HEDONIC TEST OF EMULGEL CONTAINING CARROT (DAUCUS CAROTA L.) EXTRACT

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Abstract. Carrot plants, scientifically known as *Daucus carota* L., offer numerous benefits for skin health, including maintaining moisture, softening, and reducing the appearance of wrinkles. These effects are largely due to antioxidants in carrots, which counteract free radicals that can damage skin. Carrots are rich in essential nutrients like Vitamin A, beta-carotene, Vitamin C, and Vitamin K. This study aimed to develop a carrot extract-based emulgel using experimental methods. An emulgel combines the benefits of both emulsions and gels, providing an effective carrier for topical applications. The emulgel formulations underwent physicochemical testing, which included organoleptic evaluation, homogeneity assessment, pH testing, spreadability measurement, and phase separation analysis. Three formulations with varying carrot extract concentrations—5% (F1), 10% (F2), and 15% (F3)—were created and tested. A hedonic test was also conducted to evaluate the texture, color, and odor of each formulation, providing insight into user preference and overall sensory experience.

Keywords: *Daucus carota,Carrot extract,Skin health.*

Introduction

The lifestyle of people using natural ingredients in personal care (back to nature) has become very popular these days, so people are again resorting to using various natural ingredients. Long before formal healthcare services and modern medicines reached the society level, effective plants had greater economic value and fewer side effects than synthetic drugs. Therefore, the use of natural medicines with proper formulation is very important and naturally safe and effective. A nutritious plant with many benefits is carrot (Daucus carota L) which contains vitamins A, C and K and beta-carotene. The beta-carotene in carrot (Daucus carota L.) tubers is useful in

maintaining skin moisture, softening the skin and preventing the formation of wrinkles on the face, making the face look radiant at all times. Carrot (Daucus carota L) is not only rich in vitamins but also easy to obtain and available at a price that is affordable for all sections of society. This is why carrot (Daucus carota L) is enjoying great popularity. The development of cosmetics for personal care is progressing very quickly these days. Cosmetics are a mixture of several formulated ingredients so that it can serve to care for and beautify body parts according to the purpose of the cosmetics. Nowadays, there are many types of skin care products such as creams, gels, emulgels and skin emulgels, which are designed to prevent the skin from remaining healthy and protected from free radicals.

To obtain the properties of a plant, the so-called extraction is carried out, namely the extraction of the desired nutrient from a plant through various extraction methods and assisted by various types of solvents suitable for the desired nutrient, with the end result being a thick extract that can then be used as a dry extract or added to the selected preparation, but the form of the extract, whether it is still a thick extract or whether it has become a dry extract, still carries the original properties of the plant in terms of color and smell, so it often lacks the dosage form that has been added to a preparation. visually appealing.

Organoleptic testing is a method of measuring, judging or testing the quality of goods using the sensitivity of human sense organs, namely the eyes, nose, mouth and fingertips. Organoleptic testing, also called subjective measurements, is based on human subjective responses as a measuring tool (Soekarto, 1990). Organoleptic evaluation is very widely used for quality assessment in the food industry and other agricultural product industries. This assessment can sometimes provide very thorough assessment results. The assessment by the senses in some cases exceeds the accuracy of even the most sensitive instruments, including the hedonic (like) test. A like test is basically a test in which the test subjects answer whether they are satisfied or not with the properties of the material being tested.

Like tests are also called hedonic tests. Panelists were asked for their personal feedback on likes and dislikes. In addition, panelists also expressed their likes. This level of liking is called the hedonic scale. For example, with respect to "like", it can have a hedonic scale such as: very, very similar, very similar, similar, quite similar. On the other hand, if the idea of "dislike" can have a hedonic scale such as "like" and something "similar", there is a reaction that is called neutral, that is, neither "like" nor "dislike".

The hedonic scale can be stretched or compressed depending on the desired scale range. The hedonic scale can also be converted into a numerical scale with quality ratings according to the degree of preference. Statistical analysis can be performed using these numerical data. The use of hedonic scales in practice can be used to determine differences. Therefore, hedonic tests are often used for organoleptic

assessment of raw materials or similar development products. Hedonic tests are often used to evaluate final products.

Therefore, in this study, a hedonic test or preference test was conducted for the emulgel preparation with carrot extract, which was the most popular among the panelists.

Methodology

Method of producing carrot (Daucus carota L) extract

1. Material collection

The material used for the research was carrot (Daucus carota L) obtained from Lembang market in Bandung district, West Java province.

2. Making simplicia

Carrot tubers are cleaned, then washed and cut into small pieces with a knife. Chopped carrots are dried in air without direct sunlight for up to 7 days. The maximum water content in simplicia is not more than 10%. Dry sorting is then carried out to remove unnecessary foreign matter.

3. Preparation of carrot extract (Daucus carota L)

Prepare 500 grams of dried carrot simplicia, add 2200 ml of 95% ethanol solvent, put it in a closed bottle and add filter liquid or solvent, namely ethanol, cover and leave for five days protected from light and stir regularly for three days up to four times for about five minutes. After 5 days, the mixture was filtered, then the macerate was thickened using a rotary evaporator at a pressure of 70 rpm and a temperature of 70 °C (Voigt, 1997).

Formula design

The emulgel preparation is prepared in 3 formulas with variations of carrot extract, with a volume of 100 ml in each formula, the formula is shown in Table 1.

Table 1. Design of emulgel formula for carrot (Daucus carota L).

BAHAN	FORMULA (%)		
	F1	F2	F3
Ekstrak wortel	5	10	15
HPMC	1	1	1
Liquid Paraffin	7.5	7.5	7.5
Tween 20	1	1	1
Span 20	1.5	1.5	1.5
Propylene Glycol	10	10	10
Nipagin	0.03	0.03	0.03
Nipasol	0.01	0.01	0.01
TEA	2	2	2
Aqua ad.	100	100	100

Method for preparing carrot (Daucus carota L) emulgel.

The working procedure for preparing carrot (Daucus carota L) extract emulgel is as follows: Preparation of emulgel by dispersing HPMC in distilled water (75 °C) with constant stirring at medium speed with a mechanical stirrer and adjusting the pH to 5.5-6.5 with triethanolamine (TEA), the oil phase was prepared by dissolving Span 20 in liquid paraffin while the water phase was prepared by dissolving Tween 20 in distilled water. 0.03 g of methyl paraben and 0.01 g of propyl paraben dissolved in 10 g of propylene glycol and vitamin C mixed with the water phase. The oil and water phases are heated separately to 70-80 °C. Then the oil phase was added to the water phase with continuous stirring until it cooled to room temperature. The emulsion is poured into the gel with gentle stirring until a homogeneous emulsion is formed (V. Naga Sravan et al, 2014)

Methylparaben and other preservatives are greatly reduced in the presence of non-ionic surfactants due to micellization. However, propylene glycol (10%) has been shown to enhance the antimicrobial activity in the presence of non-ionic surfactants (Rowe, 2006).

Evaluation of Emulgel

Physical Properties Test of Emulgel

A. Organoleptic Examination

Organoleptic examination included visual observation of shape, color and odor which was done by observing changes in shape, odor and color of the Emulgel preparation during four weeks of storage.

B. Homogeneity Test

Apply the preparation on a piece of transparent glass. The preparation is found to be of homogeneous composition.

C. pH Test

Place the preparation in a container with a pH meter and then immerse the electrode in the container. The value indicated by the pH meter is the pH of the emulgel.

D. Spreadability test

The spreadability on the skin depends on the concentration and viscosity of the emulgel. This spreadability is very important when applying the preparation to the skin, since a preparation with good spreadability ensures an even distribution of the dose on the skin. The test was carried out using the extensometry method. The principle is to calculate the increase in surface area that the preparation offers when subjected to a load of a certain weight and within a certain time interval.

Hedonic Test Emulgel Carrot Extract

Preparation of the panelists

The researchers involved in this study were 20 panelists with the following intrinsic and extrinsic criteria:

 Intrinsic criteria: female, aged 20-50, able to communicate, willing to take hedonic tests and fill out questionnaires and have sensory sensitivity to the five senses.

 Extrinsic criteria: They have limitations in responding to sensory perceptions.

How to present samples

Hedonic test samples should be presented and coded randomly. When giving a rating, panelists are not allowed to repeat the rating or compare the examples presented. Therefore, an untrained rater should be presented with the samples one at a time so that the rater does not compare one sample with another.

How to evaluate

The hedonic test assessment must be done spontaneously. Then, panelists can fill out the questionnaire. In this case, the panelists first conducted an acceptance test for carrot extract emulgel of 6 types of brands and the evaluation was done at 5 levels of preference. Then proceed to the hedonic test.

Observation Table

Panelist Names:

Sample Type: Emulgel

Number of Samples: 3

Test Date:

Instructions: Test the samples from left to right, test and evaluate each sample thoroughly and then neutralize your sight and smell for 1 minute. Then continue with another sample until the 3rd sample.

Hedonic/Liking Test

Rate it using the following scale:

1 = Very dislike

2 = Dislike

3 = Normal/Neutral

4 = Like

5 = Very like

Sample Code	Evaluation Criteria		
	Texture	Color	Smell

Research variables

The variable used is a single variable, namely the degree of preference for emulgel cosmetic preparations in terms of texture, color and smell of emulgel from three carrot extract emulgel formulas prepared previously.

Data analysis techniques

The data analysis used by the researchers is a descriptive quantitative data analysis based on a Likert scale, where the highest score is calculated divided by the maximum score for each indicator. Data analysis activities include:

Scoring

Scoring is the process of providing values in the form of numbers as answers to questions to obtain quantitative data. In this study, the scores given are based on the level of responses received from the respondents, namely:

Score 5 I really like

Score 4

Score 3 I don't like

Score 2 I really don't like

Score 1

Tabulation

Tabulation is the process of ordering and comprehensively grouping responses, then calculating and adding them in tabular form.

Analysis of respondents' like measurements

Increase respondents' preferences by calculating the percentage of each question indicator (texture, color, and smell). Using Sugiyono formula, 2010.

$$\% = \frac{number\ of\ points\ scored}{maximum\ number\ of\ points}\ x\ 100\%$$

Range of respondents' preference scale:

1. 81–100% really like
2. Like 61–80%
3. Quite a bit 41–60%
4. 21–40% dislike
5. 0–20% dislike at all

Results and Discussion

Preparation of carrot extract (Daucus carota L)

Carrot extract was prepared from 6 kg carrots and 2200 ml of 95% ethanol with a soaking time of 7 days, yielding 63 grams of extract. The obtained carrot extract is used as an antioxidant.

The characteristics of the physical properties of carrot extract after filtering in the form of organoleptics (consistency, smell, color) are presented in Table 2.

Table 2. Physical properties of carrot extract (Daucus carota L)

Sediaan	**Organoleptis**		
	Konsistensi	**Bau**	**Warna**
Ekstrak Wortel	Kental	Khas wortel	Coklat Tua

From the data in the table, it is known that the prepared carrot (Daucus carota L) extract is thick in consistency because it undergoes a separation process between the solvent and the extract during the rotation process. The smell of the resulting extract is typical of carrot and is dark brown in color, the color change in the extract occurs because oxidation takes place from the crushing process to the extraction process.

Procedure for Preparation of Carrot (Daucus carota L) Extract Emulgel

To prepare the emulgel from carrot (Daucus carota L) extract, all the ingredients of oil phase (stearicum acid, paraffin, nipasol, cetil alcohol) are melted in an evaporator beaker over a water bath. The water phase is prepared by dissolving nipagin in hot water, using hot water according to the solubility of nipagin and then adding TEA. Place the oil phase in a mortar and grind until homogeneous. Gradually add the water phase, then add carrot extract (Daucus carota L) and finally add alcohol to taste.

Emulgel physical properties test results

After the emulgel was prepared, the physical form of the emulgel was tested. The aim was to determine the possibility of changes in physical properties during storage (4 weeks) using different amounts of carrot extract (Daucus carota L) F1 5%, F2 10% and F3 15%. The results of the emulgel physical form test include organoleptics, homogeneity, pH and spreadability.

A. Organoleptic test

Organoleptic analysis was performed by observing changes in shape, odor and color of emulgel preparations containing different variations of carrot extract (Daucus carota L). Observations were made every week during the four weeks of storage. The results of the organoleptic test can be found in the following table:

Table 3: Organoleptic test results of carrot extract emulgel (Daucus carota L)

No	Formulasi	Organoleptis	Minggu ke			
			I	II	III	IV
1	F1	Bentuk Warna Bau	Kental Kuning kecoklatan Khas wortel	Kental Kuning kecoklatan Khas wortel	Kental Kuning kecoklatan Khas wortel	Kental Kuning kecoklatan Khas wortel
2	F2	Bentuk Warna Bau	Kental Coklat Khas wortel	Kental Coklat Khas wortel	Kental Coklat Khas wortel	Kental Coklat Khas wortel
3	F3	Bentuk Warna Bau	Kental Coklat tua Khas wortel	Kental Coklat tua Khas wortel	Kental Coklat tua Khas wortel	Kental Coklat tua Khas wortel

The organoleptic examination was done by direct observation of the emulgel preparation for 4 weeks. The observations were done for 4 weeks because by that time the changes occurred in the emulgel were already evident. The parts observed include color, shape and smell of the emulgel preparation. In the first to fourth week, the form of each formula did not change in shape and smell but in the color observation from the first to the fourth week of each formula (F1, F2, F3) there were differences where F1 was brownish yellow, F2 brown, F3 is dark brown, this is due to differences in carrot extract content.

B. Homogeneity Test

The homogeneity test is done to determine whether the preparation has been made homogeneous or not. The examination is done by placing a small amount of emulgel between 2 glass objects and then holding the glass against the light, no coarse grains should be visible. The results of the homogeneity test are shown in the following table:

Table 4. Results of the homogeneity test for carrot extract emulgel (Daucus carota L)

No	Formulasi	Minggu ke			
		I	II	II	V
1	F1	Homogen	Homogen	Homogen	Homogen
2	F2	Homogen	Homogen	Homogen	Homogen
3	F3	Homogen	Homogen	Homogen	Homogen

The purpose of the homogeneity test is to find out whether the active ingredient and additives are well mixed. Based on the data contained in the table, it is evident that each formula is homogeneous and no coarse grains are visible. This shows that variations in the carrot extract content do not affect the homogeneity of the carrot extract emulgel.

C. Test the pH

The purpose of the emulgel pH test was to find out whether the preparation prepared by the author meets the pH requirements for standard emulgel, namely in the range of 4 to 7. The pH test is carried out using a pH meter. The results of the pH measurements for each emulgel formulation are as follows:

Table 5. Results of pH tests for carrot extract emulgel (Daucus carota L)

No	Formulasi	Minggu ke				Rata-rata
		I	II	III	IV	
1	F1	4,50	4,46	4,38	4,27	4,40
2	F2	4,47	4,45	4,34	4,23	4,37
3	F3	4,44	4,42	4,30	4,20	4,34

D. Spreadability test

Weigh (350 mg) of Emulgel on a glass plate (10 x 5 cm). Another glass plate (10 x 5 cm and 5.8 ± 1 g) was dropped from a distance of 5 cm. The diameter of the spreading circle was measured after 1 minute (V. Naga Sravan et al, 2014, based on the spreading are given in Table 6).

Tabel 6. Jenis gel berdasarkan penyebaran (Dignesh, 2012)

Jenis gel	Pengukuran (cm)
Gel cair	Lebih dari 2,4
Gel semi-cair	1.9-2.4
Gel semi kaku	1.9-1.6
Gel kaku	1.6-1.4
Gel sangat kaku	Kurang dari 1,4

The results of measuring the spreadability of each emulgel formulation are shown in Table 7 below:

Table 7. Results of spreadability tests of carrot extract emulgel (Daucus carota L)

No	Formulasi	Minggu ke				Rata-rata
		I	II	III	IV	
1	F1	2,23	2,29	2,30	2,37	2,30
2	F2	1,97	2,01	2,14	2,19	2,08
3	F3	1,94	1,98	2,02	2,10	2,01

Hedonic Test Results

A. Hedonic Test on Texture of Carrot Extract Emulgel Preparations

The hedonic test on texture of carrot extract emulgel preparation was conducted by making direct observations on the three preparation formulas as test samples. High level of liking represents the texture appearance that panelists liked the most and can be observed in Table 8.

Table 8. Hedonic Test on Texture of Carrot Extract Emulgel Preparations

Panelis	Sampel		
	1	2	3
P1	5	4	3
P2	3	4	2
P3	2	3	4
P4	2	2	5
P5	3	3	2
P6	2	2	3
P7	4	3	2
P8	4	5	4
P9	3	3	3
P10	3	2	2
P11	5	5	5
P12	4	4	3
P13	3	2	5
P14	4	3	3
P15	3	2	2
P16	4	3	4
P17	4	4	4
P18	3	3	3
P19	4	3	4
P20	3	2	3
Skor Total	**68**	**66**	**62**

Information :

P = Panelist

Likeness level 1 = Strong dislike

Likeness level 2 = Dislike

Likeness level 3 = Moderate/Neutral

Likeness level 4 = Like

Likeness level 5 = Like very much

From the panelists' responses to three samples of carrot extract emulgel based on the texture of the preparation, it was found that Sample 1 received the highest total score compared to the other two samples, namely 68, which when converted into a liking level is in the "like" category as stated according to Sugiyono, 2010. Also for ranks 2 and 3, Samples 2 and 3 received scores of 64 and 62, respectively, meaning that both samples were in the "like" category.

B. Hedonic color test of carrot extract emulgel preparation

The hedonic color test was conducted by direct observation of the three test sample preparations. A high level of liking represents the color representation most frequently chosen by the panelists, which can be seen in Table 9.

Table 9. Hedonic color test of carrot extract emulgel

Panelis	**Sampel**		
	1	**2**	**3**
P1	4	3	2
P2	3	4	2
P3	2	3	4
P4	2	2	5
P5	3	3	2
P6	2	2	3
P7	4	3	2
P8	4	5	4
P9	3	3	3
P10	3	2	2
P11	5	5	5
P12	4	4	3
P13	3	2	4
P14	4	3	3
P15	3	2	2
P16	4	3	4
P17	4	4	4
P18	3	3	3
P19	4	3	4
P20	23	2	3
Skor Total	**67**	**62**	**60**

Information :

P = Panelist

Likeness level 1 = Strong dislike

Likeness level 2 = Dislike

Likeness level 3 = Moderate/Neutral

Likeness level 4 = Like

Likeness level 5 = Like very much

From the panelists' responses to three samples based on the color of the preparation, it was found that Sample 1 received the highest total score compared to the other two samples, namely 67, which, when converted to a liking level according to Sugiyono, 2010, is in the "like" category, just like the other sample is Sample 2, each of which is in the "like" category.

C. Hedonic test on the smell of carrot extract emulgel preparations

The hedonic test or assessment of the smell of preparations is carried out by directly observing the three preparations as test samples. A high level of liking represents the odor presentation that the test participants liked the most, which can be seen in Table 10.

Table 10. Hedonic odor test of carrot extract emulgel preparations

Panelis	**Sampel**		
	1	**2**	**3**
P1	5	5	4
P2	4	5	3
P3	5	4	4
P4	4	4	4
P5	4	3	5
P6	5	3	3
P7	4	4	3
P8	5	4	5
P9	3	3	3
P10	3	2	2
P11	5	5	5
P12	5	5	3
P13	5	5	2
P14	3	3	3
P15	3	2	2

P16	5	5	5
P17	3	4	3
P18	4	3	4
P19	4	5	4
P20	3	3	5
Skor Total	**82**	**77**	**72**

Information :
P = Panelist
Likeness level 1 = Strong dislike
Likeness level 2 = Dislike
Likeness level 3 = Moderate/Neutral
Likeness level 4 = Like
Likeness level 5 = Like very much

Based on the panelists' responses to three samples of carrot extract emulgel based on the smell of the preparation, it was found that sample 15 received the highest total score compared to the other two samples, namely 82, which when converted into a liking level, was in the "very like" category, while the other samples were in the "like" category according to Sugiyono, 2010.

D. Hedonic test summary of each test component

The results of each sample on the three criteria are shown in tabular and diagrammatic form in the following table:

Table 11. Summary of hedonic tests

PARAMETER	SKOR SAMPEL		
	SAMPEL 1	SAMPEL 2	SAMPEL 3
TEKSTUR	68	66	62
WARNA	67	62	60
BAU	82	77	72
SKOR TOTAL	217	205	194

Conclusion

From the research results, it can be concluded that:

1. Carrot extract (Daucus carota L) can be formulated in the form of emulgel, which has antioxidant properties.

2. Variations in carrot extract content affect the physical properties of each formula (F1, F2, F3).

3. The results of the hedonic test for the three formulas showed that Formula 1 containing 5% carrot extract received the highest score, indicating that the lowest extract concentration was most preferred by the participants.

SUGGESTTION

For further investigation, it is recommended to add preparation test parameters, stimulus tests, and in vitro and in vivo efficacy tests.

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