Note By Note Cooking Report

Spring Blossom – A Note by Note Fruit Surprise

Advanced Molecular Gastronomy 2024-2025

TFCS9025

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1. AIM

The aim of this project was to create a deconstructed, modernised dessert using molecular gastronomy techniques, combining orange gel, green apple pearls, strawberry pearls, and coconut crumb.

2. INTRODUCTION

Note by Note cuisine is an innovative culinary approach introduced by Hervé This. Unlike traditional cooking, which uses whole foods such as fruits, vegetables , meats etc., Note by Note cooking constructs dishes from pure compounds. This method allows to precisely control texture, flavour, aroma of the dish (This, 2009).

In contrast to molecular gastronomy which deals with whole ingredients but modifies them using scientific techniques, Note by Note cooking goes further by building the food structures entirely from the pure compound and chemical notes that compose flavours and textures. This notion not only expands culinary creativity but also aligns with sustainability by reducing reliance on perishable ingredients (Barham et al., 2010).

The dish for this project is inspired by Note by Note principles, as it focuses on reconstruction of flavour and texture components. The orange gel cubes, apple and strawberry pearls, and coconut crumb were all made through precise applications of food chemistry, rather than traditional culinary methods. For example, the orange gel was formed through agar gelation which is a technique that transforms liquid into a firm, sliceable matrix without relying on natural fruit segments. Similarly, the fruit pearls used spherification to recreate the juicy burst of real fruit using calcium chloride and sodium alginate reactions. The visual and flavour design of the dish was also inspired by the vibrant, fresh colours and sensations of spring. The bright orange, green, red, and white elements reflect blooming flowers, fresh fruits, and light textures typically associated with the season. By constructing the dish in this way, building each component separately before assembly, it reflects the idea of Note by Note cooking which is creating complex food experiences from fundamental sensory elements. The result is a dish that is showcasing how food chemistry can push the boundaries of culinary art while offering new perspectives on flavour design and texture manipulation.

3. MATERIALS AND METHODS

3.1 METHODS

Ingredients required for the orange gel cube are listed in the Table 1.

Table 1: Ingredients for Orange Gel

INGREDIENT	AMOUNT (IN GRAMS)	PICTURE
Water	100 ml	N/A
Sosa Orange Flavour	0.05 gram	
MSK Lemon Flavour	0.05 gram	
Texturas Citras	0.25 grams	
el Granero Fructose	5 grams	
Special Ingredients Agar – Agar(E406)	0.5 grams	

msk Gellan Gum(E418)	0.5 gram	
msk Malic Acid (E296)	0.05 gram	
Sosa Orange Food Colour	0.1 gram	

Table 2: Ingredients for Coconut Crumb

INGREDIENT	AMOUNT (IN GRAMS)	PICTURE
Sosa Maltodextrin	3 grams	
RTC Coconut Oil	2 grams	
Sosa Sorbitol (E420)	0.25 grams	
Salt	0.5 grams	N/A

Table 3 : Ingredients for green apple pearls and strawberry pearls

INGREDIENT	AMOUNT (IN GRAMS)	PICTURE
Water	150 grams	N/A
Green apple aroma	0.1 grams	
Mallard ferriere Green Coloring(102 and E133)	0.05 grams	
msk Malic Acid(E296)	0.2 grams	
el Granero Fructose	3.5 grams	
Sosa Pectin(E440)	1 gram	
msk Sodium Alginate(E401)	2 grams	

For strawberry pearls – *Mallard ferriere* Red coloring(contains 102 and E133)	0.05 grams	
msk Strawberry flavour	0.2 grams	
For calcium Bath		
msk Calcium Chloride(E509)	0.5 gram	
Water	150 ml	N/A

Table 4: Equipment used in preparation of each recipe presented below

Equipment	Purpose
Whisk	Used for mixing ingredients
Mixing bowl	Used for combining liquids and powders
Immersion Blender	Used for thoroughly blending mixtures
Saucepan	Used to heat and boil the gel mixture
Measuring spoons	Used for accurate ingredient measurements and shape formation
Ladle	Used to create shapes
Strainer	Used for separating solidified spheres from liquid baths
Metal Textura Spoons	Used for handling delicate gels and spherifications
Silicone moulds	Used to set orange gel in uniform shape

3.2 METHODS

3.2.1 Orange Gel

To make the orange gel cubes, distilled water was mixed with orange flavouring, lime flavouring, citras, and orange colour along with fructose for sweetness and malic Acid for a hint of tartness in the amounts given in Table 1. Once the flavour was balanced, agar-agar and gellan gum were whisked in to help the mixture set into a gel. The mixture was then brought to a boil as given in Figure 1. After boiling, it was poured into a silicone mould and left to set at room temperature. Once fully set, the gel was cut into small cubes, ready to be plated as one of the main elements.

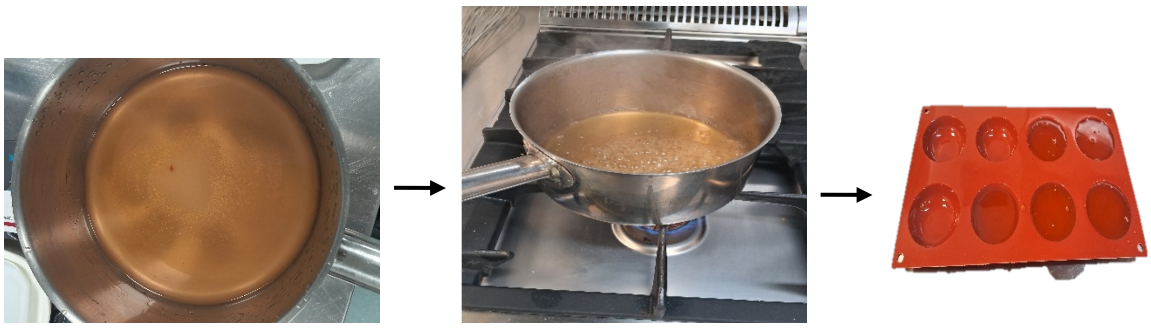


Figure 1: Preparation of Orange Gel

3.2.2 Coconut Crunch Crumb

For the coconut crumb**,** maltodextrin was combined with coconut oil (in the amounts given in Table 2) in a dry bowl and stirred until the mixture turned into a light, dry crumb. Maltodextrin was used to absorb coconut oil and create a dry, crumbly texture, a technique commonly used in modernist cooking to turn fats into powders (Lopez-Alt, 2011). Fructose was added for sweetness, along with a small pinch of salt to enhance the flavour. This crumb served as the base of the dish, adding texture and a rich coconut taste.

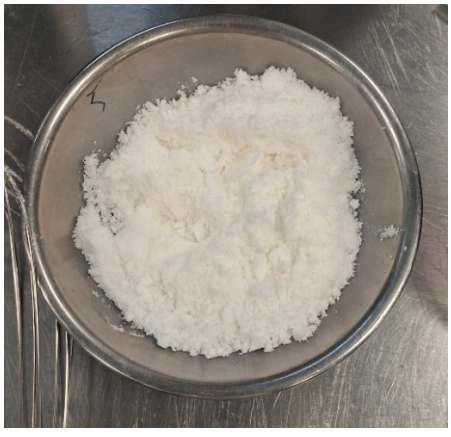


Figure 2: Preparation of Coconut Crumb

3.2.3 Apple and Strawberry Pearls

Sodium alginate and calcium chloride were used for the spherification, a well-known molecular gastronomy technique (This, 2009).To make the green apple pearls, distilled water was mixed with apple-flavoured components like Green Apple flavouring, Green apple colorant along with Malic Acid and Fructose for a sweet and tart balance as given in Table 3. Pectin and Sodium Alginate were blended into this mix using a hand blender until smooth. The mixture was left to rest for 30 minutes to remove any air bubbles. In the meantime, a calcium bath was made by dissolving Calcium Chloride in 150 ml of distilled water.

The apple-alginate mixture was dropped into this bath, where it underwent basic spherification, a process where the alginate in the flavoured liquid reacts with calcium ions in the bath, forming a gel membrane on the outside of each droplet (Burke and Danaher, 2025a). This technique allows the pearls to hold a soft, liquid core inside a delicate shell.

The strawberry pearls were made using the same method, but with a strawberry-flavoured liquid instead of green apple. This allowed both types of pearls to have their own fruity taste and colour, adding variety to the dish.

Sensory Test: A sensory evaluation was conducted to assess the organoleptic qualities, including colour vibrancy, aroma characteristics, flavour intensity, and overall flavour profile of the dish.

A Google Form survey was created, a QR code was distributed to 10 participants. Each participant was told to observe, smell, and taste the sample. The evaluation was carried out individually, and responses were collected anonymously to ensure an unbiased feedback.

Participants rated attributes such as:

- Colour vibrancy (scale of 0–5)
- Aroma description and intensity
- Sweetness intensity
- Flavour compatibility
- Overall flavour profile

4. RESULTS AND DISCUSSION

Figure 3 shows the final presentation of the dish, made using the Note by Note cooking approach. The dish has a base of coconut crumb, topped with small orange gel cubes, and decorate with green apple, and strawberry pearls.

Figure 3: Spring Blossom – A Note by Note Fruit Surprise

The coconut crumb was made by combining coconut oil with maltodextrin. Maltodextrin can absorb fat and turn it into a dry, crumbly texture. This makes it possible to serve the flavour of coconut oil in a powdery form, without making the dish oily or wet (Myhrvold, Young and Bilet, 2011). The apple and strawberry pearls were made using a technique called basic spherification, where a flavoured liquid containing sodium alginate is dropped into a calcium chloride bath (Burke and Danaher, 2025a). When the alginate touches the calcium, a thin gel forms around the outside, creating a soft membrane with liquid inside. This gives the pearls a juicy, "burst-in-the-mouth" experience. The pearls not only add visual interest but also release fresh fruit flavours when eaten, which adds to the overall sensory effect.

A sensory evaluation was carried out with a group of 10 panelists. The results showed that 60% of the panelists found the dish to be visually vibrant, highlighting the contrast between the orange gel cubes, the colourful fruit pearls, and the white coconut crumb. In terms of aroma, more than half of the panelists described it as fruity and fresh. Moreover, 50 % described the

overall flavour profile as fruity as shown in Figure 4, which corresponds to the use of apple and lime flavourings as well as Citras, enhances tartness and brings out fruit-like notes.

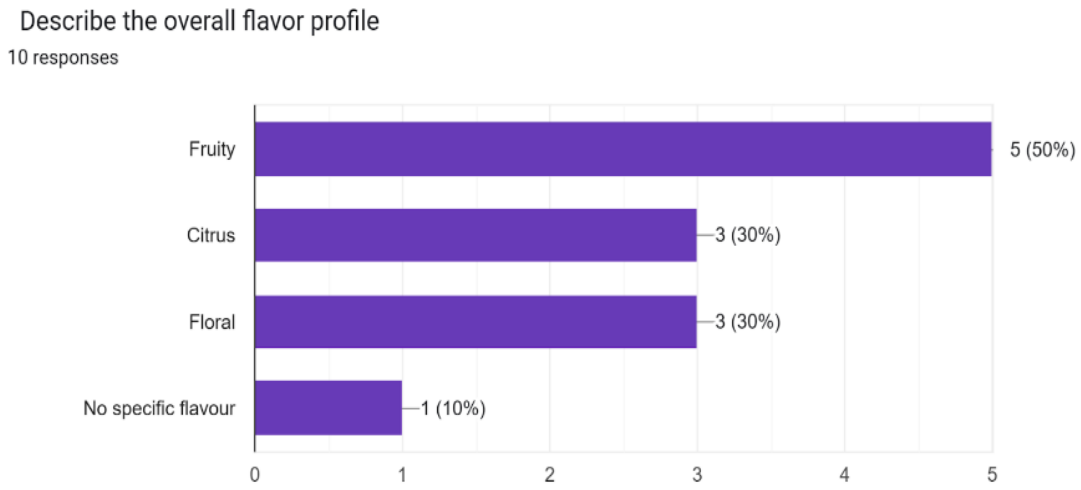


Figure 4: Overall flavour profile

5. Conclusion

The execution of "Spring Blossom – A Note by Note Fruit Surprise" demonstrates how Note by Note cuisine can be used to redefine traditional culinary boundaries through the precise manipulation of pure chemical compounds. Originally conceptualised by Hervé This (This, 2009), this method allow to craft dishes by constructing flavour, texture, and aroma from pure compounds, removing dependency on traditional ingredients.

In this project, spherification and gelation techniques were applied to create individual components with tailored sensory qualities. The orange gel cubes formed through agar and gellan gum gelation illustrate the application of hydrocolloids in textural design (McClements, 2005). The fruit pearls, made via spherification using sodium alginate and calcium chloride, the burst and juiciness of real fruit while being completely synthetic. These methods highlight how food structure can be engineered to meet specific functional and sensory goals (Barham et al., 2010).

Sensory feedback supported the effectiveness of the design of the dish, as participants described it as visually appealing and aromatic. The integration of colour, aroma, and texture demonstrates how multisensory alignment can elevate consumer experience (Auvray and Spence, 2008). Moreover, the sustainability implications of Note by Note cuisine are noteworthy. As global food systems face increasing pressure from climate change, population growth, and supply chain instability, Note by Note cooking presents a solution by increasing the shelf-stable, scalable compounds (This, 2013). In summary, this project has not only fulfilled its goal of creating a deconstructed, flavour-rich dessert through scientific means but also shown the value of Note by Note cuisine as a tool for innovation, sustainability, and multisensory food design.

Recommendations

Based on the sensory evaluation of the note-by-note dish and practical observations, several improvements are recommended for the continued development of *Spring Blossom – A Note by Note Fruit Surprise*. The texture of the orange gel, although improved, remained slightly too firm so therefore, a further reduction in the concentration of agar-agar and gellan gum is suggested to achieve a more delicate consistency. The sweetness level, while balanced for some, was considered mild by other, an increase in fructose, particularly in the orange gel,

could enhance overall flavour appeal without overpowering the citrus notes. To improve flavour harmony, adjusting the ratios of flavour compounds such as citras, malic acid, and fruit essences may help create a more cohesive and pleasant taste.

REFERNCES

- Auvray, M. and Spence, C., 2008. The multisensory perception of flavor. *Consciousness and Cognition*
- Barham, P., Skibsted, L.H., Bredie, W.L.P., Bom Frøst, M., Møller, P., Risbo, J., Snitkjær, P. and Mortensen, L.M., 2010. Molecular gastronomy: a new emerging scientific discipline. *Chemical Reviews*, 110(4), https://doi.org/10.1021/cr900105w
- Burke, R. and Danaher, P. (2025a) 'Gelling', *TFCS9025: Advanced Molecular Gastronomy*. Brightspace, TU Dublin Grangegorman [Accessed 1 May 2025].
- McClements, D.J., 2005. *Food Emulsions: Principles, Practices, and Techniques*. Boca Raton: CRC Press.
- Myhrvold, N., Young, C. and Bilet, M., 2011. *Modernist Cuisine: The Art and Science of Cooking*. Bellevue, WA: The Cooking Lab.
- This, H., 2009. *Molecular Gastronomy: Exploring the Science of Flavor*. New York: Columbia University Press.
- This, H., 2013. *Note-by-Note Cooking: The Future of Food*. New York: Columbia University Press.
- Lopez-Alt, J. K., 2011. *Olive Oil Powder Recipe*. Serious Eats. [online] Available at: https://www.seriouseats.com/olive-oil-powder-maltodextrin-modernist-cuisine-recipe [Accessed 8 May 2025].

LOGBOOKS

MODULE CODE: TFCS 9025

MODULE TITLE: Advanced Molecular Gastronomy

STUDENT NAME: Renuka Sanjay KULKARNI

FOOD PRODUCT: Spring Blossom – A Note by Note Fruit Surprise

WEEK NO.: 01 DATE: 24/03/2025

Weekly Aims and Objectives:-

To prepare:-

Orange Gel Cube – A smooth, citrus-flavoured gel with a slight tang.

Coconut Crunch Crumb – A light, crispy coconut-flavoured crumb for texture.

Green Apple Pearls – Spherified green apple-flavoured spheres bursting with flavour.

Materials and Method (Ingredients, Equipment and Method)

Ingredients

For the Orange Gel Cube:-

INGREDIENT	AMOUNT
Water	100 ml
Orange Flavour	0.05 gram
Lemon Flavour	0.05 gram
Citras	0.25 grams
Fructose	3 grams
Agar – Agar	2 grams
Gellan Gum	1 gram
Malic Acid	0.05 gram
Orange Colour	0.1 gram

For the Coconut Crunch Crumb

INGREDIENT	AMOUNT
Maltodextrin	5 grams
Coconut Oil	1 gram
Sorbitol	1 grams
Salt	0.7 gram

For the Green Apple Pearls:-

INGREDIENT	AMOUNT
Water	150
Green apple flavour	0.1 gram
Green food colouring	0.07 gram
Malic Acid	0.2 gram
Fructose	3.5 grams
Pectin	1 gram
Sodium Alginate	2 grams
For Calcium Bath	
Calcium Chloride	0.5 gram
Water	150 ml

Method:-

Step 1: Prepare the Orange Gel Cube

1. In a saucepan, mix distilled water, Citras, Fructose, and malic Acid, orange flavour, and lemon flavour.
2. Whisk in Agar-Agar and Gellan Gum until fully dissolved.
3. Bring to a boil, then pour into a silicone mold to set at room temperature.
4. Once set, cut into small cubes.

Step 2: Make the Coconut Crunch Crumb

1. In a dry bowl, mix Maltodextrin with Coconut Oil, stirring until a crumbly texture forms.
2. Add sorbitol and a pinch of salt for taste.

Step 3: Prepare the Apple Pearls

1. In a beaker, mix distilled water, Malic Acid, green apple aroma and Fructose.
2. Blend in Pectin and Sodium Alginate using an immersion blender.
3. Let the mixture rest for 30 minutes to remove air bubbles.

Step 4: Prepare the Calcium Bath

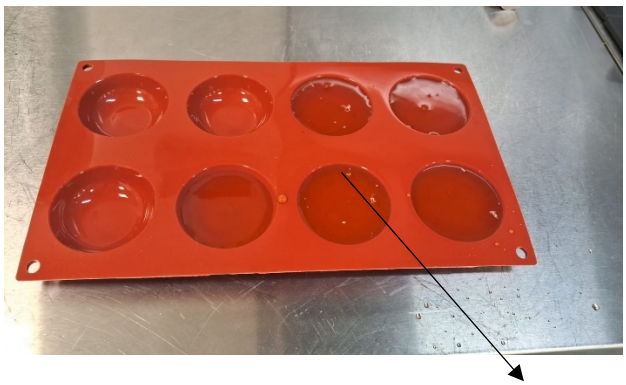
1. Dissolve calcium chloride in 150 ml of distilled water in a bowl.

Step 5: Form the Green Apple Pearls

1. Using a dropper or syringe, carefully drop small amounts of the apple-alginate liquid into the calcium bath.
2. Let the pearls sit for 30–60 seconds.
3. Remove and rinse in clean water.

Results and discussion: The Spring Blossom – A note by note surprise is shown in the following picture with the individual element – coconut crumb and orange gels.

Coconut Crumb



Setting of Orange gel

- The consistency of the orange gel was too firm, likely due to the high concentration of gelling agents (agar-agar and gellan gum). A reduction in these quantities is considered in future trials to achieve a softer, more palatable texture.
- The coconut crumb exhibited a strong, slightly overpowering flavour, which may have resulted from an excessive amount of maltodextrin. Adjusting this ratio could result in a more balanced flavour profile.
- The green apple pearls were larger than intended, which affected both texture and visual appeal. Smaller pearls in varied colours could improve both presentation and mouthfeel.

Recommendations for next week

- Reduce the quantity of gelling agents in the orange gel to create a less rigid texture.
- Use a smaller amount of maltodextrin in the coconut crumb to moderate the intensity of flavour.
- Prepare smaller fruit pearls of different colours for improved aesthetics and refined texture.

MODULE CODE: TFCS 9025

MODULE TITLE: Advanced Molecular Gastronomy

STUDENT NAME: Renuka Sanjay KULKARNI

FOOD PRODUCT: Spring Blossom – A Note by Note Fruit Surprise

WEEK NO.: 02 DATE: 31/03/2025

Weekly Aims and Objectives:-

- To prepare:-

Orange Gel Cube – A smooth, citrus-flavoured gel with a slight tang.
Coconut Crunch Crumb – A light, crispy coconut-flavoured crumb for texture.
Green Apple Pearls: spherified green apple-flavoured spheres, and starawberry flavoured spheres.

- Reduce the amount of gelling agents used to make orange gels.
- Reduce maltodextrin amount in coconut crumb.

Materials and Method (Ingredients, Equipment and Method)

Ingredients

For the Orange Gel Cube:-

INGREDIENT	AMOUNT
Water	100 ml
Orange Flavour	0.05 gram
Lemon Flavour	0.05 gram
Citras	0.25 grams
Fructose	3 grams
Agar – Agar	1 gram
Gellan Gum	1 gram
Malic Acid	0.05 gram
Orange Colour	0.1 gram

For the Coconut Crunch Crumb:-

INGREDIENT	AMOUNT
Maltodextrin	3 grams
Coconut Oil	2 grams
Sorbitol	0.25 gram
Salt	0.5 gram

For the Green Apple Pearls and strawberry pearls:-

INGREDIENT	AMOUNT
Water	150
Green apple flavour	0.1 gram
Green food coloring	0.05 gram
Malic Acid	0.2 gram
Fructose	3.5 grams
Pectin	1 gram
Sodium Alginate	2 grams
For strawberry pearls – Strawberry Red coloring	0.05 gram
Strawberry flavor	0.2 gram
For Calcium Bath	
Calcium Chloride	0.5 gram
Water	150 ml

Method

Step 1: Prepare the Orange Gel Cube

5. In a saucepan, mix distilled water, Citras, fructose, and malic Acid, orange flavour, and lemon flavour.
6. Whisk in Agar-Agar and Gellan Gum until fully dissolved.
7. Bring to a boil, then pour into a silicone mold to set at room temperature.
8. Once set, cut into small cubes.

Step 2: Make the Coconut Crunch Crumb

3. In a dry bowl, mix Maltodextrin with Coconut Oil, stirring until a crumbly texture forms.
4. Add sorbitol and salt for taste.

Step 3: Prepare the Green Apple Pearls

4. In a beaker, mix distilled water, Malic Acid, green apple aroma and Fructose.
5. Blend in Pectin and Sodium Alginate using an immersion blender.
6. Let the mixture rest for 30 minutes to remove air bubbles.

Step 4: Prepare the Calcium Bath

2. Dissolve Calcium Chloride in 150 ml of distilled water in a bowl.

Step 5: Form the Apple Pearls

4. Using a dropper or syringe, carefully drop small amounts of the apple-alginate liquid into the calcium bath.
5. Let the pearls sit for 30–60 seconds (longer for a thicker membrane).
6. Remove and rinse in clean water

Repeat the same procedure as apple pearls for strawberry pearls with strawberry flavouring and food colouring

Result and Discussion

Gelling agents were reduced in amount this week, resulting in a softer and more desirable gel texture compared to the previous batch, however still a bit firm. The product showed improved mouthfeel and less rigidity.

Strawberry-coloured pearls were introduced using Mallard Ferrière Rouge Fraise, enhancing visual appeal through vibrant contrast.

Recommendations for next week

The orange gel remains slightly firm and could benefit from a further reduction in gelling agents. To support development, it is suggested to organize a sensory test to gather structured feedback on texture, flavour, and overall acceptance. An increase in fructose is also recommended to make it the orange gel sweeter. Also, a slight increase in green food colouring to improve the visual appeal is suggested.

MODULE CODE: TFCS 9025

MODULE TITLE: Advanced Molecular Gastronomy

STUDENT NAME: Renuka Sanjay KULKARNI

FOOD PRODUCT: Spring Blossom – A Note by Note Fruit Surprise

WEEK NO.: 03 DATE: 07/04/2025

Weekly Aims and Objectives:-

- To prepare:-

Orange Gel Cube – A smooth, citrus-flavoured gel with a slight tang.
Coconut Crunch Crumb – A light, crispy coconut-flavoured crumb for texture.
Green Apple Pearls – Spherified green apple-flavoured spheres and starawberry flavoured spheres.

- Reduce the amount of gelling agents used to make orange gels
- Increase the green food colouring for a more appealing colour
- Increase fructose in orange gel to make the gel sweeter.

Materials and Method (Ingredients, Equipment and Method)

Ingredients

For the Orange Gel Cube:-

INGREDIENT	AMOUNT
Water	100 ml
Orange Flavour	0.05 gram
Lemon Flavour	0.05 gram
Citral	0.25 grams
Fructose	5 grams
Agar – Agar	0.5 gram
Gellan Gum	0.5 gram
Malic Acid	0.05 gram
Orange Colour	0.1 gram

For the Coconut Crunch Crumb

INGREDIENT	AMOUNT
Maltodextrin	3 grams
Coconut Oil	2 grams
Sorbitol	0.25 gram
Salt	0.5 gram

For the Apple Pearls

INGREDIENT	AMOUNT
Water	150
Green apple flavour	0.1 gram
Green food colouring	0.07 gram
Malic Acid	0.2 gram
Fructose	3.5 grams
Pectin	1 gram
Sodium Alginate	2 grams
For strawberry pearls – Strawberry Red coloring	0.05 gram
Strawberry flavour	0.2 gram
For Calcium Bath	
Calcium Chloride	0.5 gram
Water	150 ml

Method:-

Step 1: Prepare the Orange Gel Cube

9. In a saucepan, mix distilled water, Citral, Fructose, and Malic Acid, orange flavour, and lemon flavour.
10. Whisk in Agar-Agar and Gellan Gum until fully dissolved.
11. Bring to a boil, then pour into a silicone mold to set at room temperature.
12. Once set, cut into small cubes.

Step 2: Make the Coconut Crunch Crumb

5. In a dry bowl, mix Maltodextrin with Coconut Oil, stirring until a crumbly texture forms.
6. Add sorbitol and a pinch of salt for taste.

Step 3: Prepare the Apple Pearls

7. In a beaker, mix distilled water, Malic Acid, green apple aroma and Fructose.
8. Blend in Pectin and Sodium Alginate using an immersion blender.
9. Let the mixture rest for 30 minutes to remove air bubbles.

Step 4: Prepare the Calcium Bath

3. Dissolve Calcium Chloride in 150 ml of distilled water in a bowl.

Step 5: Form the Apple Pearls

7. Using a dropper or syringe, carefully drop small amounts of the apple-alginate liquid into the calcium bath.
8. Let the pearls sit for 30–60 seconds (longer for a thicker membrane).
9. Remove and rinse in clean water

Repeat the same procedure as apple pearls for strawberry pearls with strawberry flavouring and food colouring

A Google Form-based sensory analysis survey was conducted to evaluate the taste, aroma, and overall flavour profile of the note-by-note dish. Participants accessed the survey using the QR code provided below, which allowed for easy and direct participation in the feedback process.

Results and Discussions

- Colour Vibrancy: 60% of participants rated the colour as 4 (out of 5), and 20% rated it as 5, indicating strong visual appeal. This suggests the strawberry colour pearls were well-received.
- Aroma Description: The most common description was "fruity" (50%), followed by “fresh” and “no specific aroma” (both 30%).
- Aroma Intensity: Most respondents rated the aroma between 2 and 3, suggesting a mild to moderate aroma, with some room for improvement in aromatic strength.
- Sweetness Intensity**:** Responses were spread between levels 1–4, with most choosing 2 or 3. This indicates a balanced but light sweetness, which may suit the fruity profile but could be adjusted depending on the target preference.
- Flavour Compatibility: 60% rated the flavour pairing at 3 or 4, while only 10% felt the flavours were perfectly complementary (score 5). One response rated it low (1), suggesting flavour harmony could be further refined.
- Overall Flavour Profile: “Fruity” was the most selected (50%), followed by equal votes for “citrus” and “floral” (30% each), confirming the intended flavour direction was achieved.

Conclusion

The sensory feedback indicates that the dish had strong visual appeal and a recognizably fruity, citrus-forward profile. However, aroma intensity and flavour harmony had moderate scores, suggesting these aspects could be optimized further. Adjusting the balance of aromatic compounds and fine-tuning the flavour blend may enhance sensory impact in future trials.