



Formulation of air Freshener Gel with Carrageenan as Gelling Agent, Lemon Oil as Fragrance and Patchouli Oil as Binder

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Abstract : Freshener is a household product that can release the chemicals they contain into the air and inhaled by consumers which are intended to dampen bad smells inside the room so as to cause the room feels comfortable. Carrageenan is abundant in nature and are expanding when contact to water. The purpose of this research is to determine the ability of carrageenan to be formulated as a air freshener gelling agent with fragrance of lemon oil and binder of patchouli oil.

Gel formulation in the study was made from a mixture of carrageenan and sodium benzoate in distilled water at a temperature of 75oC and then added patchouli and citrus essential oil with a variety of different concentrations of 1%, 2% and 3%, then performed an evaluation form hedonic test gel with 15 panelists , evaporation of a liquid test during 4 weeks of storage.

The results of this study indicate that the best gel formula is the formula A3 with a carrageenan concentration of 3%. Results per cent of total evaporation of liquid air freshener gel formula are respectively 58.45%, 40.46%, 27.55%..

Keywords : Gel, room fragrances, Carrageenan, Orange Oil, Evaporation Test, Test passions.

Introduction

Freshener is a household product that can release the chemicals they contain into the air and inhaled by consumers which are intended to dampen smells bad inside the room so as to cause the room feels comfortable. Forms of freshener on the market there are several types, among others, the solid (used for cabinets and toilets), liquid, spray and gel. Fragrances, gel is usually laid out by hanging or placed in a place ^[1].

Freshener consists of two basic ingredients, namely, fragrances and solvents. Solvents there are two types of water and oil. Fragrances that uses water-based materials are made in the form of a gel ^[2]. Shaped air freshener scent gels have a relatively short stability, yet easy teruarai making it safe for the environment. In addition, the air freshener in gel dosage form is easier in terms of storage and packaging ^[3].

The use of natural polymers / biopolymers as a raw material for medicine is not a new thing. Natural polymers have several advantages such as good water solubility, the ability to expand high, does not produce toxic, has a high biocompatibility and can be broken down by the body. Natural polymer derived from carbohydrates have the potential as raw material for the manufacture of, among others, such as alginate, carrageenan, tragacanth, pectin, xanthan gum, gellan gum, and guar gum ^[4]. Structure of carrageenan can be seen in Figure 1.

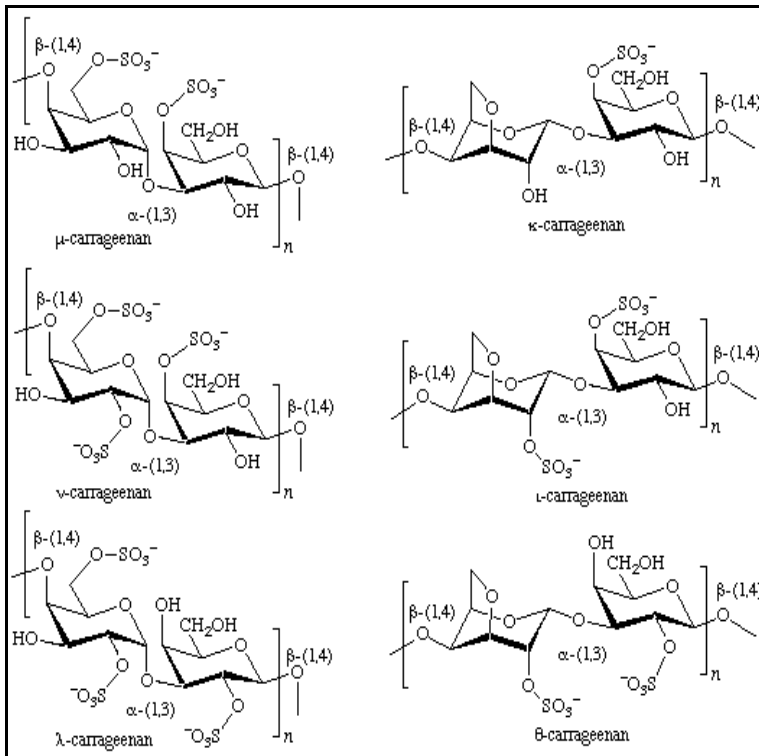


Figure 1. Structure of carrageenan

Based on the above carrageenan has a good gel forming properties so that researchers want to develop the use of carrageenan as a gelling base air freshener that is safe for the environment and can survive for long.

Materials And Methods

This study is experimental that illustrate the characteristics of the air freshener gel with varying concentrations of the carrageenan as gelling agent with citrus oil as fragrance and patchouli oil as binders.

Materials and Tools

The tools used in this research are: Glassware (Iwaki). The materials used in this research are: Carrageenan (Merck), Ethanol (Merck), Distilled Water (Bratachem), Propylene Glycol (Ned Raya), Sodium Benzoate (Bratachem), Patchouli Oil (Agrowindo Sukses Abadi) and Orange Oil (Griff Abadi).

Air Freshener Gel Formula

Several formula of freshener gel formulation with variation of carrageenan concentration can be seen in Table 1.

Table 1. Several formula of freshener gel formulation

Number	Materials	A1 (g)	A2 (g)	A3 (g)
1	Citrus Oil 2%	2.00	2.00	2.00
2	Patchouli Oil 2%	2.00	2.00	2.00
3	Carrageenan	1.00	2.00	3.00
4	Sodium Benzoate 0,1%	0.10	0.10	0.10
5	Propylene Glycol 10%	10.00	10.00	10.00
6	Distilled water	84.90	83.90	82.90
7	Total	100	100	100

Note : A1 : Gel with 1% concentration of carrageenan 1%; A2 : Gel with 2% concentration of carrageenan; A3 : Gel with 3% concentration of carrageenan

Air Freshener Gel Formulation

Distilled water was added to the carrageenan and sodium benzoate and stir until dissolved. The mixture was heated at a temperature of 75°C, stirring, stirring until homogeneous then lowered the temperature to 65°C, propylene glycol is added and stirred. Then added patchouli oil and orange oil, stirring until homogeneous, inserted in the mold and allowed to stand at room temperature^[5].

Hedonic Test

Hedonic test is the test method used to measure the level of preference for products using the assessment form. A minimal amount of panelists in one test is 6 people. According to the National Bureau of Standards (2006) terms panelists were as follows:

- Attracted by the organic test sensory and willing to participate
- Consistent in taking decisions
- Healthy body

A test was conducted to determine the level of panelist preference to air freshener gel preparation that has been made. Testing was performed using 30 panelists by asking each panelist to smell air freshener gels and calculated the percentage of preference for each dosage. It can be concluded that a good formula. The assessment criteria of air freshener gel preparation are shown in Table 2.

Table2. Assessment criteria of air freshener gel preparation

Number	Criteria	Score
1	Very Fragrant	5
2	Fragrant	4
3	Moderate Fragrant	3
4	Less Fragrant	2
5	Not Fragrant	1

Total Liquid Evaporation

Liquid evaporation test of gel preparation is done by weighting the gel weight each week for four weeks. From this test, obtained gel weight loss for every week and a total weight reduction after four weeks of storage. Weight reduction of air freshener gels obtained by calculating the difference in weight of the gel in the previous week (M_{n-1}) with a weight of gel at the time of weighing (M_n), while the total weight loss is (M_4) with weight of gel at the initial time (M_0). The difference in weight is the amount of liquid that evaporates. Percent of total liquid evaporation and percent of residual gel weight was measured by gravimetry and calculated by the formula:

$$\text{Total Liquid Evaporation Percent} = \frac{M_n - M_{n-1}}{M_0} \times 100\%$$

$$\text{Residual Gel Weight Percent} = \frac{M_n}{M_0} \times 100\%$$

Note : M_n : weight of gel at the time of weighing; M_{n-1} : weight of the gel in the previous week; M_0 : weight of gel at the initial time

Results And Discussions

In this study, Carrageenan acts as the main ingredient in the manufacture of gel, distilled water as solvent, propilenglikol as emulsifer, sodium benzoate as a preservative, orange oil as a fragrance, and patchouli oil as a fixative (binder). Carrageenan and sodium benzoate were mixed with distilled water, thus forming a gel mass, is heated at a temperature of 75°C after gel mass is formed, the temperature was lowered to 65°C and

added propylene glycol, then add essential oil, after all the ingredients well mixed homogeneous mass of gel is poured into the mold.

Hedonic Test

A test was conducted to determine the air freshener gel formula that is preferred by the panelists, the test of the 30 panelists were asked to smell the scent of air freshener gels and subsequently asked to fill out the assessment form (questionnaire) that has been provided. The data obtained from the assessment sheet determined the preference value for each preparation by finding the average yield of all the panelists at the 95% confidence level. Overall results of hedonic test at various time intervals and various formulas can be seen in Table 3.

Table3. Results of hedonic test at various time intervals and various formulas

Number	Time	Hedonic Test Results		
		A1 Formula	A2 Formula	A3 Formula
1	W1	Moderate Fragrant	Fragrant	Very Fragrant
2	W2	Less Fragrant	Moderate Fragrant	Fragrant
3	W3	No Fragrant	Less Fragrant	Moderate Fragrant
4	W4	No Fragrant	No Fragrant	Less Fragrant

Note : A1 : Gel with 1% concentration of carrageenan 1%; A2 : Gel with 2% concentration of carrageenan; A3 : Gel with 3% concentration of carrageenan; W1 : first week; W2 : second week; W3 : third week; W4 : fourth week

Hedonic test results data showed that scented of gel air freshener is the most preferred formula A3 with 3% concentration of carrageenan. Formula with a low concentration of carrageenan is less preferred. The higher the concentration of carrageenan then the ability to maintain scented gel formulation to better and more favored. This happens because the smell will be stored by carrageenan which has been expanding into a gel and released slowly so that it can last longer^[6-7].

Percent of Total Liquid Evaporation and Percent of Residual Gel Weight

Total liquid evaporation determined by weighting gel air freshener and calculate weightings for four weeks. Preparations weight were missing an essential oil and water evaporation of gel. Therefore, the major weight loss is inversely with the endurance of the gel^[8-9]. The smaller the weight lost or the greater weight of the remaining mean less volatile oil and water to evaporate, the greater the resistance scented gel^[10-11].

Gel formula has a same initial weight, then for updates every week, calculating the weight loss gel gravimetrically, by calculating the value of the remaining weight percentage of the initial weight of the product. Freshener gel product that has value to the remaining weight percentage of initial weight is higher evaporation means having a smaller, in other words have a higher resistance fragrance. The percentage of residual gel weight of the gel air freshener for 4 weeks is shown in Table 4.

Table4. Percentage of residual gel weight of the gel air freshener

Number	Time	Residual Gel Weight (%)		
		A1 Formula	A2 Formula	A3 Formula
1	W1	85,34	90,44	95,53
2	W2	75,15	80,33	85,28
3	W3	64,02	70,11	79,55
4	W4	41,55	59,54	72,45

Note : A1 : Gel with 1% concentration of carrageenan 1%; A2 : Gel with 2% concentration of carrageenan; A3 : Gel with 3% concentration of carrageenan; W1 : first week; W2 : second week; W3 : third week; W4 : fourth week

Residual gel weight percentage of formula A3 with 3% concentration of carrageenan was the highest, means the ability of formula A3 in maintaining the evaporates substance in a formula better than the formula A1 and A2. This is in line with research that states that carrageenan is a gelling agent that is able to maintain the

content of the gel preparation^[12-13]. Percentage of total liquid evaporation of air freshener gel for four weeks can be seen in Table 5.

Table5. Total liquid evaporation of air freshener gel for four weeks

Number	Formula	Total Liquid Evaporation (%)
1	A1	58,45
2	A2	40,46
3	A3	27,55

Note : A1 : Gel with 1% concentration of carrageenan 1%; A2 : Gel with 2% concentration of carrageenan; A3 : Gel with 3% concentration of carrageenan

The total shrinkage lowest to the highest weight in sequence is the formula A1 is 58.45%, ie 40.46% formula A2, A3 formula that is 27.55%. Formula A1 contains little carrageenan so that evaporation is higher than the melting substances A2 and A3 formulas that contain more carrageenan, and the more a formula containing carrageenan then the slow evaporation of the liquid. Formula A1 is less preferred by the panelists while A2 and A3 preferred by the panelists as more contains carrageenan. From the test results organoleptic test by 30 panelists can be seen that the formula A3 is the most preferred by the panelists and still meet the requirements, namely at a temperature of 35 ° C can last up to 4 weeks^[14-15].

Conclusions

Carrageenan can be formulated as a gelforming base in the preparation of air freshener with fragrance of lemon oil. The concentration of carrageenan as an air freshener with the most preferred base carrageenan and last a long time is a concentration of 3%.

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