Note by Note Cooking

A Dish Reminiscent of Black Forest Gateaux (Schwarzwälder Kirschtorte)

Incorporating an isomalt dome with a crisp and crunchy texture and honeycomb providing a crunchy and crackling texture.

By

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Background

Note-by-note cooking was first proposed in the 1990's by Hervé This. In an article in Scientific American (1994) he laid out the fundamental principles of Note by Note cooking. This initial article wrote about adding chemical compounds to food to improve the quality, such as adding vanilla extract (chemical compound vanillin) to cheap whiskey to add a more rounded and aged flavour. Later in 1994 continuing on from this initial idea This asked the question *"Why not make foods out of compounds?",* creating the concept of note-by-note cooking (This, 2014).

In 2009 Pierre Gagnaire became the first chef to produce an entirely note-by-note dish, known as "Note-by-Note No.1". This was the result of This persuading Gagnaire in 2006 to pursue the idea. This assisted and advised Gagnaire prior to the dishes eventual execution, as the main obstacle with note-by-note cooking for classically trained chefs is the prospect of having to learn note-by-note cooking. The ingredient list for a note-by-note dish being more familiar to a chemist than a chef. Chefs must become familiar with chemical compounds and their numerous applications in the context of cooking.

The idea of note-by-note cooking is met with a degree of scepticism by some. A review of This's book "Note-by-Note Cooking" by Los Angles Review of Books (2015) stated that note-by-note cooking is *"a chem-lab trick that produces marvels rather than meals*". Along with this today's trend of "clean labelling", where by food contains natural and familiar ingredients appears to be the polar opposite of note-by-note cooking. A note-by-note dish may use ingredients such as beta carotene and tartaric acid, to those not familiar with food chemical composition these would appear as unfamiliar and perhaps harmful ingredients. The reality being that both are naturally present in numerous plants and all food is comprised of chemical compounds.

Chemophobia (the fear of chemicals) is very much present in today's society. The rise of the internet has allowed consumers to become significantly more informed. Today anyone can publish an article online claiming the dangers of chemical ingredients in food and make misleading associations. Paracelsus a Swiss alchemist, physician and astrologer stated in his Third Defence in 1538 that *"All things are poison, and nothing is without poison, the dosage alone makes it so a thing is not a poison" (Deichmann et al., 1986).* This quote puts the fear of chemicals and their danger into perspective, that if you were to drink a large enough quantity of water it too can be a fatal poison!

The brief for this assignment is to create a note-by-note dish with crispiness, crunchiness, crackling taking inspiration from the quote *"But the crackling is superb*". This quote is in relation to a roast loin of pork made by Nicolas Kurt (the co-founder of molecular gastronomy along with Hervé This) for a televised dinner on the BBC, where pineapple juice was used to tenderise the meat. Chef Michel Roux commented on how the tenderising worked almost too well *"but the crackling is superb"*. This anecdote is documented at the start of the book "But The Crackling Is Superb – An Anthology on Food and Drink by Fellows and Foreign Members of The Royal Society" (1988). Cracking in this context relates to the crispy fatty skin of roast pork. By roasting a pork joint with the skin on, the layer of fat present directly under the layer of skin remains intact. On roasting this fat will start to render causing the skin to crisp up, creating crackling. However, cracking along with crispiness and crunchiness in the literal sense can be any food that provides auditory and textural satisfaction in relation to these characteristics. This (2011) describes how research had led to the hypothesis that the physical state of crunchy materials is due to the propagation of microscopic cracks. Meaning the brief can include any dish once these features are incorporated. The final dish need not be a reimagination of literal pork crackling.

The inspiration for the note-by-note dish being prepared for this assignment is the Black Forest Gateaux. Black Forest Gateaux or Schwarzwälder Kirschtorte originates from Germany and gained immense popularity in Britain during the 1970's (Blumenthal, 2010). Its name is not directly due to the Black Forest in Germany but more so because of Kirsch, a specialty liquor which is produced in the region. Black Forest Gateaux is comprised of layers of chocolate cake, cherries, whipped cream and Kirsch.

Chef Heston Blumenthal served Black Forest Gateaux at his restaurant "The Fat Duck". Blumenthal then proceeded to reimagine the Black Forest Gateaux as a new dessert and featured it as part of a "Seventies Feast" (2010). It was chosen as a homage to his 70's childhood and his love of the work of author Roald Dahl. The desert was called "The BFG and Golden Ticket" in reference to Dahl's books "The BFG" (Big Friendly Giant) and "Charlie and the Chocolate Factory". BFG coincidentally sharing the same acronym as Dahl's book. Inspired by Blumenthal's explorations of Black Forest Gateaux it was decided to continue this exploration into a note-by-note take on Black Forest Gateaux.

Overall Aim

To create a dish reminiscent of Black Forest Gateaux using only pure compounds which incorporates elements of crispness, crunchiness and crackling.

Final Material and Methods

Isomalt Dome

Ingredients

Ingredient (Brand- if applicable)	**Composition**	**Quantity**	**Photo**
Isomalt (Louis Francois)	Isomalt (E 953)	300 g	
Sunflower Oil (Basso)	Sunflower oil	Approximately 15 ml (needed for oiling of materials)	

Materials

Disposable gloves

Medium sized pot

Large paper cup with a 1 cm hole in the top

Scissors

Silicone baking mat

Silicone spatula

Sugar thermometer

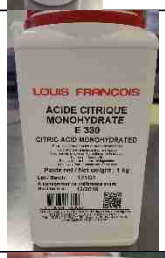
Paring knife

Method

- Using the sunflower oil, oil the rim and outside of the paper cup.
- Add isomalt to the pot.
- Heat over medium heat until isomalt is completely melted (170°C on sugar thermometer), stirring occasionally with the spatula to help the process.
- Pour onto silicone baking mat on a heat proof surface (a metal surface was used).
- Allow to cool for 1 minute before kneading the isomalt using the mat.
- Continue to knead until the isomalt is an even temperature and no longer sticks to the mat.
- Wearing gloves (as the isomalt will still be hot) shape the isomalt into a flat circle with a diameter approximately 2 cm larger than the top of the paper cup and with a thickness of approximately 0.5 cm.
- Use an oiled scissors to cut off any excess isomalt.
- Place the oiled cup top side down onto the centre of the shaped isomalt.
- Smooth the excess isomalt evenly up onto the sides of the cup.
- Lift the cup with the attached isomalt up and while holding the isomalt on the sides of the cup blow through the hole on the top of the cup to create a dome shape.
- When the shape is formed stop blowing and allow the isomalt to fully cool and set.
- When set, heat the blade of the paring knife on a flame (the flame on a gas hob was used) and very carefully run the blade through the isomalt along the rim of the cup.
- Continue heating the blade and cutting until the isomalt dome is off the top of the cup.
- Store in an airtight container until plating.

Cherry Foam

Ingredients

Ingredient (Brand- if applicable)	**Composition**	**Quantity**	**Photo**
Cherry Flavour (Mallard Ferriere)	Not listed by manufacture or available online	10 drops	
Citric Acid (Louis Francois)	Citric acid monohydrated (E 330)	2 g	
Hyfoamer (MSK)	Hydrolysed milk protein	1.3 g	
Red Food Colour Gel (Dr. Oetker)	Glucose syrup, carmine (E 120), lutein (E 161b), sugar, water, citric acid, lactic acid, acetic acid, sodium lactate, carrageenan, potassium sorbate	5 g (Plus extra for painting)	
Sugar	Sucrose	20 g	
Water	H_2O	125 ml	
Xanthan Gum (Louis Francois)	Xanthan gum (E 415)	1.3 g	

Materials (brand if applicable)

Disposable piping bag

Fine paintbrush

Rubber band

Silicone spatula

Stainless steel bowl

Stand mixer (Kenwood Major) with whisk attachment

Whisk

Method

- Add all of the ingredients besides the Hyfoamer and xanthan gum to the bowl.
- Stir with the whisk to dissolve the sugar, citric acid and evenly disperse the gel colour and flavouring.
- Add to the bowl of the stand mixer.
- Sprinkle the Hyfoamer and xanthan gum over the liquid in the mixer.
- Whisk on high until a foam is formed with no liquid at the bottom of the mixer bowl.
- Using the extra red food colour gel paint 5 thin lines evenly spaced along the inside the piping bag from the tip to the opening.
- Use the spatula to add the foam to the piping bag.
- Expelling excess air at the top of the piping bag, twist the opening to close it and fasten with the rubber band. Hold as is until plating.

Cognac Honeycomb

Ingredients

Ingredient (Brand- if applicable)	**Composition**	**Quantity**	**Photo**
Bicarbonate of Soda	Sodium bicarbonate	5 g	
Cognac Flavour (Mallard Ferriere)	Not listed by manufacture or available online	6 drops	
Gold Colouring Powder (Sosa)	Aluminium potassium silicate (E 555), titanium dioxide (E 171), iron oxides (E 172).	2g (approximately)	
Sugar	Sucrose	50 g	

Materials

Baking paper

Baking sheet

Fluffy dry paint brush

Medium sized pot

Paring knife

Whisk

Method

- Add the sugar to the pot.
- Heat the sugar over medium heat without stirring (to prevent crystallisation) but occasionally swirling the pot until all the sugar is melted and is a light caramel colour.
- Add in the cognac flavour and sprinkle the bicarbonate of soda over the caramel.
- Quickly whisk the mixture to disperse the bicarbonate of soda.
- Pour out onto a baking paper lined baking sheet.
- Allow to fully cool and set.
- When set cut into geometric chunks.
- Using the paint brush, brush all the exposed surfaces liberally with the gold colouring powder.
- Store in an airtight container until plating.

Chocolate Sponge

Ingredients

Ingredient (Brand- if applicable)	**Composition**	**Quantity**	**Photo**
Bitter Almond Flavour (Mallard Ferriere)	Not listed by manufacture or available online	4 drops	
Black Food Colour Gel (Dr. Oetker)	Glucose syrup, sugar, water, vegetable carbon (E 153), carrageenan, lactic acid, acetic acid, sodium lactate, potassium sorbate	1.5 g	
Brown Dye (Mallard Ferriere)	Not listed by manufacture or available online	5 ml	
Caster Sugar	Sucrose	37 g	
Chocolate Aroma (Sosa)	Aroma, inverted sugar, glycerine (E 422)	5 ml	
Corn Starch	Amylopectin	37 g	

Powered Egg White (Louis Francois)	Powered hen's egg albumin, xanthan gum (E 415), citric acid (E 330), triethyl citrate (E 1505)	5 g	
Soy Lecithin	Soy lecithin (E 322)	1.5 g	
Sunflower Oil	Sunflower oil	4 ml	
Water	H_2O	39 ml	

Materials

Fine mesh sieve

Large paper cup

Microwave (Panasonic Pro II Industrial)

Plate

Silicone spatula

Stand mixer (Kenwood Major) with whisk attachment

Method

- Add the powered egg whites and 30 ml of the water the stand mixer.
- Whisk on high until the mixture is cohesive and starting to aerate.
- Add the sugar into the mixer and whisk until the sugar is dissolved and a glossy meringue is obtained.
- Add in the black and brown food dye and briefly whisk until evenly incorporated.
- Whisk the oil, remining water (9 ml) and soy lecithin together in the small bowl until the mixture is emulsified.
- Remove the bowl from the mixer and fold in the emulsion, almond and chocolate flavouring using the spatula.
- Gradually sift in the corn starch. Folding each addition into the meringue mix.

- Fill the paper cup to 2/3 full with the mixture.
- Microwave on full power for 45 seconds. (Note; the mixture will expand significantly, then deflate slightly. The sponge is removed after approximately 5 seconds at this deflated state)
- Remove the cooked sponge from the microwave, turn out onto the plate and allow to cool.
- When cooled tear into small pieces to retain the rough natural texture of the sponge.

Plating

Materials

Medium sized plate

Metal spoon

Plate of any size

Scissors

Smoke gun

Previously prepared elements

Method

- Place 4 honeycomb pieces and 3 sponge pieces onto the centre of the medium plate. Ensuring the isomalt dome will fit over it all.
- Cut 1cm off the tip of the piping bag of cherry foam to open.
- Start piping the foam onto the other plate to allow the foam to mesh with the painted food dye on the piping bag.
- When the desired effect is achieved, pipe 5 mounds of appropriate sizes into the gaps between the sponge and honeycomb.
- Place the isomalt dome over the dessert.
- Light the smoke gun.
- When smoke starts flowing out of the tubing, lift one side of the dome enough just to fit the tip of the tubing under the dome.
- Allow the dome to fill with smoke.
- Serve immediately. Use the metal spoon to crack the top of the dome to release the smoke, revealing the dessert.

Results

Week 1

Final Dishes:

Honeycomb 1;

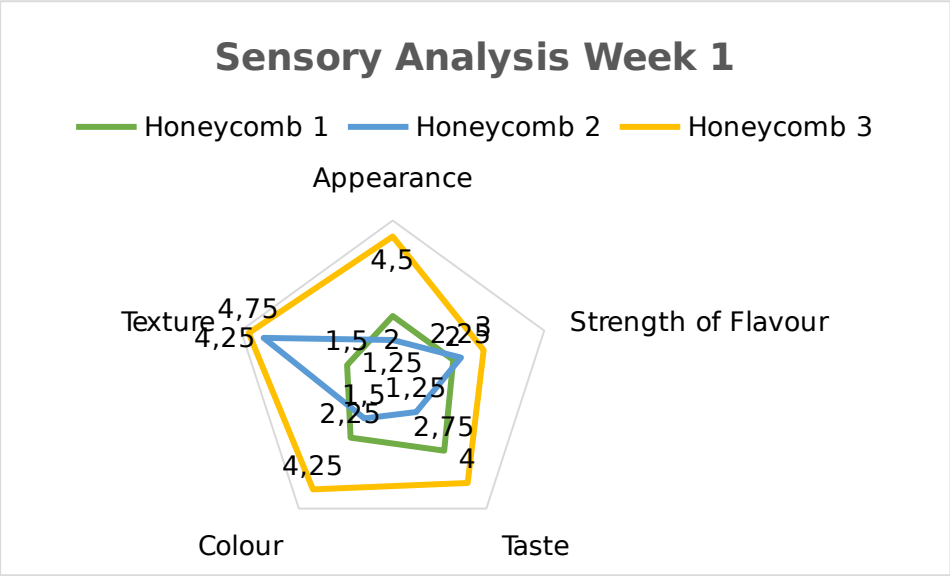
Honeycomb 2;

Honeycomb 3;

Sensory Analysis:

Note: all sensory analysis charts included in this assignment are based on average values obtained from the recorded results.

All products were rated on a scale of 1-5, with 1 being very nice and 5 being very bad.



Week 2

Final Dishes:

Thick isomalt shard;

Thin isomalt shard;

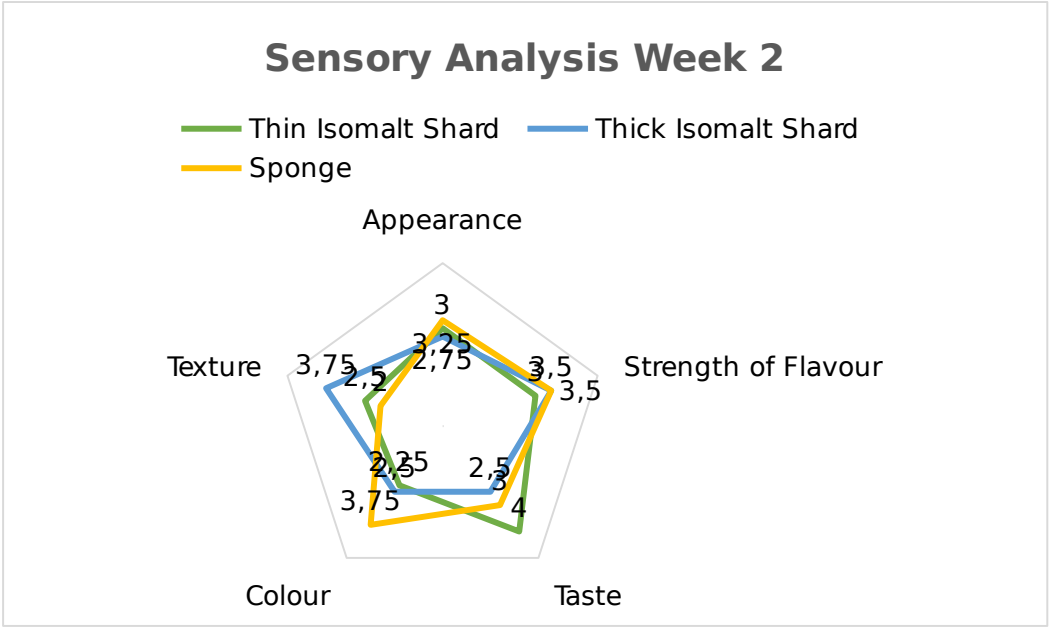
Side by side comparison of thick and thin isomalt;

Flexibility of thin isomalt;

First attempt at sponge;

Second attempt at sponge;

Sensory Analysis:



Week 3

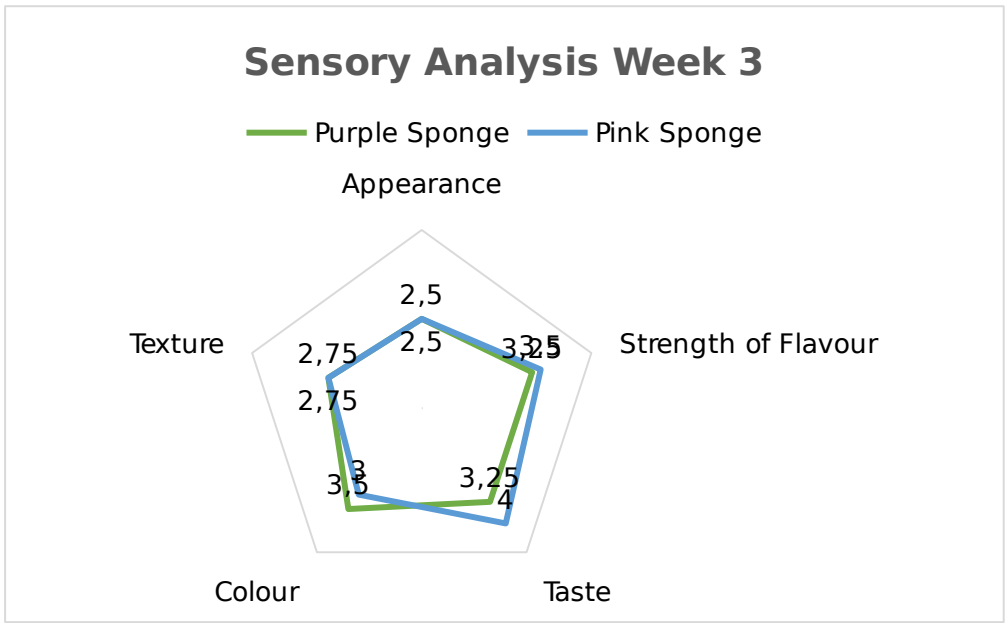
Final Dishes:

Purple sponge;

Pink sponge;

First attempt at blown isomalt;

Sensory Analysis:



Week 4

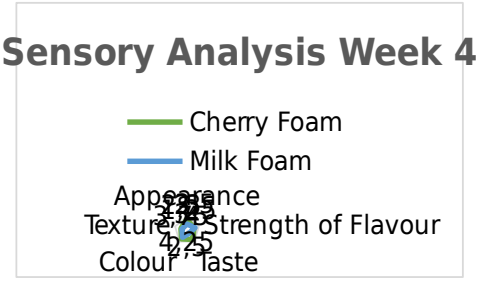
Final Dishes:

Blown isomalt dome;

Milk foam;

Cherry foam;

Sensory Analysis:



Week 5

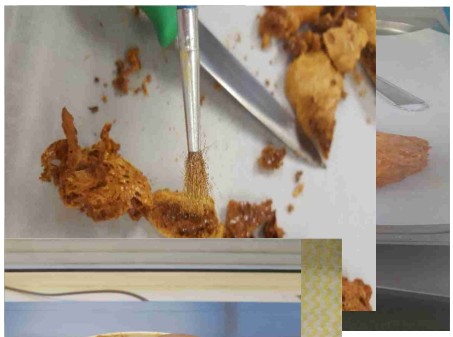
Preparation:

Sucrose beginning

Honeycomb prior to cutting:

Gold coluring powder being

to melt: *applied to cut honeycomb:*



Sponge after microwaving:

m sprinkeld over

ure prior to whipping: *Resulting foam:*

Final dish with isomalt dome;

Final dish with smashed isomalt dome;

Discussion

Week 1

A honeycomb was chosen as an element for the dish as it has a definite and distinctive crunchy and crackling texture. Once a suitable recipe was identified to achieve the optimal texture, adding colourants and flavours were able to be tested out. The initial idea was to produce a cherry coloured and flavoured honeycomb.

Sodium bicarbonate is used in cooking as a chemical leavening agent. Most chemical leavening agents exploit the reaction between acid and base. An example being sodium bicarbonate reacting with acidic buttermilk, as seen in most soda bread recipes. The reaction of which produces carbon dioxide (CO_2), this provides the leavening action. The major benefit of chemical leavening agents is that they are much faster acting than yeast. Yeast also produces CO_2 but through a biological process. The living yeast cells consume sugars present in flour and produce CO_2 as a by-product.

Modern commercial baking power is a mixture of dried acid and base, along with a starch to absorb moisture and prevent premature reaction. It has a double action of CO_2 production, firstly on hydration and secondary on heating.

When making honeycomb there is no acid present in the recipe, yet gas is clearly produced as the melted sugar expands massively when the sodium bicarbonate is added. This is due to the thermal decomposition of sodium bicarbonate at temperatures greater than 120°, which also produces CO_2 (Edwards, 2015)

$$2NaHCO_3 + \text{Heat} \rightarrow Na_2CO_3 + CO_2 + H_2O$$

Sodium Bicarbonate + Heat → Sodium Carbonate + Carbon Dioxide + Water

The Thermal Decomposition of Sodium Bicarbonate

The first attempt at honeycomb yielded a product that lacked the characteristic honeycomb texture. The result was a very solid candy that had a strong alkaline taste due to the sodium bicarbonate present in the honeycomb. This was due to insufficient sodium bicarbonate in the recipe. The photo of honeycomb 1 shows a small number of bubbles present, showing

thermal decomposition did occur but that the quantity was insufficient to alter the total composition of the melted sugars to create a honeycomb.

The further honeycomb recipes used significantly more sodium bicarbonate, nearly 6 times more by total sugar weight. Honeycomb 2 and honeycomb 3 both had the desired texture. Honeycomb 2 had a clear burnt taste, this was due to the colourants being added as the sugar melted. This prevented the sugar burning from being seen. The burnt sugar taste also prevented the added cherry flavouring from being tasted. Honeycomb 3 had no colourant added to focus on testing the cherry flavouring in the honeycomb.

It was then decided not to proceed with adding cherry flavouring to the honeycomb. As honeycomb alone has a strong flavour profile due to the caramelisation of sugar was difficult for the cherry to come through. The cherry flavour was therefore added to another element.

Sensory analysis of the three honeycombs gives more insight into the honeycombs. It can be seen on the sensory analysis chart for week 1 that Honeycomb 3 scored the highest in each category making it the most liked honeycomb. Honeycomb 2 scored quite low by receiving a 2 or lower on each category besides texture. This was to be expected as Honeycombs 2 and 3 used the same amount of sugar and bicarbonate of soda resulting in a very similar texture. Honeycomb 1 scored very low with a 1.5 on texture, this was again to be expected as it did not have the typical honeycomb texture and was instead very solid and therefore difficult to eat.

Week 2

Week 2 marked the start of working with isomalt. The original idea was to create isomalt shards with a cognac flavour, which would provide a crisp and crunchy texture different to the texture of the honeycomb.

Isomalt is a sugar alcohol which is used a sugar substitute. The original source of isomalt is sucrose (standard table sugar) and it has a relative sweetness of 50% in comparison to sucrose. Isomalt was commercialise in the 1980's (McGee, 2004a).

The first test produced a thick isomalt shard. The recipe used 0.125% water per weight of isomalt. The mixture of isomalt and water was heated until the isomalt was completely dissolved. This resulted in a crisp and brittle texture as desired, but it was quite thick. It was desired to make it thinner, such that the shards would snap more easily. Along with this the cognac flavour was overpowering, therefore less was added to the next test.

The second text which produced a thinner isomalt shard used 0.25% water per weight of isomalt. The resulting shard took longer to set than the thick isomalt, this was due to water still present in the melted isomalt. The same method for preparation was used for the thin isomalt shards, that being to heat the mixture until the isomalt was fully dissolved. The isomalt with 0.25% water took longer to dissolve than the 0.125%, this may have been hindered by the present of more water. As isomalt melts at a higher temperature than water (approximately 145°C (Sigmaaldrich.com, 2018)) it would not be able to fully melt until the water present started to evaporate off. Water has a heat capacity of 100°C, meaning it cannot reach a higher temperature than 100°C. As more water was present in the 0.25% preparation, inevitably it would take longer to boil off the water in this preparation than in the 0.125%.

A thermometer was not used for these tests. Because of this the isomalt with more water may not have reached the correct temperature at which it will produce a hard set. Isomalt requires a final moisture content of approximately 1% to form a stable product. This is achieved by allowing the molten isomalt to reach 165°C (Edwards, 2000). As a thermometer was not used during these initial experiments with isomalt, the moisture content of the final product can not be estimated. To ensure this low final moisture content was produced in further tests a sugar thermometer was used. High moisture content was further avoided in future work by

not adding water to mixture, so not to initially create a higher than already present moisture content. As in actuality water is not required to melt isomalt.

Sensory analysis of the isomalt showed that the texture of the thick isomalt was better than the thin isomalt which was not as crisp as the thick isomalt. The flavour of the thin isomalt was preferred, it used half the amount of cognac flavouring as the thick isomalt. The appearance of both gave close results of 3 and 2.75, with the thin isomalt scoring higher. Similarly, the colour of both gave close results of 2.25 and 2.5.

The first sponge attempt tried to replicate a traditional sponge cake by firstly creating a meringue, then adding in oil, flavourings, colourings and methyl cellulose. The ideal being to see if the methyl cellulose would stabilise the meringue mixture and form a sponge like texture. Methyl cellulose is a hydrocolloid that is typically used to form heat stable gels (Lersch, 2014a). By sifting in the methyl cellulose and folding it into the meringue (with added water and oil) the thought was that the methyl cellulose would be evenly dispersed among the network of incorporated air in the meringue allowing it to form a gel network around the trapped air creating a sponge like texture. In practice this actually resulted in the formation of a slimy gel which was foul smelling. Using the methyl cellulose as a stabiliser in this instance was not successful.

The second sponge attempt looked at taking a more traditional approach to cake making and adapting it. The second sponge attempt was based on a simple gluten free sponge cake recipe (Low, 2013). This recipe consists of just eggs, sugar and corn starch. From this recipe the only ingredient that had to be transferred to note-by-note acceptable form was the egg. The second sponge attempt used powered egg white in place of the egg, reconstituted as recommended by the manufacturer along with sugar and corn starch. Corn starch like methyl cellulose is also a hydrocolloid but acts as more of a thickening agent than a gelling agent (Lersch, 2014b). The resulting sponge was significantly better than the first attempt. The sponge had the initial sponge like texture, however on standing for a few minutes it dried out completely. In hindsight this was due to the lack of fat and additional moisture provided by egg yolk. Further recipe development was therefore required to fully replicate the egg yolk.

Sensory analysis was not carried out on the first sponge attempt as it was inedible! The second sponge attempt was analysed. Results showed that the dry texture was not well received, by scoring a 2. Appearance, strength of flavour, taste and colour on the other hand were well received, scoring between 3.25 and 3.75.

Week 3

Week 3 continued the pursuit of creating a note-by-note sponge. The focus was to build on the second sponge produced in week 2 and find a suitable substitution for egg yolk. An investigation into the composition of egg yolks was carried out in order to make informed ingredient choices.

Simply put an egg yolk *"is a bag of water that contains free-floating proteins and protein-fat-cholesterol-lecithin aggregates"* (McGee, 2004b). These aggregates are what give egg yolk it's emulsifying properties, and more specifically it is the compound lecithin which causes this effect. Lecithin is amphiphilic meaning it is both hydrophilic (water-loving) and lipophilic (lipid-loving), this characteristic results in emulsification if exposed to both water and lipids (fats). Water and lipids will both bind to the lecithin causing them to be held simultaneously together, resulting in a homogeneous mixture or emulsification. This ability of egg yolk is commonly utilised in the production of mayonnaise, to emulsify egg yolk with oil and either vinegar or lemon juice.

An egg yolk has an approximate composition (by weight) of 50% water, 23% fat, 16% protein, 9% lecithin, 0.3% carbohydrate and 1.7% minerals (Clarke, 2004).

- Water is simple to mimic!
- Oil is pure fat meaning it can be used gram-for-gram to represent the fat present in egg yolk).
- The protein posed an issue to substitute. The proteins found in egg yolk are different to those found in egg white. Usual sources of pure protein for recipe substitution would be egg white or whey protein. Like egg white protein, whey protein is different to the protein found in egg yolk. It was therefore decided to leave out a protein element as part of the egg yolk substitution. It was thought that as part of the recipe as a whole a slight decrease in protein would not have a detrimental effect. That it was more important to focus on the emulsifying property of the egg yolk.
- Soybean is a common source of pure lecithin, meaning it could be used to replace the lecithin found in egg yolk.
- The 0.3% carbohydrate and 1.7% minerals were excluded as the quantities are negligible.

Using the manufacturers guidelines, a standard egg white is equivalent to 5 g of powered egg white reconstituted with 30 g of water, a resulting weight of 35g. Based on the yolk comprising of a third of the weight of an egg it should in this instance weigh 17.5 g in total. Therefore, it can be approximately calculated that a standard egg yolk could be substituted for;

9 g water

4 g oil

1.5 g soy lecithin

Using the calculated quantities of extra water, oil and soy lecithin along with the already used corn starch, powered egg white, water and sugar a successful sponge was created. It had the desired light sponge texture that was moist and retained its moisture on cooling. The lack of egg yolk protein was undetectable.

Two versions; one pink and one purple were produced on week 3 to test colorants and added flavours. The purple version contained only cherry flavouring, while the pink contained almond flavouring along with cherry flavouring. Cherry and almond both contain the aromatic compound benzaldehyde (McGee, 2004c). Almond was added to the purple sponge to deepen the almond nuance naturally present in cherry.

Sensory analysis of the sponges shows how in all attributes besides the taste the sponges scored identically. The pink sponge was found to taste better, meaning the experiment of adding almond flavouring to deepen the overall flavour of the pink sponge was successful.

Blown isomalt was attempted on week 3 but was not successful. More research into the finer details of isomalt bowing was necessary before the next attempt on week 4.

Week 4

Week 4 aimed to create an isomalt dome large enough to cover the final desert. It was decided to create a dome instead of using the isomalt shards previously made in week 2. There was several deciding factors to this decision, firstly blown isomalt demonstrates more skill than simple shards. It was thought that an isomalt dome would really showcase the crisp texture. As to reveal the desert one would have to first smash through the dome using a metal spoon or other utensil. Further to this was the idea to also fill the dome with smoke using a smoke gun just before serving, this would add more visual appeal and drama to the final dish. This idea came from the initial basis of the dish, black forest gateaux. The idea being that the smoke would evoke the image of fog in a forest.

Research into blowing isomalt was carried out. The main points from conducting this research were as follows;

- Melting the isomalt until it reaches 170°C on sugar thermometer
- Kneading the hot isomalt until it no longer stuck to the silicone bake mat, this was to both cool the isomalt down and to ensure that the temperature was even throughout the melted isomalt, (Sift by Kara, 2014)
- Using a wide implement to blow the isomalt make it easier as you are already starting with a wide shape. This was particularly suited to creating the desired dome shape.
- Important to store the isomalt in an airtight container, though less hydroscopic than sucrose (McGee, 2004a) an isomalt structure would still be affected by the humidity naturally present in air if given time. Storing the isomalt dome in an airtight container also prevented the delicate structure from breaking.

Using these guiding principles and taking time and caution, a dome was successfully made. For time saving purposes the isomalt dome was stored in an airtight contained wrapped in cling film until plating the following week (week 5).

Between weeks 3 and 4 it was decided to create a cherry flavoured foam over a sponge. As after consideration it was felt that cherry flavour would work better in a foam, a preparation where it would not be heated keeping the flavour as pronounced as it could be. A foam was picked as it would provide a textural contrast to the crispy and crunchy elements already produced. Instead a chocolate flavoured sponge will be created. A milk foam was explored as an option.

Both foams utilised Hyfoamer. Hyfoamer is a specialist ingredient produced by the company MSK, it is a powered hydrolysed milk protein which is designed to mimic or enhance egg whites (Msk-ingredients.com, 2018). They suggest to *"simply whisk hyfoamer into fruit or vegetable juice to produce a light meringue style foam, this can be stabilised with the addition of sugar or xanthan gum"*. From these recommendations both the cherry and milk foams used hyfoamer along with the addition of sugar and xanthan gum. Xanthan gum is a polymer obtained by microbial fermentation of glucose (This, 2002), one of it's main functions is the reduction of syneresis (water drainage) (Lersch, 2014c).

The cherry foam was successfully made. It also utilised citric acid as a seasoning, to balance out the sweetness to make the foam more reminiscent of sour cherries.

The milk foam was an experiment to test the capabilities of the hyfoamer with fat. The recipe used milk powder and whey protein as part of its ingredients. A foam was produced, as can be seen in the side by side photos of the two foams in the result section it can be clearly observed that the milk foam was nowhere near as voluptuous as the cherry foam. The foam proceeded to deflate after standing. The presence of fat hindered the hyfoamer from working as effectively as it is capable to, as seen in the cherry foam.

Sensory analysis showed that each aspect of the cherry foam was better than the milk foam. In particular the flavour of the cherry foam scored 2.75 points higher than the milk foam. The cherry foam was proceeded with for the final dish.

Week 5

Week 5 was the cumulation of the past four weeks, bringing the elements from each week together. No new recipes were used this week, but a number of flavours and colourings were altered as previously discussed.

The sponge element is now chocolate flavoured and coloured brown to look like chocolate cake. As a nod to the experimentation with the combination of cherry and almond flavouring during the previous sponge testing the chocolate sponge contained bitter almond flavouring along with chocolate essence. Eating the dish as a whole will bring together the similar benzaldehyde flavours of cherry and almond.

The isomalt dome does not contain any flavouring, like the cognac flavouring which was previously used in the isomalt shards. The cognac flavour will therefore be added to the honeycomb. It was felt the cognac would pair well with the strong natural caramel flavours of the honeycomb. Though traditional black forest gateau contains kirsch not cognac, cognac was used. This was due to a kirsch flavouring not being available but. Cognac is commonly used as a substitute for kirsch in black forest gateau. The resulting cognac flavoured honeycomb was cut into geometric shaped pieces to contrast with the soft shape of the piped foam and torn sponge. It was also dusted with gold colouring powered for added visual effect.

The cherry foam was produced using a red food colouring gel not pink colourings previously used. Extra gel was painted in stipes on the piping bag in which it was contained prior to plating. This gave the piped mounds of pale red foam stripes of deep red. This added a welcomed touch of colour to the dish.

The isomalt dome stayed intact form week 4 to week 5. The idea of filling the dome with smoke was tried. There was issues with getting the smoke gun to work at full capacity, however enough smoke was produced to gain an idea of the concept. It shattered very well on impact with a metal spoon. The desired effect of showcasing the crisp texture through aural and visual channels was achieved.

Final Conclusion

The brief of incorporating crispiness, crunchiness and crackling was achieved. The isomalt dome provided a crisp and crunchy texture, the honeycomb provided a different crunchy and crackling texture. The soft textures of the sponge and foam added textural contrast to the dish further highlighting the crispy, crunchy and crackling textures present in the dish.

The dish only utilised pure compounds which unsurprisingly proved difficult but ultimately was achievable. Various methods were tested and suitable ones were identified and used in the final dish.

The initial idea of creating a dish reminiscent of Black Forest Gateaux was achieved by the successful preparation of representative elements of the traditional flavours of chocolate, cherry and liquor. An element representative of the whipped cream traditionally found in a Black Forest Gateaux was not separately produced, however the soft, light and moist texture of the cherry foam is very similar and therefore reminiscent of whipped cream.

Overall this foray into the world of note-by-note cooking was very challenging but provided endless enjoyment! This small period of time allowed only a glimpse into this radical and developing area.

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Log Book

Week 1

Aims

- Make cherry flavoured and coloured honeycomb.

Objectives

- Try different sugars in making honeycomb,
- Try different quantities of bicarbonate of soda in making honeycomb.
- Try different quantities of flavouring in the honeycomb.
- Try different quantities of colourant in the honeycomb.

Test 1

Materials

Copper saucepan, tray lined with baking paper, whisk, scales.

Ingredients

200g sucrose

100g glucose

5g sodium bicarbonate

5 drops cherry flavouring

2 drops pink food colouring

2 drops purple food colouring

Method

- Heat sucrose and glucose, until glucose is dissolved.
- Add in 10 drops of cherry flavour and pink and purple colour.
- Remove from heat and whisk in sodium bicarbonate.
- Pour out onto a baking paper lined baking sheet.

Results

Colour was too pale (pale pink) aim is to have a deep cherry colour. Flavour did not come through. Desired honeycomb texture was not achieved. The alkaline taste of the sodium bicarbonate was not very pleasant to taste, to try adding an acid to balance out the flavour.

Test 2

Materials

Copper saucepan, tray lined with baking paper, whisk, scale

Ingredients

100g sucrose

10g sodium bicarbonate

Few pinches of malic acid

10 drops cherry flavouring

6 drops pink food colouring

6 drops purple food colouring

Method

- Used same method. Adding a lot more colourant and cherry flavour as sugar was melting.

Results

Cherry flavour did come through. Desired texture was achieved. However, as colouring was added as the sugar heated, it was not possible to monitor the progress of the sugar melting. As a result, it slightly burned. Imparting a burnt taste and unappealing dark brown colour in the centre of the honeycomb.

Test 3

Materials

Copper saucepan, tray lined with baking paper, whisk, scales, spray bottle attachment

Ingredients

50g sucrose

5g sodium bicarbonate

Larger amount of malic acid

Cherry flavouring

Method

- Used same method not adding any colourant or flavour.
- Cherry flavour was sprayed on top of the set honeycomb.

Results

Desired texture was achieved. There was no burning, so this did not affect the flavour. The sprayed-on flavour did not come through. The malic acid was too strong this time.

Overall result

It was decided not to continue with pursuing a cherry flavoured honeycomb. The flavour profile of the honeycomb is too strong for a cherry flavour to compete with it. Chocolate or cognac flavour may work better with the honeycomb. Incorporating a cherry flavour into a sponge element may be a better idea.

Recommendations for next week

- Try adding a different flavour into the honeycomb.
- Try making a cherry sponge.

Week 2

Aim

- Make isomalt shards.
- Make cherry flavoured sponge.

Objectives

- Try different quantities of water in melting the isomalt.
- Experiment with different sponge recipes.

Isomalt Test One

Materials

Medium sized pot, tray lined with baking paper, spatula, scales.

Ingredients

64 g isomalt

8 g water

12 drops of cognac flavour

Method

- Heat isomalt and water until isomalt is completely dissolved.
- Add in flavouring.
- Pour onto a baking paper lined baking sheet.

Result

Texture was crisp and brittle as desired. Though it was quite thick, so it would be desirable to have it thinner. The flavour was overpowering, less will be added in the next test.

Isomalt Test Two

Ingredients

64 g isomalt

16 g water

6 drops of cognac flavouring

Method

- The same method as before.

Result

Texture was thinner than previous, however it took longer to set due to the higher water content. It also did not set as much as the isomalt with the lower water content, meaning it was flexible and could be bent into curved shapes. The flavour was improved on.

Sponge Test 1

Materials

Scales, stand mixer with whisk attachment, fine mesh sieve, large paper cup, microwave, silicone spatula.

Ingredients

15 g powered egg white

105 ml water

210 g sugar

6 g methyl cellulose

12 g sunflower oil

6 drops cherry flavouring

15 drops purple food colouring

Method

- Add the powered egg whites and 90 ml of the water the stand mixer.
- Whisk on high until the mixture is cohesive and starting to aerate.
- Add the sugar into the mixer and whisk until the sugar is dissolved and a glossy meringue is obtained.

- Add in the purple food dye and briefly whisk until evenly incorporated.
- Remove the bowl from the mixer and fold in the oil, remining water (5 ml), cherry flavouring using the spatula.
- Sift over the methyl cellulose and fold into the mixture.
- Fill the paper cup to 2/3 full with the mixture.
- Microwave on full power for 60 seconds.

Results

Result was inedible. It did not have the texture of sponge, it had more of a slimy texture. More dry ingredients will be added on the next attempt to try and achieve a sponge like texture. It also had a very strong odour. Sensory analysis was not carried out on this product.

Sponge Test 2

Materials

Scales, stand mixer with whisk attachment, fine mesh sieve, large paper cup, microwave, silicone spatula.

Ingredients

15 g powered egg white

90 ml water

110 g sugar

110g corn starch

10 drops pink food colouring

Method

- Add the powered egg whites and the water the stand mixer.
- Whisk on high until the mixture is cohesive and starting to aerate.
- Add the sugar into the mixer and whisk until the sugar is dissolved and a glossy meringue is obtained.
- Add in the pink food colouring and briefly whisk until evenly incorporated.

- Remove the bowl from the mixer, sift over the corn starch and fold into the mixture using the spatula.
- Fill the paper cup to 2/3 full with the mixture.
- Microwave on full power for 45 seconds

Result

Texture was light and sponge like, though quite dry. After the sponge standing for a few minutes it had completely dried out.

Recommendations for next week

- Continue with experimentation with the sponge recipe, using test 2 as a starting point as it seems promising.
- Continue with isomalt experimentation, perhaps attempting to create a blown isomalt structure.

Week 3

Aim

- Finalize a sponge recipe.
- Attempt blown isomalt. In hope that a dome could be created to place over the completed dish.

Objectives

- Continue experimentation with sponge recipe.
- Prepare molten isomalt and attempt to mould it by blowing.

Pink Sponge

Materials

Scales, stand mixer with whisk attachment, fine mesh sieve, large paper cup, microwave, silicone spatula, small whisk, small metal bowl.

Ingredients

5 g powered egg white

39 ml water

37 g sugar

4 g sunflower oil

1.5 g soy lecithin

37 g corn starch

10 drops pink food colouring

10 drops cherry flavouring

2 drops almond flavouring

Method

- Add the powered egg whites and 30 ml of the water the stand mixer.
- Whisk on high until the mixture is cohesive and starting to aerate.

- Add the sugar into the mixer and whisk until the sugar is dissolved and a glossy meringue is obtained.
- Add in the pink food dye and briefly whisk until evenly incorporated.
- Whisk the oil, remining water and soy lecithin together in the small bowl until the mixture is emulsified.
- Remove the bowl from the mixer and fold in the emulsion and flavouring using the spatula.
- Gradually sift in the corn starch. Folding each addition into the meringue mix.
- Fill the paper cup to 2/3 full with the mixture.
- Microwave on full power for 45 seconds.
- Remove the cooked sponge from the microwave, turn out onto the plate and allow to cool.

Result

The mixture will expand significantly, then deflate slightly. The sponge was removed after approximately 5 seconds at this deflated state approximately 45 seconds. The sponge was a desirable light and moist texture which did not dry out on standing.

Purple Sponge

Materials

Scales, stand mixer with whisk attachment, fine mesh sieve, large paper cup, microwave, silicone spatula, small whisk, small metal bowl.

Ingredients

5 g powered egg white

39 ml water

37 g sugar

4 g sunflower oil

1.5 g soy lecithin

37 g corn starch

10 drops purple food colouring

10 drops cherry flavouring

Method

- Add the powered egg whites and 30 ml of the water the stand mixer.
- Whisk on high until the mixture is cohesive and starting to aerate.
- Add the sugar into the mixer and whisk until the sugar is dissolved and a glossy meringue is obtained.
- Add in the purple food dye and briefly whisk until evenly incorporated.
- Whisk the oil, remining water and soy lecithin together in the small bowl until the mixture is emulsified.
- Remove the bowl from the mixer and fold in the emulsion and cherry flavouring using the spatula.
- Gradually sift in the corn starch. Folding each addition into the meringue mix.
- Fill the paper cup to 2/3 full with the mixture.
- Microwave on full power for 45 seconds.
- Remove the cooked sponge from the microwave, turn out onto the plate and allow to cool.

Result

The purple sponge was very similar to the pink sponge and they used the same ingredients besides colouring and flavourings, however the purple sponge has a slightly more rubbery texture which was due to overworking of the sponge mixture as the corn starch was added.

Blown Isomalt

Materials

Medium sized pot, silicone baking mat, spatula, scales, ball point plastic pen (with ink cartridge, screw on end lid and ball point tip removed, just leaving the plastic tube), sugar thermometer.

Ingredients

100 g isomalt

Method

- Add isomalt to the pot.

- Heat over medium heat until isomalt is completely melted (170°C on sugar thermometer), stirring occasionally with the spatula to help the process.
- Pour onto silicone baking mat on a heat proof surface (a metal surface was used).
- Allow to cool before kneading the isomalt using the mat.
- Attach a portion of the melted isomalt to the narrow end of the pen
- Blow through the other end in attempt to mould.

Result

The pen was quite awkward to use to blow isomalt, as it only has a small opening it would require a lot of time to blow the isomalt to a size sufficiently large to cover a dessert. The time required would also raise the issue of the isomalt cooling and hardening with time. The isomalt only inflated slightly before bursting.

Overall result

At this point it was decided to create a cherry flavoured foam over a sponge. As after consideration it was felt the cherry flavour would work better in a foam. Instead a chocolate flavoured sponge will be created. A milk foam will also be explored as an option.

Recommendations for next week

- Continue with blown isomalt, using a different implement to blow it.
- Create foams.
-

Week 4

Aim

- Create a blown isomalt dome
- Make foams and decide on which flavour works better.

Objectives

- Use improved knowledge of working with isomalt, mainly using a wider implement to try once again to create and isomalt dome.
- Make a cherry foam.
- Make a milk foam.

Blown Isomalt

Materials

Disposable gloves, medium sized pot, large paper cup with a 1 cm hole in the bottom, scissors, silicone baking mat, silicone spatula, sugar thermometer, paring knife, air tight container.

Ingredients

300 g isomalt

15 ml sunflower oil (approximate amount, needed for oiling of materials)

Method

- Using the sunflower oil, oil the rim and outside of the paper cup.
- Add isomalt to the pot.
- Heat over medium heat until isomalt is completely melted (170°C on sugar thermometer), stirring occasionally with the spatula to help the process.
- Pour onto silicone baking mat on a heat proof surface (a metal surface was used).
- Allow to cool for 1 minute before kneading the isomalt using the mat.
- Continue to knead until the isomalt is an even temperature and no longer sticks to the mat.
- Wearing gloves (as the isomalt will still be hot) shape the isomalt into a flat circle with a diameter approximately 2 cm larger than the top of the paper cup and with a thickness of approximately 0.5 cm.

- Use an oiled scissors to cut off any excess isomalt.
- Place the oiled cup top side down onto the centre of the shaped isomalt.
- Smooth the excess isomalt evenly up onto the sides of the cup.
- Lift the cup with the attached isomalt up and while holding the isomalt on the sides of the cup blow through the hole on the top of the cup to create a dome shape.
- When the shape is formed stop blowing and allow the isomalt to fully cool and set.
- When set, heat the blade of the paring knife on a flame (the flame on a gas hob was used) and very carefully run the blade through the isomalt along the rim of the cup.
- Continue heating the blade and cutting until the isomalt dome is off the top of the cup.
- Store in the airtight container until plating.

Result

A dome was successfully made. For time saving purposes the isomalt dome was stored in an airtight contained wrapped in cling film until plating the following week (week 5).

Cherry Foam

Materials

Disposable piping bag, silicone spatula, stainless steel bowl, stand mixer with whisk attachment, whisk.

Ingredients

125 ml water

10 drops cherry flavouring

1.3 g hyfoamer

1.3 g xanthan gum

Pinch of malic acid

6 drops pink food colouring

20 g sugar

Method

- Add all of the ingredients besides the Hyfoamer and xanthan gum to the bowl.

- Stir with the whisk to dissolve the sugar, citric acid and evenly disperse the gel colour and flavouring.
- Add to the bowl of the stand mixer.
- Sprinkle the Hyfoamer and xanthan gum over the liquid in the mixer.
- Whisk on high until a foam is formed with no liquid at the bottom of the mixer bowl.
- Use the spatula to add the foam to the piping bag.

Result

A light pink voluminous foam with a clear cherry flavour for obtained.

Milk Foam

Materials

Disposable piping bag, silicone spatula, stainless steel bowl, stand mixer with whisk attachment, whisk.

Ingredients

125 ml water

1.3 g hyfoamer

1.3 g xanthan gum

10 g milk powder

5 g whey protein

20 g sugar

Method

- Add all of the ingredients besides the Hyfoamer and xanthan gum to the bowl.
- Stir with the whisk to dissolve the sugar, citric acid and evenly disperse the gel colour and flavouring.
- Add to the bowl of the stand mixer.
- Sprinkle the Hyfoamer and xanthan gum over the liquid in the mixer.
- Whisk on high until a foam is formed with no liquid at the bottom of the mixer bowl.
- Use the spatula to add the foam to the piping bag.

Result

A white foam was obtained with a feint milky flavour. It was not as voluminous as the cherry foam. The foam also deflated as it was left to stand.

Overall results

As the milk foam was not as voluminous and further decreased on standing it will not be used in the final dish. The cherry foam had a clear flavour and did not deflate on standing. It will be used in the final dish. The sponge element will be chocolate flavoured. As the isomalt does not contain any flavouring, like the cognac flavouring which was previously used. The cognac flavour will be added to the honeycomb.

Recommendations for next week

- Add chocolate flavouring to the sponge.
- Add cognac flavouring to the honeycomb.

Week 5

Aim

- Create complete dish.

Objectives

- Make honeycomb adding cognac flavour.
- Make sponge adding chocolate flavour.
- Make foam.
- Plate the final dish.

Cherry Foam

Materials

Disposable piping bag, fine paintbrush, rubber band, silicone spatula, stainless steel bowl, stand mixer with whisk attachment, whisk.

Ingredients

125 ml water

10 drops cherry flavouring

1.3 g hyfoamer

1.3 g xanthan gum

2 g citric acid

5g red food colour gel (plus extra for painting)

20 g sugar

Method

- Add all of the ingredients besides the Hyfoamer and xanthan gum to the bowl.
- Stir with the whisk to dissolve the sugar, citric acid and evenly disperse the gel colour and flavouring.
- Add to the bowl of the stand mixer.
- Sprinkle the Hyfoamer and xanthan gum over the liquid in the mixer.
- Whisk on high until a foam is formed with no liquid at the bottom of the mixer bowl.

- Using the extra red food colour gel paint 5 thin lines evenly spaced along the inside the piping bag from the tip to the opening.
- Use the spatula to add the foam to the piping bag.
- Expelling excess air at the top of the piping bag, twist the opening to close it and fasten with the rubber band. Hold as is until plating.

Result

A cherry foam was obtained, which on piping had a striped pattern.

Cognac Honeycomb

Materials

Baking paper, baking sheet, fluffy dry paint brush, medium sized pot, pairing knife, whisk.

Ingredients

5g bicarbonate of soda

6 drops cognac flavouring

2 g (approximately) gold colouring powder

50 g sucrose

Method

- Add the sugar to the pot.
- Heat the sugar over medium heat without stirring (to prevent crystallisation) but occasionally swirling the pot until all of the sugar is melted and is a light caramel colour.
- Add in the cognac flavour and sprinkle the bicarbonate of soda over the caramel.
- Quickly whisk the mixture to disperse the bicarbonate of soda.
- Pour out onto a baking paper lined baking sheet.
- Allow to fully cool and set.
- When set cut into geometric chunks.
- Using the paint brush, brush all the exposed surfaces liberally with the gold colouring powder.
- Store in an airtight container until plating.

Result

A cognac flavoured honeycomb was obtained.

Chocolate Sponge

Materials

Fine mesh sieve, large paper cup, microwave, plate, silicone spatula, small whisk, small metal bowl, stand mixer with whisk attachment.

Ingredients

4 drops bitter Almond Flavour

1.5 g black Food Colour Gel

5 ml brown food colouring

37 g sucrose

5 ml chocolate aroma

37 g corn starch

8 g powered egg white

2 g soy lecithin

5 ml sunflower oil

35 ml water

Method

- Add the powered egg whites and 30 ml of the water the stand mixer.
- Whisk on high until the mixture is cohesive and starting to aerate.
- Add the sugar into the mixer and whisk until the sugar is dissolved and a glossy meringue is obtained.
- Add in the black and brown food dye and briefly whisk until evenly incorporated.
- Whisk the oil, remining water (5ml) and soy lecithin together in the small bowl until the mixture is emulsified.
- Remove the bowl from the mixer and fold in the emulsion, almond and chocolate flavouring using the spatula.
- Gradually sift in the corn starch. Folding each addition into the meringue mix.
- Fill the paper cup to 2/3 full with the mixture.

- Microwave on full power for 45 seconds. (Note; the mixture will expand significantly, then deflate slightly. The sponge is removed after approximately 5 seconds at this deflated state)
- Remove the cooked sponge from the microwave, turn out onto the plate and allow to cool.
- When cooled tear into small pieces to retain the rough natural texture of the sponge.

Result

Chocolate coloured and flavoured sponge was obtained.

Plating

Materials

Medium sized plate, metal spoon, plate of any size, scissors, smoke gun, previously prepared elements

Method

- Place 4 honeycomb pieces and 3 sponge pieces onto the centre of the medium plate. Ensuring the isomalt dome will fit over it all.
- Cut 1cm off the tip of the piping bag of cherry foam to open.
- Start piping the foam onto the other plate to allow the foam to mesh with the painted food dye on the piping bag.
- When the desired effect is achieved, pipe 5 mounds of appropriate sizes into the gaps between the sponge and honeycomb.
- Place the isomalt dome over the dessert.
- Light the smoke gun.
- When smoke starts flowing out of the tubing, lift one side of the dome enough just to fit the tip of the tubing under the dome.
- Allow the dome to fill with smoke.
- Serve immediately. Use the metal spoon to crack the top of the dome to release the smoke, revealing the dessert.

Overall result

A complete dish was obtained.