

NOTE BY NOTE ASSIGNMENT

Report on,

Dish- The Temple : Savory Indian Twist

MODULE: Advanced Molecular Gastronomy

MODULE CODE: TFCS9025

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1.Introduction

Molecular gastronomy is the study of science that deals with the physical and chemical transformation that happens during the cooking process. The idea was coined by physical chemist Hervé This and physics professor Nicholas Kurti in 1988 to understand the science behind the culinary process. By incorporating chemistry and physics it has come up with various techniques which are known as molecular cooking and cuisine based on this is called molecular cuisine (*molecular gastronomy (History, Theory, Techniques, & Facts, 2022)*).

Note by note cooking is a method of synthetic cooking that uses pure compounds to build food. The dish is looked at from a chemical point of view to make a dish that has a balance of macronutrients. The major areas that it deals with are nutrition, toxicity, and sustainability. The purpose of this form of cooking is to design food for humankind in 2050 is expected to reach 10 billion. This form of cooking would also help us solve the problems related to food spoilage, and water shortage and save energy as well. Hervé is one of the founding members of this form of cooking and believes that it could improve food security on a global level.

The theme provided to us for note cooking is “*Savory dice and Fiber*”. The purpose of including fiber is because of recent discoveries. The effect of laxation is long known to benefit consuming fibers, but current discoveries show that it is one of the major factors responsible for maintaining the composition and metabolic activity of the *microbiota (Health Benefits of Fiber Fermentation, 2022)*.

2.Aim

The aim was to create a savory cube that has prebiotic benefits and is fibrous. The name of the dish is ‘*The Temple: Savory Indian twist*’. The dish would be in the shape of an Indian temple.

2.1.Objective

- Flavor profile- Indian, a combination of salty and spicy.
- Incorporate prebiotic and fiber benefits into the dish.
- The dish would be a combination of carbohydrates and protein since they are major building blocks of the human body.

2.2.Dish Description

The dish would have four layers. The cube would be formed from a combination of mashed potato layer flavored with cheddar cheese and tomato gel layer. To add crunch there would be chili flavored crisps and to balance the spiciness there would a creamy mint flavored sauce. Inulin will be added to tomato gel and psyllium husk would be added to mashed potato layer to achieve the second objective.

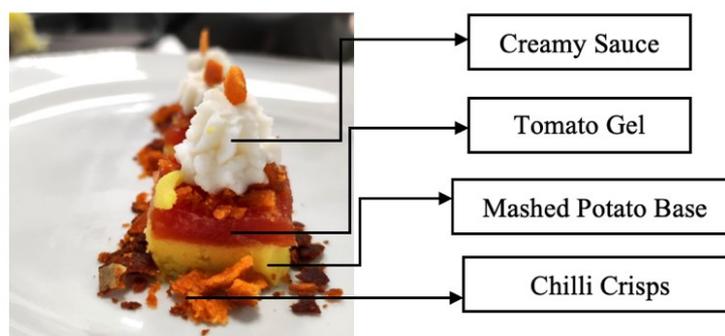
3.Materials and Equipment required

Sl. No.	Ingredients	Amount
1	Flour	35gm
2	Sosa-Tomato Powder	10gm
3	Sosa-Aroma Chilli Pepper	1 drop
4	Water	200gm
5	Salt	2gm
6	Sugar	0.5gm
7	Sunflower oil	320ml
8	Knorr Mashed Potato Powder	50gm
9	Sosa-Cheddar Cheese Powder	2gm
10	Sosa-Onion flavor(no. 57)	1 drop
11	Lepicol High Fibre Psyllium husk	2gm
12	Sosa-Agar Agar	2gm
13	Sosa-Inulin	3gm
14	Sosa-Green Tomato Flavor (no. 63)	1 drop
15	Caesin Powder	30 gm
16	Sosa-Spear Mint Flavor (no. 49)	0.5 drop
17	Mallard Ferrière Food Colouring in Yellow gel	1 drop
18	Mallard Ferrière Food Colouring in Red gel	1 drop
Other Equipment		
19	Mixing Bowl	4
20	Weighing Machine	1

21	Frying pan	1
22	Spatula	1
23	Spoon	1
24	Fork	1
25	Sharp knife	1
26	Plate for serving	1
27	Balloon Whisk	1
28	Piping bag	1
29	Square moulds	1
30	Piping bag & star nozzle	1

4.Preparation Method

The dish has four-layer,



4.1.Creamy sauce

The creamy sauce was made using casein as the base ingredient and for flavoring mint and salt was used. Other parts of the dish are very flavorful, to balance it up the sauce flavor level should be very mild.

Sl. No.	Ingredients	Amount
1	Bulk PowderCaesin Powder	30 gm

2	Water	10gm
3	Sosa-Spear Mint Flavor (no. 49)	0.5 drop
4	Salt	0.5gm

- All the above four

ingredients are taken together in a bowl and mixed using the steel balloon whisk until it is a smooth paste, and the mint flavor and salt have evenly distributed throughout the sauce.

- Then transfer it into a piping bag with the star-shaped nozzle and keep it aside.

4.2. Tomato gel

Sl. No.	Ingredients	Amount
1	Sosa Tomato Powder	3gm
2	Salt	1gm
3	Sosa-Agar Agar	2gm
4	Sosa-Inulin	3gm
5	Sosa-Green Tomato Flavor (no. 63)	1 drop

- Mix all the dry ingredients in a saucepan and heat it on a medium flame for 3-5 minutes until all the ingredients dissolve in water and water temperature reaches 100 °C.
- After it dissolves remove it from flame and add the green tomato flavor mix it and then add it to cube moulds of around 0.5cm thickness.

4.3. Mashed Potato base

Sl. No.	Ingredients	Amount
1	Knorr Mashed Potato Powder	50gm
2	Sosa-Cheddar Cheese Powder	2gm
3	Salt	0.1gm
4	Water	25gm

5	Sosa-Onion flavor(no. 57)	1 drop
6	Mallard Ferrière Food Colouring in Yellow gel	1 drop
7	Lepicol High Fibre Psyllum husk	2gm

- All the above seven ingredients are taken together in a bowl and mixed using the steel balloon whisk until a very thick paste is formed, and all the ingredients have been evenly distributed throughout the paste.
- Once done then keep it aside for 10 minutes to set, for the mashed potato powder to absorb the water.

4.4.Chili crisps

Sl. No.	Ingredients	Amount
1	Flour	35gm
2	Sosa-Tomato Powder	5gm
3	Sosa-Aroma Chilli Pepper	1 drop
4	Water	20ml
5	Salt	0.2gm
6	Sugar	0.5gm
7	Sunflower oil	410ml
8	Mallard Ferrière Food Colouring in Red gel	1 drop

- Add 400ml of the sunflower oil to the deep fry pan and rest 10ml in a bowl. To the same bowl add flour, tomato powder, aroma chili pepper water, salt, and sugar then knead it.
- After kneading roll it flat and cut out a round shape as shown in Fig. 2.
- After that, the oil is heated on a high flame, when the oil is hot add the flat dough then reduce the flame and let it fry until it turns to a crisp Fig.3.



Fig. 2

After
Frying →



Fig. 3. Chili Crisp

4.5. Assembling all the parts

- After the tomato gel has been set then layer the mashed potato over it and by the combination of both the layers form the final cube.
- Then remove the cube and place it over the plate. On the top center add the white sauce with the help of a piping bag as shown in Fig.1.
- Then crush the chili crisp and add it to the dish as shown in Fig.1 and Fig.4

5. Results

The figures below show the final dish “*The Temple: Indian Savory Twist*”



Fig.4. Top view of the dish.



Fig.5. Side view of the dish

5.1.Texture

The four layers contributed four different textures complimenting each other as planned. The crisps turned out to be a little hard and chewy while the white sauce turned out to be creamy balancing all other textures. The tomato gel layer turned out very well. It was a gel, but it mixed well with the mashed potato when in the mouth. The mashed potato layer turned out to be slightly grainy.

5.2.Flavor

The casein in the white sauce did not contribute to any flavor, so the flavor of the white sauce was spearmint. The tomato gel had the flavor of green tomatoes. In the mashed potato layer, the cheddar cheese and mashed potato flavor very well complemented each other. I added crisps on the side since it had the chili flavor and while tasting a person had the option of not consuming it. The spiciness of chili was balanced by the creamy sauce.

6.Discussion

The sensory analysis revealed that overall, the product turned out to be acceptable. Since the sensory analysis contained a mix of students from different parts of the world so depending on the individual perception the acceptability of the level of spice and intensity of flavor differed.

The texture of the tomato gel layer is achieved using agar. Agar is a seaweed hydrocolloid made of polysaccharides. The main structure is made of D-galactose and 3,6-anhydrous-L-galactose (*Harris, 1990*). The gelling property is due to the interaction between the helix structure. It is important to heat the agar with water to 100°C for 3-5 minutes to hydrate the agar (*Chemical and Physical Properties of Agar in Cooking, 2022*). This is because the gelling property of agar is due to the hydrogen bond formed in its linear galactan chains (*Phillips, G. O., & Williams, P. A. 2009*). Inulin is a non-digestible carbohydrate found in bananas and artichokes. Due to its chemical structure, the enzymes present in the digestive tract cannot hydrolyze and it passes through the mouth stomach and small intestine unaltered. Studies have shown that no significant amount of inulin is detected in the feces which shows that in the colon the inulin is completely metabolized by the intestinal bacteria. This function makes it a prebiotic because

of which it is added to the dish. Excess inulin and agar gave an artificial flavor and unacceptable chewiness to the product which was controlled by reducing the respective quantities.

The psyllium husk added to the mashed potato layer is to incorporate fiber into the dish. It is a dietary and functional fiber that can't be digested by human body enzymes. They promote microbial growth in the intestine by becoming a substrate to ferment and act as a laxative. The white sauce was made using casein makes the dish rich in protein. Studies show that casein prevents increased blood pressure and has other cardiovascular benefits (*Sánchez et al., 2011*).

7. Conclusion

This form of cooking was a completely new experience. The major challenge was to balance nutrition and flavor. To improve the nutrition inulin, agar, psyllium husk, and casein powder were used. Inulin was added to give the dish benefits of consuming prebiotics and agar was added to achieve a tomato-like texture. So, the process of finding the right balance was a great learning experience. The psyllium husk was added as a source of fiber, casein as a source of protein, and mashed potato powder as a source of carbohydrate. The drawback of the dish is it lacks balanced micro-nutrients. Further research is required to incorporate it into the dish.

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Appendix Logbook-1

MODULE: Advanced Molecular Gastronomy

MODULE CODE: TFCS9025

STUDENT NAME: Priyadarshini Mallick

FOOD PRODUCT: The Temple: Savory Indian twist

WEEK NO.: 1

DATE: 28.3.22

Weekly Aims and Objectives

- Prepare a crispy layer with chili flavor.
- Make tomato gel whose flavor and texture are as close as possible to tomato.
- Incorporate inulin into the gel recipe.

Materials and Method

1. Chili Crisps

Sl. No.	Ingredients	Amount
1	Sosa-Tomato Powder	20gm
2	Sosa-Carrot Powder	40gm
3	Sosa-Albuwhip	14gm
4	Sosa-Aroma Chilli Pepper	2 drop
5	Sosa-Onion flavor(no. 57)	1 drop
6	Plain Wheat Flour	40gm
7	Water	30gm

- To the bowl add all the ingredients then knead it well.
- Then use your hand to press it into a thin flat sheet and cut out small square shapes of 2inch sides.
- A baking tray is taken and covered with parchment paper, then the flat square dough is placed over it. It is then baked at 150 °C for 20 mins.
- Then remove it from the oven and place it aside to cool down.

2. Tomato gel

Sl. No.	Ingredients	Amount
1	Sosa Tomato Powder	3gm
2	Salt	1gm
3	Sosa-Agar Agar	2gm
4	Sosa-Inulin	3gm
5	Sosa-Green Tomato Flavor (no. 63)	1 drop

- Mix all the dry ingredients in a saucepan and heat it on medium flame until all the ingredients dissolve in water.
- After it dissolves remove it from flame and add the green tomato flavor mix it and then add it to cube moulds of around 0.5cm thickness and keep it aside to set.

Results and discussion

As per the sensory analysis

- The chili crisps turned out to be so dry from the outside and soft from the inside.
- The flavor of the chili crisp turned out to be too spicy.
- The gel turned out to be harder in texture than required.
- The flavor of the gel was tangy.

Conclusions

- Due to the albuwhip air was incorporated into the mixture and the fiber contributed by carrot powder and tomato powder led to the chili crisp becoming soft from inside.
- The due to increased quantity of agar in the gel there there was too much interaction between helix of 3,6-anhydro-L-galactose containing the hydrogen atom.
- The increased quantity of inulin in the product caused the tomato gel to taste artificial.

Recommendations for the following week

- Reduction in inulin, agar, and tomato powder quantity in the tomato gel recipe.
- Remove albuwhip and carrot powder and reduce the quantity of chili flavor in the chili crisp recipe.
- Try frying the chili crisps to get the crispy texture.

Logbook-II

MODULE: Advanced Molecular Gastronomy

MODULE CODE: TFCS9025

STUDENT NAME: Priyadarshini Mallick

FOOD PRODUCT: The Temple: Savory Indian twist

WEEK NO.: 2

DATE: 1.4.22

Weekly Aims and Objectives

- Prepare chili crisps without carrot powder and albuwhip and reduce the flavor of chili.
- Make tomato gel with reduced agar, inulin, and tomato powder quantity.
- Prepare mash potato layer of the dish.

Materials and Method

1. Chili Crisps

Sl. No.	Ingredients	Amount
1	Flour	35gm
2	Sosa-Tomato Powder	5gm
3	Sosa-Aroma Chilli Pepper	1 drop
4	Water	20ml
5	Salt	0.2gm
6	Sugar	0.5gm
7	Sunflower oil	410ml
8	Mallard Ferrière Food Colouring in Red gel	1 drop

- Add 400ml of the sunflower oil to the deep fry pan and rest 10ml in a bowl. To the same bowl add flour, tomato powder, aroma chili pepper water, salt, and sugar then knead it.

- After kneading roll it flat and cut out a round shape as shown in Fig. 2.
- After that, the oil is heated on a high flame, when the oil is hot add half of the flat dough then reduce the flame and let it fry until it turns crisp as shown in Fig.3.
- A baking tray is taken and covered with parchment paper, then place the other half of the flat square dough is placed over it. It is then baked at 150 °C for 20 mins.
- Then remove it from the oven and place it aside to cool down.

2. Tomato gel

Sl. No.	Ingredients	Amount
1	Sosa Tomato Powder	10gm
2	Salt	1gm
3	Sosa-Agar Agar	4gm
4	Sosa-Inulin	5gm
5	Sosa-Green Tomato Flavor (no. 63)	1 drop

- Mix all the dry ingredients in a saucepan and heat it on medium flame until all the ingredients dissolve in water.
- After it dissolves remove it from flame and add the green tomato flavor mix it and then add it to cube moulds of around 0.5cm thickness and keep it aside to set.

Results and discussion

As per the sensory analysis

- The fried Chili crisps turned out to be perfectly crispy whereas the baked ones were a bit softer.
- The flavor of chili crisp was as per the requirement.
- The tomato gel also turned out as per the requirement.

Conclusions

- The baked chili crisps absorb moisture compared to fried ones since fried ones tend to have an oil coating over them which kind of gives a laminating effect.

Recommendations for the following week

- There is no requirement for making the changes in the above recipe.
- Work on mashed potato layer and white sauce.

Logbook-III

MODULE: Advanced Molecular Gastronomy

MODULE CODE: TFCS9025

STUDENT NAME: Priyadarshini Mallick

FOOD PRODUCT: The Temple: Savory Indian twist

WEEK NO.: 3

DATE: 4.4.22

Weekly Aims and Objectives

- Perform trials on mashed potato layer
- Prepare the white sauce

Materials and Method

1. Mashed Potato base

-Trial 1

Sl. No.	Ingredients	Amount
1	Knorr Mashed Potato Powder	50gm
2	Sosa-Cheddar Cheese Powder	4gm
3	Salt	0.1gm
4	Water	25gm
5	Sosa-Onion flavor(no. 57)	1 drop
6	Mallard Ferrière Food Colouring in Yellow gel	1 drop
7	Lepicol High Fibre Psyllum husk	2gm

- All the above seven ingredients are taken together in a bowl and mixed using the steel balloon whisk until a very thick paste is formed, and all the ingredients have been evenly distributed throughout the paste.

- Once done then keep it aside for 10 minutes to set, for the mashed potato powder to absorb the water.

-Trial 2

Sl. No.	Ingredients	Amount
1	Knorr Mashed Potato Powder	50gm
2	Sosa-Cheddar Cheese Powder	2gm
3	Salt	0.1gm
4	Water	25gm
5	Sosa-Onion flavor(no. 57)	1 drop
6	Mallard Ferrière Food Colouring in Yellow gel	1 drop
7	Lepicol High Fibre Psyllum husk	2gm

- All the above seven ingredients are taken together in a bowl and mixed using the steel balloon whisk until a very thick paste is formed, and all the ingredients have been evenly distributed throughout the paste.
- Once done then keep it aside for 10 minutes to set, for the mashed potato powder to absorb the water.

2. White sauce

Sl. No.	Ingredients	Amount
1	Bulk PowderCaesin Powder	30 gm
2	Water	10gm
3	Sosa-Spear Mint Flavor (no. 49)	1 drop
4	Salt	0.5gm

- All the above four ingredients are taken together in a bowl and mixed using the steel balloon whisk until it is a smooth paste, and the mint flavor and salt have evenly distributed throughout the sauce.

Results and discussion

As per the sensory analysis

- For the mashed potato layer, the trial-1 sample had too much cheese flavor while the trial-2 turned out to be perfectly acceptable.
- The white sauce turned out to have too much mint flavor

Conclusions

- Further work on the recipe of white sauce is required.

Recommendations for the following week

- Reduce the mint flavor in the white sauce.

Logbook-IV

MODULE: Advanced Molecular Gastronomy

MODULE CODE: TFCS9025

STUDENT NAME: Priyadarshini Mallick

FOOD PRODUCT: The Temple: Savory Indian twist

WEEK NO.: 4

DATE: 20.4.22

Weekly Aims and Objectives

Weekly Aims and Objectives

- Reduce mint flavor in the white sauce
- Prepare the chili crisps, tomato gel and the mashed potato layer for assembling the four layers to make the final dish.

Materials and Method

1. Creamy sauce

Sl. No.	Ingredients	Amount
1	Bulk PowderCaesin Powder	30 gm
2	Water	10gm
3	Sosa-Spear Mint Flavor (no. 49)	0.5 drop
4	Salt	0.5gm

- All the above four ingredients are taken together in a bowl and mixed using the steel balloon whisk until it is a smooth paste, and the mint flavor and salt have evenly distributed throughout the sauce.
- Then transfer it into a piping bag with the star-shaped nozzle and keep it aside.

2. Tomato gel

Sl. No.	Ingredients	Amount
1	Sosa Tomato Powder	3gm
2	Salt	1gm
3	Sosa-Agar Agar	2gm
4	Sosa-Inulin	3gm
5	Sosa-Green Tomato Flavor (no. 63)	1 drop

- Mix all the dry ingredients in a saucepan and heat it on medium flame until all the ingredients dissolve in water.
- After it dissolves remove it from flame and add the green tomato flavor mix it and then add it to cube moulds of around 0.5cm thickness.

3. Mashed Potato base

Sl. No.	Ingredients	Amount
1	Knorr Mashed Potato Powder	50gm
2	Sosa-Cheddar Cheese Powder	2gm
3	Salt	0.1gm
4	Water	25gm
5	Sosa-Onion flavor(no. 57)	1 drop
6	Mallard Ferrière Food Colouring in Yellow gel	1 drop
7	Lepicol High Fibre Psyllum husk	2gm

- All the above seven ingredients are taken together in a bowl and mixed using the steel balloon whisk until a very thick paste is formed, and all the ingredients have been evenly distributed throughout the paste.
- Once done then keep it aside for 10 minutes to set, for the mashed potato powder to absorb the water.

4. Chili crisps

Sl. No.	Ingredients	Amount
1	Flour	35gm
2	Sosa-Tomato Powder	5gm
3	Sosa-Aroma Chilli Pepper	1 drop
4	Water	20ml
5	Salt	0.2gm
6	Sugar	0.5gm
7	Sunflower oil	410ml
8	Mallard Ferrière Food Colouring in Red gel	1 drop

- Add 400ml of the sunflower oil to the deep fry pan and rest 10ml in a bowl. To the same bowl add flour, tomato powder, aroma chili pepper water, salt, and sugar then knead it.
- After kneading roll it flat and cut out a round shape as shown in Fig. 2.
- After that, the oil is heated on a high flame, when the oil is hot add the flat dough then reduce the flame and let it fry until it turns crisp.

5. Assembling all the parts

- After the tomato gel has been set then layer the mashed potato over it and by the combination of both the layers form the final cube.
- Then remove the cube and place it over the plate. On the top center add the white sauce with the help of a piping bag as shown in Fig.1.
- Then crush the chili crisp and add it to the dish as shown in Fig.1 and Fig.4

Result

- The dish is ready for the final sensory and showcase.