



**TFCS4025 Molecular Gastronomy 2 Assignment**

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**Due Date: 13<sup>th</sup> January 2020**

## **Introduction:**

### **What is molecular gastronomy?**

Molecular gastronomy is also known as the science of cooking and is concerned with the physical and chemical changes that occur during the cooking of food. It was first introduced as 'molecular and physical gastronomy' in 1988 by Hervé This, a physical chemist and Nicholas Kurti, a former professor of physics at the University of Oxford. The pair were interested in the events that occurred in food during culinary processes.

(Encyclopedia Britannica., 2020).

Although food science had existed for centuries, it was more focused on the nutritional properties of food as well as industry production and the chemical composition of ingredients. Molecular gastronomy focuses on the culinary transformations that occur during cooking to food, why they happen, for example why does mayonnaise thicken, and the sensory phenomena experienced eating it. It also aims to discover new methods of cooking foods with their roots based in science. These are called molecular cooking and the dishes they produce are known as molecular cuisine.

(Kitchen Theory | Gastrophysics & Multisensory Dining.,2020).

In the beginning, molecular gastronomy involved modelling recipes testing 'old wives tales' now known as precisions and inventing new recipes, ingredients and tools in the kitchen. However it has now been given a more defined definition involving two parts. The first part deals with the definition of dishes, for example jam is made when fruit is boiled with sugar, whilst the second deals with the 'old wives tales' or culinary precisions as they are now known.

(Scienceofcooking.com., 2020).

(This, H. ,2012).

### **Note by note cooking**

Note by note cooking is a style of cooking based on molecular gastronomy developed by Hervé This. Dishes are created using pure compounds instead of plant and animal tissues. Traditional ingredients such as vegetables and meat are replaced by their chemical constituents like amino acids which then can be used to create a vast number of dishes with different textures and flavours.

(Chandran, N.,2020).

(This, H., 2012).

Traditional dishes such as steak can be made as well as designing brand new ones. According to This, this novel cooking method prevents food spoilage, can feed more people and save energy.

(Kitchen Theory | Gastrophysics & Multisensory Dining., 2020).

(Monitor, T., 2020).

### **Pectin and the Gelling of Pectin**

Pectin is a polysaccharide carbohydrate found in apples, berries and other fruits. It is found in the cell walls of the fruits and is used as a setting agent in jellies and jams. There are two main types of pectin- high methoxyl otherwise known as rapid set pectin and low methoxyl otherwise known as slow set pectin. Rapid set pectin is best suited to marmalades and jams whilst slow set is best suited to clear jellies.

(Sciencedirect.com., 2020).

(The Spruce Eats., 2020).

### **Aims and Objectives:**

The aim of this assignment was to research pectin and sugar substitutes and using that knowledge and the knowledge gained throughout the module develop a dishing using pectin that had the lowest sugar content possible.

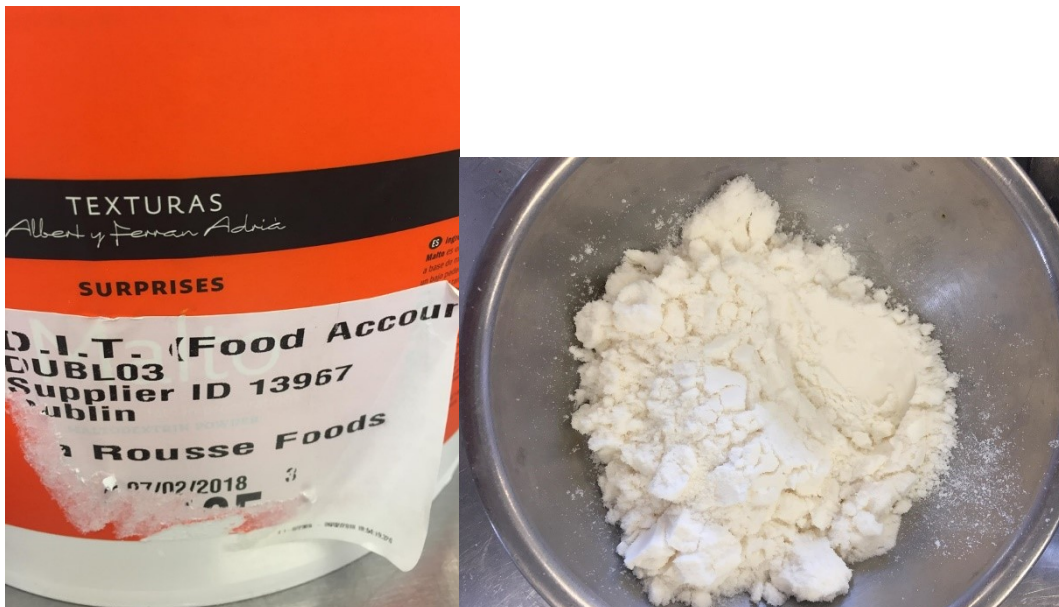
The dish I chose to create was a variation of the classic jelly and ice cream, using agar and pectin to set the jelly and maltodextrin to create the 'ice cream' component.

## Materials and Methods:

### Equipment:

- 3 mixing bowls
- 3 tablespoons
- 2 teaspoons
- 1 small saucepan
- 1 large saucepan
- 1 whist
- 1 large tray
- Weighing scales (Salter Measuring Scale)
- Silver Crest Micro Scales
- 5cm circle cutter
- Blast chill fridge
- White serving plate

### Ingredients:



**Maltodextrin- Texturas Albert y Ferrandria, Tapioca Maltodextrin**



**Freeze Dried Strawberries**



**Agar- Texturas Albert y Ferrandria, Agar Powder**



**100% Cocoa Powder, Valrhona**



**Rapid Set Pectin, Louis Francois**

## Recipes

### Strawberry Jelly

- 300ml water
  - 48g fructose
  - 3g malic acid
  - 30g crushed dried strawberries
  - 3 drops red food colouring
  - 6g rapid set pectin
  - 3.8g agar
1. Weigh out ingredients.
  2. Add to a saucepan and slowly bring to the boil, stirring often.
  3. Remove from heat and pour into a large tray.
  4. Leave in the blast chill to set.

### Ice Cream and Chocolate Flake

- 50g maltodextrin
  - 20g clarified butter
  - 1 drop pure vanilla extract
  - 5g pure cocoa powder
1. Melt butter in a small pan.
  2. Once melted, remove solids to make clarified butter.
  3. Weigh out 20g maltodextrin.
  4. Add butter and vanilla extract and mix.
  5. Split the mix into two bowls.
  6. Add one drop of the vanilla to one bowl and mix. Add the cocoa powder to the other.

Once the jelly has set, remove it from the blast chill. Cut out 5cm circles, then line the mould with Perspex paper. Layer the circles in the mould on the serving plate with the vanilla flavoured maltodextrin mix in between them as the 'ice cream' component. Remove the mould and Perspex paper. Sprinkle the cocoa flavoured maltodextrin mix on top as the

**Results:**



**Figure 1**

Figure 1 shows the earliest stage of the dish in week 2. It was after this I decided I needed to add more to it and therefore came up with the ‘ice cream’ component.



**Figure 2 and 3**

Figure 2 and 3 are images of the final dish. It was served on a white plate with the ‘jelly and ice cream’ stack served in the middle and the ‘flake’ sprinkled around it. The white plate was used as the red colour of the jelly and brown chocolate colour of the flake stood out starkly against it in contrast.



### Sensory Analysis of ‘Jelly and Ice Cream’:

Those part taking in this sensory test were asked to rate the dish from 1 to 10 under the headings colour, taste, texture, overall appearance and aroma. 1 being the lowest rating and 10 being the highest. The results are represented on the table below.

**Figure 3- Sensory Analysis Results**

<b>Colour</b>	<b>Taste</b>	<b>Texture</b>	<b>Overall Appearance</b>	<b>Aroma</b>
6	7	5	8	9
8	7	4	7	9
7	6	4	7	8
8	5	5	8	6
6	5	6	9	7
8	8	3	7	9
9	6	4	6	7
7	6	4	8	8
6	6	5	8	8
9	7	6	7	8
<b>Average</b>	<b>Average</b>	<b>Average</b>	<b>Average</b>	<b>Average</b>
<b>7.4</b>	<b>6.3</b>	<b>4.6</b>	<b>7.5</b>	<b>7.9</b>

### Discussion:

Initially I found this assignment difficult. Having never worked with pectin before and having little interaction with sugar substitutes such as sweeteners, I had to research the topic to find out more. Getting around the concept of working with pure compounds instead of food also took some time as its something I’m not used to. However, after researching online some more about note by note cooking, pectin and sugar substitutes it became easier.

Various recipes with different modifications of the strawberry jelly were prepared over the four weeks to get the correct colour, flavour and texture. Initially I tried to obtain the red colour from the crushed freeze dried strawberries, however I couldn’t obtain a deep enough colour so food colouring was added to the recipe. I needed a more set jelly to be able to cut out the disc shapes and stack them on top of each other with the maltodextrin ‘ice cream’.

Eventually I came to the conclusion that adding 1% agar to the solution would allow the mix to set to the consistency I needed.

To achieve the texture I needed for the ice cream and flake was initially done through trial and error, adding the clarified butter to the maltodextrin 2g at a time. The resulted texture was able to be compacted into the mould between the layers of jelly to create the ice cream constituent of the dish and also crumbly enough to act as a broken flake on top.

Overall the dish was eye catching with the red jelly being a stark comparison in colour to the white plate, flake and white vanilla flavoured maltodextrin. The jelly had a nice strawberry flavour coming through and the malic acid gave it a sharpness which contrasted well with the ice cream and flake. The texture was set although still a little slimy something which could be worked on and this was reflected in the sensory analysis results as it received the lowest rating. I believe this was from the agar present in the mix so perhaps using something a different type of pectin to try obtain how set the jelly needed to be would be an idea if continuing this project further. The freeze dried strawberries gave a great aroma along with the vanilla used in the maltodextrin. I would like to work on the flake component to get it slightly chocolateier in flavour however the texture worked really well.

### **Conclusion:**

The aim of this assignment was to create a dish using pectin and low sugar substitutes and this was achieved. Throughout the four weeks, my knowledge of note by note cooking, pectin and sugar substitutes was expanded as the knowledge gained through researching the topics was put into practice. The dish of 'Jelly and Ice Cream' presented well on the plate and through sensory analysis it was determined that texture would be one of the key things to work on if ever carrying on with this project.

## References:

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## **Appendices:**

### **Log Book Week 1**

#### **Aims:**

The aims for week 1 was to extract pure pectin from the rind of lemons as there was none available.

#### **Materials and Methods:**

##### **Equipment**

- Chopping board
- Knives
- 2 bowls
- Large saucepan
- Measuring jug

##### **Recipe**

- 225g lemon rind
  - 60ml lemon juice
  - 480ml water
1. Remove peel from lemons.
  2. Slice white pith from lemon rind and chop into small pieces.
  3. Combine the pith with the lemon juice and leave to stand for 2 hours.
  4. Add water and leave to stand for another hour.
  5. Bring the mix to the boil over a high heat.
  6. Reduce heat and let simmer for 15 minutes.
  7. Remove from heat and allow to cool.
  8. Strain mix through several layers of cheesecloth. The pectin is now ready to use.

#### **Results:**

For the amount of lemon rind used and the amount of time and effort the pectin took to prepare, there was very little pectin produced.

#### **Recommendations:**

Try to obtain pure pectin as it is very labour some to produce.

## **Log Book Week 2**

### **Aims:**

The aim for week 2 was to test various pectins with low sugar substitutes to try and obtain a gel set enough for my dish. Flavour compounds were also experimented with to get the flavour of the jelly.

### **Materials and Methods:**

#### **Equipment**

- 5 mixing bowls
- 5 tablespoons
- 5 saucepans
- Silver Crest micro scale
- 5 trays

#### **Recipe**

- Water
  - Fructose
  - Maltose
  - Malic acid
  - Crushed dried strawberries
  - Drops red food colouring
  - Rapid set pectin
1. Mix ingredients in a pan in various concentrations to determine the optimum one.
  2. Bring each to the boil.
  3. Pour into trays and allow to set.

### **Recommendations:**

The jellies produced were not set enough needed for the dish. For next week's class, adding other gelling agents like agar will hopefully help to set the gel. It was discovered that the best way to obtain the strawberry flavour was to use blitzed freeze dried strawberries so they were added to the recipe for next week.

## **Log Book Week 3**

### **Aims:**

The aim for this week was to add other gelling agents to the jelly mix to make it more set.

### **Material and Methods:**

#### **Equipment**

- 5 mixing bowls
- 5 tablespoons
- 5 saucepans
- Silver Crest micro scale
- 5 trays

#### **Recipe**

- Water
  - Fructose
  - Maltose
  - Malic acid
  - Crushed dried strawberries
  - Drops red food colouring
  - Rapid set pectin
  - Agar
4. Mix ingredients in a pan in various concentrations to determine the optimum one.
  5. Bring each to the boil.
  6. Pour into trays and allow to set.

#### **Recommendations:**

Adding a 1% concentration of agar to the jelly mix will help it to be more set for the final dish next week.

## **Log Book Week 4**

### **Aims:**

The aim of this week was to create all elements of the final dish and serve them together.

### **Materials and Methods:**

#### **Equipment:**

- 3 mixing bowls
- 3 tablespoons
- 2 teaspoons
- 1 small saucepan
- 1 large saucepan
- 1 whist
- 1 large tray
- Weighing scales (Salter Measuring Scale)
- Silver Crest Micro Scales
- 5cm circle cutter
- Blast chill fridge
- White serving plate

### **Recipes**

#### **Strawberry Jelly**

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  - 3g malic acid
  - 30g crushed dried strawberries
  - 3 drops red food colouring
  - 6g rapid set pectin
  - 3.8g agar
5. Weigh out ingredients.
  6. Add to a saucepan and slowly bring to the boil, stirring often.
  7. Remove from heat and pour into a large tray.
  8. Leave in the blast chill to set.

## Ice Cream and Chocolate Flake

- 50g maltodextrin
  - 20g clarified butter
  - 1 drop pure vanilla extract
  - 5g pure cocoa powder
7. Melt butter in a small pan.
  8. Once melted, remove solids to make clarified butter.
  9. Weigh out 20g maltodextrin.
  10. Add butter and vanilla extract and mix.
  11. Split the mix into two bowls.
  12. Add one drop of the vanilla to one bowl and mix. Add the cocoa powder to the other.

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