ADVANCED MOLECULAR GASTRONOMY

TFCS9025

Note by Note Cooking

Iosselin Fuentes Rodriguez

1. INTRODUCTION

The Food and Agriculture Organization (FAO) estimate that by 2050 it will be necessary to produce 60% more food to feed the world population. Following the path of doing farming in the usual way would limit the availability of natural resources (Graziano Da Silva, 2012). Moreover, globally, around 25% of the food that is produced is wasted. Food waste is considered a significant contributor to climate change. Food waste generates around 8%-10% of global greenhouse gas emissions (Environmental Protection Agency, 2023). A new innovative approach to tackle with these two big problems is to work with molecular gastronomy.

Molecular cooking promotes the culinary deconstruction. A new dish not only consists on the shape and consistency, but also on the sensations that contributes the experience of eating. The molecular combination that is chosen modify the intensity of this experience. Note by Note cooking use pure compounds as ingredients. The ingredients of this NbyN dish will stimulate the receptors for taste, odour and colour (This, 2014).

2. AIMS

Develop a new product using pure compounds as ingredients that represents somehow the waste, through the concept or the ingredients used, understanding the molecular combination of the product.

3. OBJECTIVES

- Define the concept of the dish.
- Determine the ingredients and the equipment required to develop the product.
- Define the process to follow for the elaboration of the product.
- Determine the function of the ingredients.
- Develop the prototype.

4. CONCEPT OF THE PRODUCT

The name of the dish is "***Caché entre les Polymères***". The purpose is to represent how the nature is contaminated by the plastic. There are 3 main elements: the plastic, the pearls and the leaves. The first one, wants to show how the plastic is covering all the nature we have. The second element represents the water, part of the nature that is also contaminated by the plastic. The third element shows the beauty of the nature in its different forms and colours. This dish reflects the concept of abstract art and deconstruction as well as molecular cooking.

5. MATERIALS AND METHODS

The list of ingredients for this dish can be seen below:

Table 1. List of Ingredients.

Ingredients	Unit	Quantity
Plastic		
Water	g	200
Gelatin	g	10
Glycerin	g	1,4
Lemon Flavor	Drops	5
Pearls		
Water	ml	300
Sodium Alginate	%	1
Maltodextrin	g	4
Bacon Flavour	Drops	5
Bath: Water	ml	500
Bath: Calcium Chloride	g	5
Blue Colorant	Drops	1
Leaves		
Water	ml	260
Potato Starch	g	60
Bacon Flavour	Drops	5
Green, Red & Yellow Colorant	Drops	1
Salt	g	1

The equipment required is presented in the Table 2:

Table 2. List of equipment.

Equipment	Quantity
Cooking Pot	1
Balance	1
Bowl (3 sizes)	3
Wooden spoons	1
Rolling pin	1

Cutting board	1
Knife	1
Tray	1
Pan	2
Oven	1

The process developed for this product is presented in three parts. The plastic process can be seen in Figure 1:

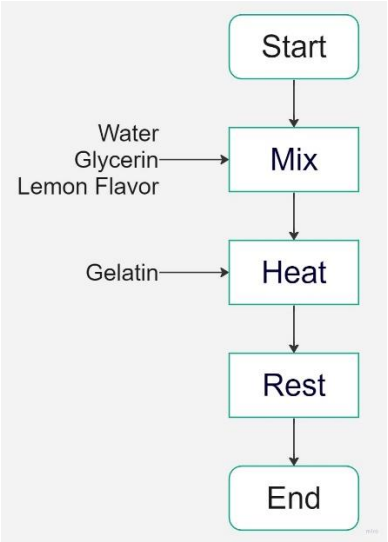

Figure 1. Plastic Process Flowchart

The pearls process can be seen in Figure 2:

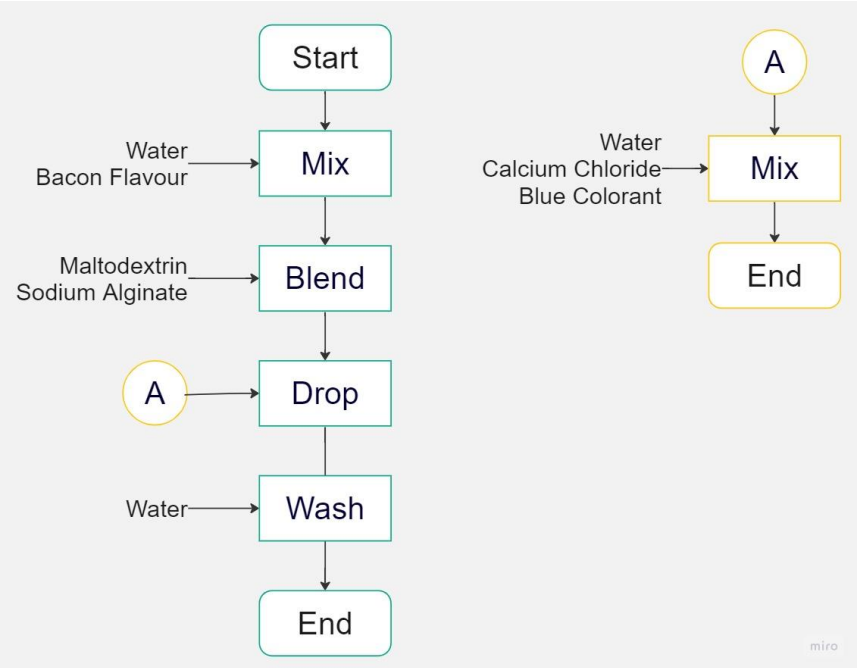

Figure 2. Pearls Process Flowchart

For the design of the leaves, two types of texture were obtained with the same process. The difference is the temperature used for the oven. One was at 150°C and the other was at 80°C. The last one was deep-fried in oil to obtain a glass appearance. The leaves process can be seen in Figure 3:

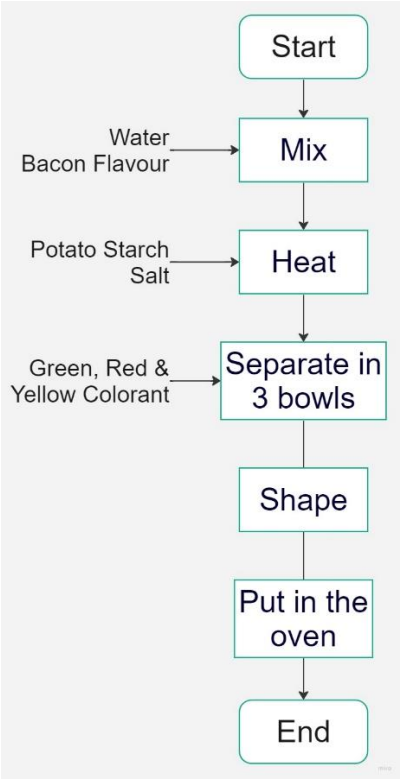

Figure 3. Leaves Process Flowchart

6. RESULTS AND DISCUSSION

6.1. GANTT DIAGRAM

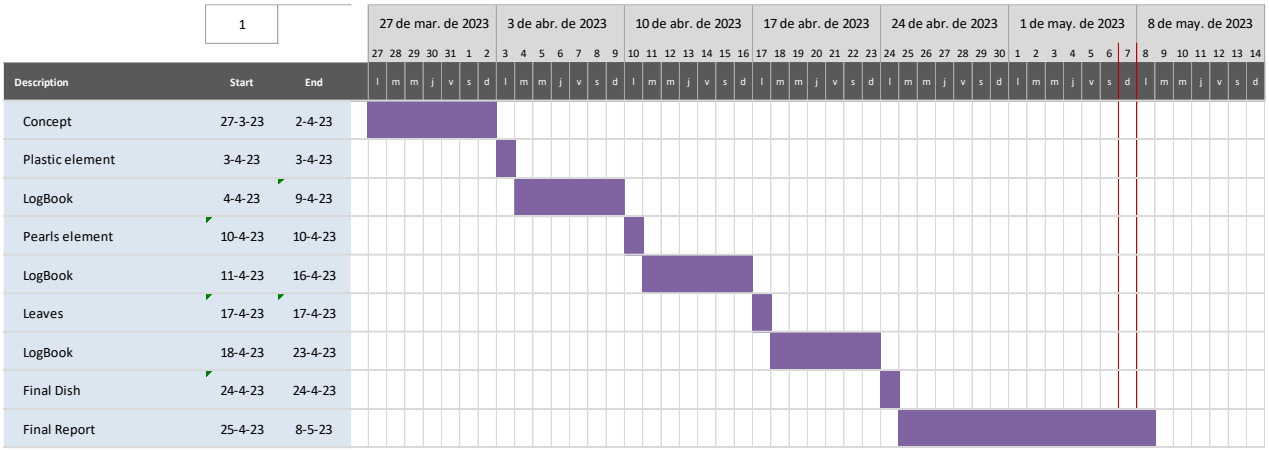

Figure 4. Gantt Diagram

6.2. FUNCTION OF THE INGREDIENTS

6.2.1. Plastic

Gelatin is a protein obtained by partial hydrolysis of collagen. It is the main protein in skin, bones, and white connective tissues of the animal body (Haug & Draget, 2011). Gelatin is not considered as a food additive. The addition of the glycerin helps to the flexibility of the product. It reduce the brittleness and fragility of films (Tarique, et al., s.f.). The pure compound in the lemon flavoring used is the R-limonene and S-limonene (ACS Chemistry for life, 2021).

6.2.2. Pearls

Pearls were made using a spherification method. The gel W/S works in a way works in a way that the liquid is coated by the gelatinous liquid, getting in this way a “tissue”. The result is a burst in the mouth effect (Dhrubo Jyoti Sen, 2017). According to EFSA, the amount of colorant used for the dish is within the limits of acceptance of the daily intake of colorants (European Food Safety Authority, 2013).

6.2.3. Leaves

Potato starch consists in two polysaccharides, amylose and amylopectin. The branch point clustering determine the starch functionality (Bertoft & Blennow, 2016). The process influences in how perceptible is the flavor in the product. To help the artificial flavor, it was user a flavor enhancer. In this case, the salt brings out the bacon flavor in the product (This, 2014). According to EFSA, the amount of colorant used for the dish is within the limits of acceptance of the daily intake of colorants (European Food Safety Authority, 2013). The main components of the bacon flavor that is also used for the pearls (Section 6.1.2) are the hydrocarbons, aldehydes and alcohols. This is characteristic from the Maillard reaction of the bacon when is fried (Compound interest, 2014).

6.3. PROTOTYPE DEVELOPMENT PROCESS

The prototype develop after 4 weeks of classes is presented below.

Figure 5. Prototype "***Caché entre les Polymères***"

7. CONCLUSION AND RECOMMENDATIONS

This dish represents how the nature is hidden by the plastic. The use of these three elements make unique this dish. The colours and the textures used gives an abstract perspective of what we can see in real life. The flavors and the ingredients used show that is possible to make a dish only with pure compounds.

Using the same process but changing some variables as the temperature, can give different elements with different textures and shapes. It is necessary to control these variables. Moreover, it is necessary to be careful with the quantities of the additives used. For this is necessary to review the food regulation.

The shape of the leaves can be improved by the used of rubber molds and a refrigeration step to keep the shape while dehydrating.

Regarding the presentation of the dish, the use of a professional camera and lights can help to show better the dish. In general, after 4 weeks of work this dish was well developed.

8. References

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9. Appendices

9.1. Annex 1. Log Book

MODULE CODE: TFCS9025
MODULE TITLE: Molecular Gastronomy
STUDENT NAME: Iosselin Katiuska Fuentes Rodriguez
FOOD PRODUCT: Caché entre les polymères
WEEK NO.: 1 **DATE: 03/04/2023**

1. **Weekly Aim**

   The aim of this week is to develop one of the elements of the dish “plastic” using pure compounds and working with the texture and flavor.

2. **Objectives**

   - Determine the right proportions of the ingredients.
   - Define the color of the element.
   - Determine flavor of the element.
   - Determine consistency of the element (texture).

3. **Materials (Ingredients and Equipment)**

   The ingredients required for this element is presented below:
   - Gelatin
   - Water
   - Lemon Flavoring
   - Glycerol

   The equipment used for this element is described below:
   - Cooking pot
   - Balance
   - Bowl
   - Plate
   - Whisk
   - Wood spoon

4. **Method**

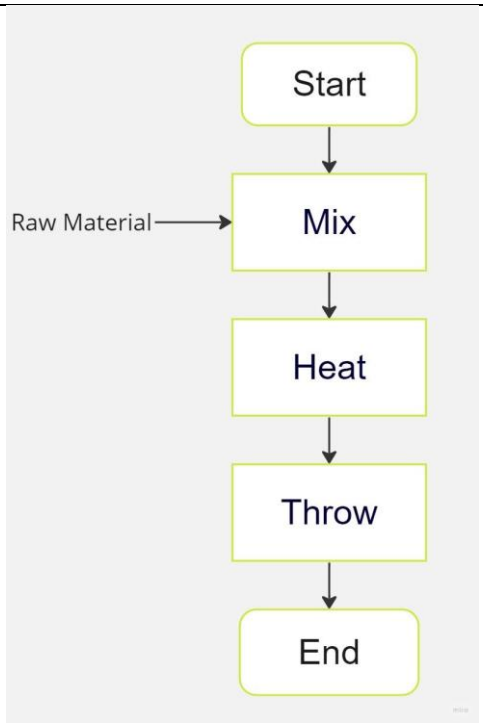

Figure 1. “Plastic” Process Flowchart

5. Results and discussion

The consistency of the product was just right. However, the amount of flavoring used was too little. It is necessary to let it dry for at least 2 hours. The “plastic” obtained is presented below.

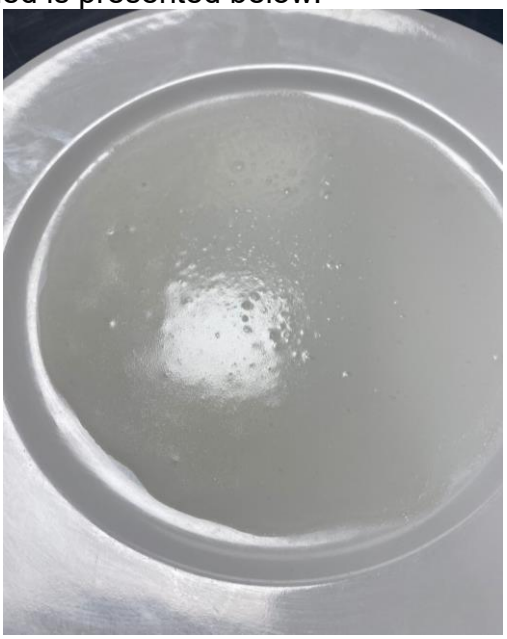

Figure 2. First element “Plastic”.

6. Conclusions

The flavor was too little. Regarding appearance, this element has a shiny and transparent colour. The texture was firm and with a good consistency. In general, the product was well developed.

7. **Ingredients required for the following 2 weeks.**

    - Water
    - Sodium Alginate
    - Maltodextrin
    - Bacon Flavouring
    - Bath: Water
    - Bath: Calcium Chloride
    - Blue Colorant

MODULE CODE: TFCS9025
MODULE TITLE: Molecular Gastronomy
STUDENT NAME: Iosselin Katiuska Fuentes Rodriguez
FOOD PRODUCT: Caché entre les polymères
WEEK NO.: 1 **DATE: 10/04/2023**

1. **Weekly Aim**

    The aim of this week is to develop one of the elements of the dish “pearls” using pure compounds and working with the texture and flavor.

2. **Objectives**

    - Determine the right proportions of the ingredients.
    - Define the amount of color used for this element.
    - Determine flavor of the element.
    - Determine consistency of the element (texture).

3. **Materials (Ingredients and Equipment)**

    The ingredients required for this element is presented below:

    - Water
    - Sodium Alginate
    - Maltodextrin
    - Bacon Flavouring
    - Bath: Water
    - Bath: Calcium Chloride
    - Green and orange Colorant

    The equipment used for this element is described below:

    - Hand blender
    - Balance
    - Bowls
    - Plate
    - Whisk
    - Spoon
    - Plastic dropper

4. Method

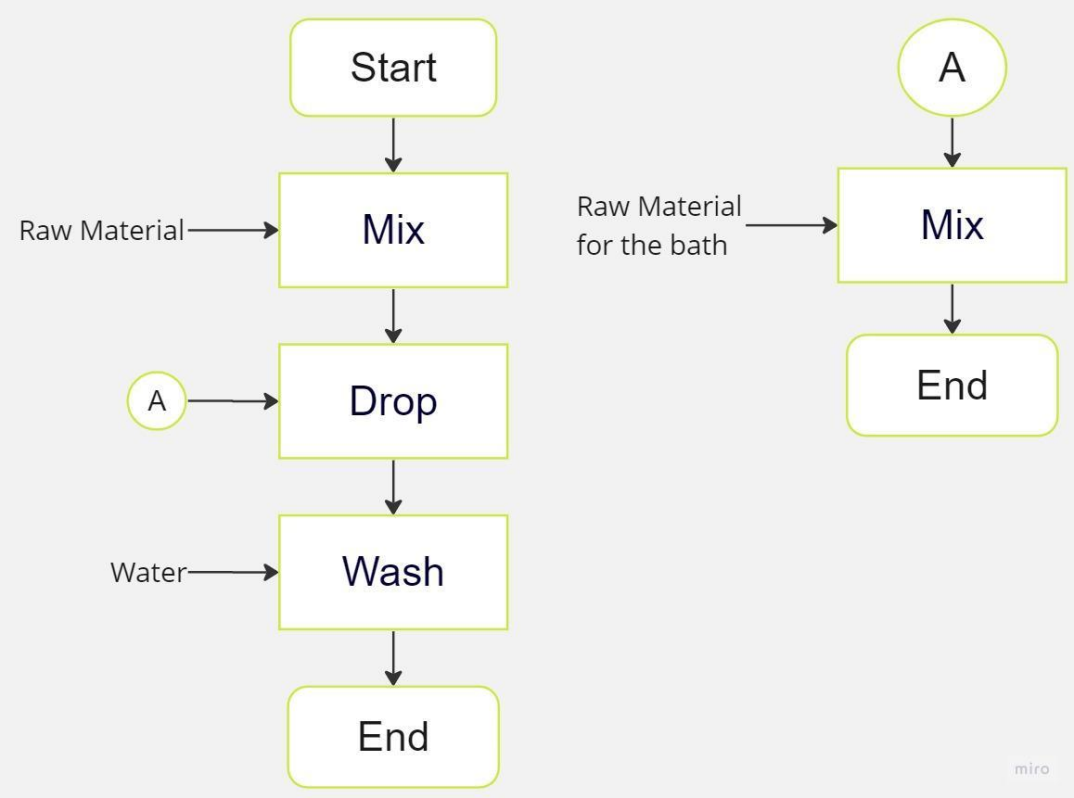

Figure 1. “Pearls” Process Flowchart

5. Results and discussion

The consistency of the product was just right. The amount of flavoring used was right. It is necessary to be careful with drip speed. The “pearls” obtained are presented below.

Figure 2. Second element “Pearls”.

6. Conclusions

The flavor was right. Regarding appearance, this element has a shiny colour. The texture was firm and with a good consistency.
In general, the product was well developed.

7. **Ingredients required for the following 2 weeks.**

    - Water
    - Bacon Flavouring
    - Green, Red & Yellow Colourant
    - Salt
    - Potato Starch

MODULE CODE: TFCS9025
MODULE TITLE: Molecular Gastronomy
STUDENT NAME: Iosselin Katiuska Fuentes Rodriguez
FOOD PRODUCT: Caché entre les polymères
WEEK NO.: 1 **DATE: 17/04/2023**

1. **Weekly Aim**

    The aim of this week is to develop one of the elements of the dish “leaves” using pure compounds and working with the texture and flavor.

2. **Objectives**

    - Determine the right proportions of the ingredients.
    - Define the amount of color used for this element.
    - Determine flavor of the element.
    - Determine consistency of the element (texture).

3. **Materials (Ingredients and Equipment)**

    The ingredients required for this element is presented below:

    - Water
    - Bacon Flavouring
    - Green, Red & Yellow Colourant
    - Salt
    - Potato Starch

    The equipment used for this element is described below:

    - Balance
    - Bowls
    - Plate
    - Whisk
    - Spoon

4. **Method**

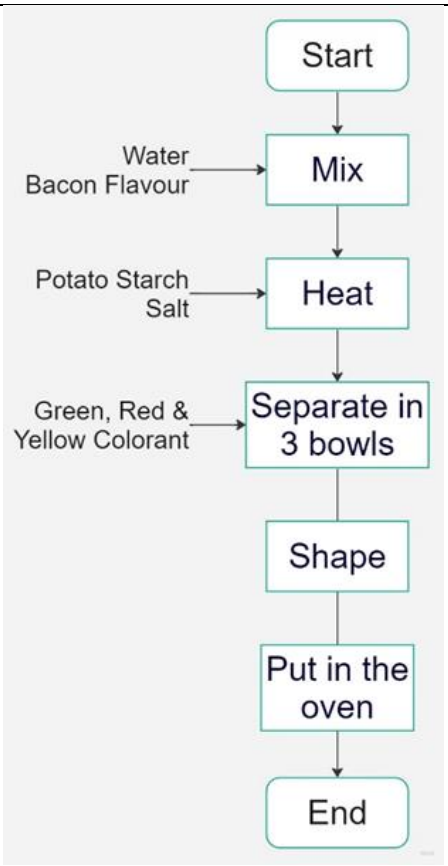

Figure 1. “Leaves” Process Flowchart

5. Results and discussion

The consistency of the product was just right. The amount of flavoring used was right. It is necessary to be careful with the time and temperature of both types of leaves. The “leaves” obtained are presented below.

Figure 2. Third element “Leaves”.

6. Conclusions

The flavor was right. Regarding appearance, the leaves type 1 has a shiny colour. The height of the leaves type 2 are correct. The texture was firm and with a good consistency. The salt helps to enhance the flavor.
In general, the product was well developed.