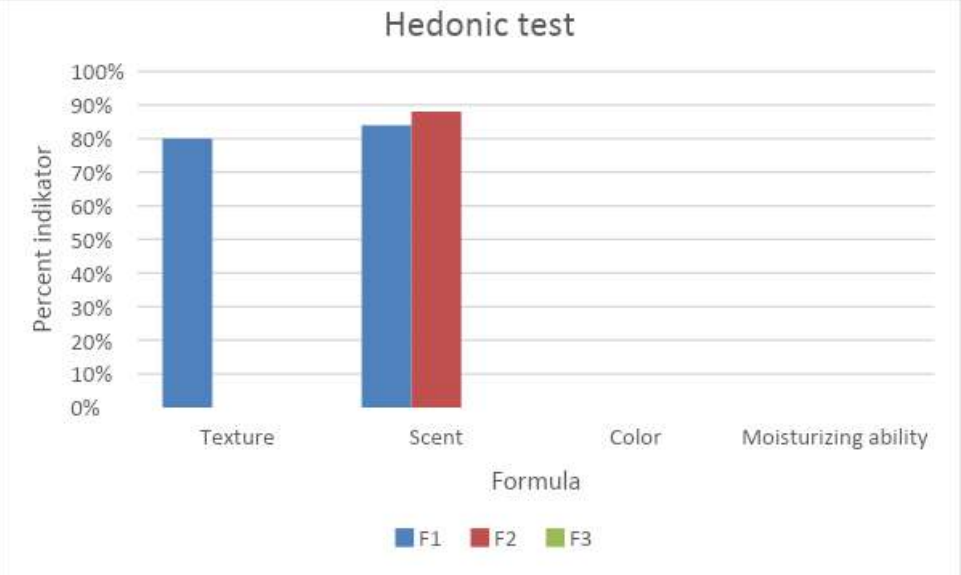

Figure V. Histogram of average hedonic test of moisturizer liquid foundation from formulas F1, F2, and F3 data is an average of 3 times of replication

An adhesion test is the ability of a preparation to adhere to the skin when used. Good preparations have high adhesion. The higher the adhesion, the better for liquid foundation preparations (Husnani et al., 2017). Testing the stickiness of the liquid foundation moisturizer obtained the results for F1: 6.1, F2: 6.3, and F3: 6.5. Adhesion for topical preparations for more than 4 seconds means that the test results are appropriate. The results of adhesion are directly proportional to the viscosity of the liquid foundation moisturizer preparation. The statistical results of the pH value are 0.015 <0.05 (significant effect) Linear Regression. The following are the results of the viscosity test shown below.

The hedonic test is one type of acceptance test for liquid foundation preparations. In the hedonic test, the panelists were asked to give their personal opinion about their likes or dislikes of the liquid foundation moisturizer that was made, and the panelists were invited to fill out the questionnaire. The purpose of the hedonic test is to obtain a formula for a liquid foundation moisturizer coenzyme Q10 with a variety of olive oil (Olive oil) which affects the texture, aroma, color, and ability to moisturize so that the most preferred liquid foundation moisturizer preparation is obtained from the panelists.

ISSN 2828-1500 (Online) | 2828-1985(Print)

The inclusion criteria set in this hedonic test are women aged 18-30 years. The selection of this category is based on an age assessment where at that age is a productive age for women who wear decorative cosmetics. The exclusive criteria set for the hedonic test for liquid foundation moisturizer preparations are having sensitive skin. The steps in hedonic testing are cleaning the back of the panelist's hand using a wet tissue so that it does not affect the panelist's assessment during the test, then a sample of the liquid foundation moisturizer is applied to the back of the panelist's hand.

Hedonic test (preferred test) was conducted on 15 women aged 18-30 years who were randomly selected with 4 categories, namely texture, aroma, color, and ability to moisturize. From the data obtained for the category of liking, the use of liquid foundation moisturizer preparations for the texture category the most in formula 1 with a concentration of 3% olive oil because the more olive oil concentration will affect the spreadability, adhesion, and viscosity of liquid foundation moisturizer preparations. For the Aroma category, formula 2 is preferred with a concentration of 5% olive oil. For the color category, formulas 1, 2, and 3 have the same score because all formulas use additional vanilla essence. For the ability to moisturize, formula 2 is preferred because it is influenced by the concentration of olive oil.

CONCLUSION

Moisturizer liquid foundation coenzyme Q10 with a variety of olive oil obtained organoleptic test results, which in terms of texture showed an increase in viscosity level had an ivory color and vanilla aroma. The increase in the concentration of olive oil affects the value of viscosity and the value of adhesion which is increasing, while for the spreadability test, it decreases. For the hedonic test, the most preferred formula is formula 3, wherefrom the level of texture that is considered the most preferred by the panelists.

Suggestions for research on liquid foundation moisturizer coenzyme Q10 with variations of olive oil need to do a stability test, irritation test, and penetration test in order to get the best preparation.

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