



USE SCIENCE
TO TAKE
GRILLING
TO THE
NEXT LEVEL!



USE SCIENCE TO GRILL LIKE A FOOD CHEMIST



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INTRODUCTION

Cooking is a chore enjoyed by many people. Some have even turned cooking into an art and have mastered it.

Cooking is also a science. Only a handful of people understand the chemistry and science that occurs when we cook our foods. That knowledge is crucial to the preparation of tasty and nutritious meals.

Like many of you, we have always been interested in the science behind cooking and how it creates succulent flavours in our meats. In this book, the focus will be on the science of cooking through some processes such as the Marination process as well as the Maillard Reaction.

In this book, we also introduce our meat injector, a small tool specifically designed to make marination easier and more efficient, in contrast to the traditional soaking method.

Our products are designed by specialists to enable individuals who are passionate about cooking the ability to use it effortlessly.

It also ensures that the whole meat is well marinated and gives you the best result. Turn to the next page to learn about the Maillard Reaction first and learn the importance of this cooking technique.

CHAPTER 1

What is the Maillard Reaction?

The Maillard Reaction is named after the first person who discovered the chemical reaction in 1912, French chemist Louis-Camille Maillard. Otherwise known as Browning reaction, this reaction is the chemical reaction that occurs between a reducing sugar and an amino acids in the presence of heat. The reaction results in the browning of the food under preparation, giving it new flavor and aroma.

For instance, bacon, steaks, and baked bread all undergo the same Maillard process during cooking. However, they all look, smell, and actually have different tastes. Thus, the reaction is food-specific and is responsible for the dark-brown crust that is always seen on a meat that is cooked with high temperature.

For a better understanding of the concept, let me briefly discuss the two major components of this reaction apart from heat: reducing sugar and amino acids.

Amino acids are present in food and proteins are built on them. On the other hand, reducing sugars, as indicated by their names, contribute



to biochemical process as reducing agents.

Both the reducing sugars and amino acids are rearranged in foods in rings, and sometimes, groups of rings, to enable them to have the right impact on the food, thereby contributing to its rich flavors and brown color.

When you are cooking, you are obviously attracted by the good smell from the food. The browning reaction forms some molecules that produce the aroma, irrespective of whether you are roasting, frying, baking, or searing.

If the pan is left on the heat for a long period of time, the reaction takes on a new meaning as it becomes more complex. The sugars and proteins involved in the process will continue their reaction and form more complex and various molecules.

If you have ever wondered where the sweet aroma from food comes from, you have known now. Although it is a general reaction among foods, the flavor produced during this reaction varies from one food to another. This explains why a fried egg won't produce the same aroma as a porched one.

Factors needed for the Maillard reaction

Getting the best out of the Maillard reaction depends on doing it right. Your cooking must be done with zero tolerance for mistakes in order to get the desired result, including the right aroma and taste.



There are some key factors that play a crucial role in starting the Maillard reaction with increased success rates. These are:

- **Moisture:** It will be impossible for your food to exceed the boiling point of water if it is wet. Thus, it is a necessity that your food is dry before embarking on cooking it. When cooking meat, for instance, it is advisable that you dry it in a paper towel in order to remove the moisture before cooking. The same principle applies to searing or normal pan fry. Dry the food before searing or frying it.

- **Temperature:** As the temperature increases, the chemical reaction that takes place increases as well, speeding up the rate of water evaporation in the food. The drying up of the water will lead to a corresponding concentration of the proteins and sugars and that will ultimately lead to the speeding up of the reaction.

You should endeavor to limit your cooking temperature to 355oF or 180oC. Exceeding the temperature will increase your food's risk of prolysis or burning as it's commonly known.

- **Proteins and sugars:** In the absence of these two, Maillard reaction won't produce the desired result: flavors and browning. This is due to the fact that the process won't occur if these two are not present.



Some proteins are naturally susceptible to Maillard. These types of sugars are ready to react with sugar at any time, although they are selective. Some sugars such as table sugars and starches won't react with this type of proteins because their molecules are large.

Rather, reducing sugars that are simple sugars can attract and react with amino acids at the right moisture levels and temperature to trigger Maillard reaction.

Benefits of the Maillard Reaction

The Maillard reaction has tons of benefits when done the right way. Our food won't give us the wide variety of aromas and flavors we are accustomed to without this reaction.

Imagine if your deep fried chicken wings have the same taste and aroma with the seared steak or there is no difference between scrambled and fried egg. Of course, the monotonous taste and flavor won't give us the satisfying taste and aroma we are so used to that they have become an integral part of our cooking process. We will all be consuming placid and tasteless food day in day out.

Another important cooking technique that contributes greatly to cooking is the Marination process. We will discuss this extensively in the next chapter.



CHAPTER 2

What is the Marination Process?

You are probably aware of the purpose of the marinade. It has proven over the years to be an effective protein and meat-flavoring process. During marination, the food is soaked in a seasoned liquid before the cooking process. In addition to the seasoned liquid, other components include herbs, oils, spices, and other ingredients that will be needed to flavor the food.

While the process is very simple with a lot of benefits on your proteins and meats, another marination technique involves using a meat injector to inject marinade into the meat. This is in sharp contrast to the conventional process of soaking the meat in a bagful of marinade for the same effect. What is the potential advantage of injecting the meat versus soaking it in marinade?

When you soak meat in a marinade for a period of time, the marinade will add some flavors to the meat's surface. However, the marinade won't be powerful enough to penetrate deep into the meat. Rather, only the surface will feel the impact of the marination, although this is dependent on the protein's thickness.



In essence, while you may get the desired flavor, the meat can't breakdown its protein and become tender easily.

Alternatively, you can go for the other technique and inject the meat or any protein with the marinade. This ensures a deeper penetration that allows the meat to be infused with the marinade completely, not only the surface as in the case of soaking the meat in the marinade.

During the injection process, the enzymes and acids in the marinade will break the connective tissues in the marinade down. They will also change the meat's molecular structure, making it possible for the meats not to lose their moisture. This ensures shortened cooking time due to the reduced amount of heat that is now needed for the cooking.

In a nutshell, the marination process can be sped up via the injection method. The chemical process that occurs during marination will be expanded since the agent responsible for tenderizing is the marinade is able to establish a direct contact with the internal part of the meat.

This is the basic difference between the two, and a huge difference for that matter. Rather than go through the more time-consuming and less-efficient soaking technique, with the use of a meat injector, you can get it done in the fraction of the soaking time and have the entire meat well marinated and be assured of more flavored meat.



Let's take a look at the marinade injector in order to have a better grasp of the instrument and learn the best way to maximize its potentials for effective marination.

Importance of the Marinade Process

The Marinade Process offers some benefits in addition to giving your meat the desired aroma and flavor. Some of the other benefits you will derive from this cooking technique are:

- **It improves the tenderness of meat**

The action of the enzymes and acids in marinade to break down the connective tissues increases the food's tenderness since the process also alters the meat's muscle structure.

However, it should be noted that there must be a direct contact between the meat and the marinade for the before the chemical reaction can occur, something that soaking the meat in a marinade can't guarantee.

- **It makes meat safer for consumption**

The American Cancer Research Institute has established a connection between cooking meat with direct heat from flame and cancer. According to the research, the creatine in meat and the amino acids will trigger a chemical reaction that will produce heterocyclic amines, a carcinogenic substance.



With marination, you can use safe marinades that contain such as wine, beer, vinegar, and the rest that contains acidic liquids without exposing yourself and your family to the cancer-causing agents, making such meats safer for consumption than those cooked with direct flames.

- **Seasoning becomes easier**

We all like seasoning our meat, regardless of the preparation technique used. Sometimes, a couple of ingredients may be needed for the seasoning and this can be time-consuming.

In order to beat this challenge and make the seasoning process easier, simply create a marinade and store it in your fridge for easy marination. This takes the whole stress off your shoulders.

From the above, it is obvious that marination is a cooking process that all and sundry should embrace.

You don't have to be a master chef before you identify the superiority of the injecting method over the soaking method as the most efficient way to add moisture and flavor to a smoked, barbecued, or grilled food.

With our meat injector, premium flavor is guaranteed throughout. In the end, you will get a professional taste without burning a hole in your pocket.



CHAPTER 3

Marination made easy with The Ultimate Flavor Solution!

The Kitchen Labs Co. Stainless Steel Meat Injector is an ideal culinary tool for both novice and advanced cooks because it lets you enjoy perfectly cooked meat that oozes with flavor. With the 3-ring ergonomic design, you will get a comfortable grip making flavor infusion simple even for beginners. With the 2-OZ barrel reservoir, you will notice the reduction of refills and be able to evenly disperse the marinade throughout your meat.

Bring out the science and chemistry in your cooking through the injection method!

Taking Care of Your Kitchen Labs Co. Stainless Steel Meat Injector

Your Stainless Steel Marinade Injector by Kitchen Labs Co. has probably been delivered by now. Congrats!

Your complete satisfaction is our number one priority. If you have any issues with your purchase, please contact us so we can do our best to resolve them!



Key Instructions for your Kitchen Labs Co. Marinade Injector Kit:

1. Wash Before Use

Your new Marinade Injector is cleaned before it is packaged, but in a factory setting, it is possible to still have some debris from time to time. We recommend cleaning the Kitchen Labs Co. Meat Injector with soap and warm water or place in the dishwasher before using. Please remove the silicone gaskets prior to running in the dishwasher.

2. Preparing Your New Marinade Injector

When first opening your package, you will notice the oil on the plunger. This is there to lubricate the seals. After the initial wash, the plunger on your new Marinade Injector will be tough to push and pull. To create the smooth gliding movement when fully assembled, simply apply a thin film of cooking oil around the silicone O-ring gasket.

3. Loading Your New Marinade Injector

Select your needle based on the type/thickness of the Marinade. Draw the marinade into the injector by dipping the needle into a bowl of marinade—drawing the plunger outwards.



4. Injecting the Marinade Using Your New Marinade Injector

Insert the Needle at a 45-degree angle into your choice of meat. Begin by pressing down on the 3-ring ergonomic handle – slowly withdrawing the needle to ensure even distribution of the marinade.

5. When to replace the silicone gaskets

Wear and tear is normal when it comes to frequent use of the Meat Injector. We recommend replacing the gaskets once you start to notice leaks or if the gaskets appear loose on the needles and the plunger.

This tool will give you the best result if you use it as recommended and take the necessary maintenance measures that will ensure its durability.

CHAPTER 4

Marinade Recipes That Will Have Your Friends and Family Raving!

If done right, Marination may be the difference between your family's lackadaisical attitude towards food or their high appetite.

You can start with the recipes below and have an idea of the best way to keep your family and friends asking for more.





GREAT FOR CHICKEN



1

HONEY MUSTARD MARINADE

INGREDIENTS:

- 1 cup Dijon Mustard
- 1 cup dry white wine
- 3/4 cup olive oil
- 1/4 cup honey
- 1 clove garlic, minced
- 2 T soy sauce

DIRECTIONS:

- Mix all ingredients.



2

LEMON MARINADE

INGREDIENTS:

- 2 T olive oil
- 1/2 small onion, finely minced
- 1 clove garlic, minced
- 2 T chopped fresh rosemary
- freshly ground black pepper, to taste
- grated zest of one lemon
- 1/4 cup fresh lemon juice

DIRECTIONS:

- Mix all ingredients, use immediately.



3

BRANDIED MARINADE

INGREDIENTS:

- 1/2 cup brandy
- 1/4 cup soy sauce
- 2 T unsulfured molasses
- 1/2 t Dijon mustard
- 1 T grated fresh ginger
- 1/2 cup dry white wine

DIRECTIONS:

- Mix together.





GREAT FOR PORK

MARINADE
FOR CHICKEN
AND PORK



1

PORK TENDERLOIN MARINADE

INGREDIENTS:

- 1/2 cup of soy sauce
- 1 r mustard.
- 2 T light corn syrup.
- 1/4 cup of salad oil (Alternatively, you can use olive oil)
- 2 t ginger
- Add onion powder and garlic to taste.

DIRECTIONS:

- Marinate the tenderloin in your refrigerator.
- Bake it for between 45 and 60 minutes at 350oC.
- You can cook the tenderloin slowly for a better taste.



2

BANANA CHUTNEY

INGREDIENTS:

- 1/2 lb of ripe red bananas
- 6 ounces of guava nectar
- 1 medium red onion. Chop it coarsely.
- 1 tablespoon of brown sugar.
- 2 tablespoons of vegetable oil.
- 1 tablespoon of lime juice
- 1 tablespoon of brown sugar

DIRECTIONS:

- Put the onion in oil and sauté until it is soft.
- Add the bananas to the sautéed onion and cook for 5 minutes more.
- Add the brown sugar and guava nectar, simmer for 10 minutes.
- Remove it from the heat and add the lime juice.
- Serve at room temperature.





GREAT FOR
STEAK



1

MARINADE TO TENDERIZE STEAK

INGREDIENTS:

- Seasoning salt
- Garlic powder
- lemon pepper
- 1/2 bottle of Italian dressing

DIRECTIONS:

- Add lemon pepper, seasoning salt, and garlic powder in about 1 ½-inch thick sirloin steak.
- Add about ½ bottle of Italian dressing in a ziplock bag.
- For about 4 hours, seal the content. Alternatively, you can seal it overnight.



2

BLACK PEPPER LAMB MARINADE

INGREDIENTS:

- 2 diced onions.
- 500g lamb.
- 1 tablespoon of ghee
- 1 teaspoon of black pepper.
- 1 cup of dahi.
- 1 clove
- 1 green chilli, chopped.
- 1 cinnamon stick, small.
- 2 diced onions.
- Salt to taste.
- 1 tbsp of garlic paste.
- 1 teaspoon of powdered turmeric.

DIRECTIONS:

- Mix all the ingredients together.
- Overnight, marinate the lamb.
- On low heat, cook the marinade lamb with coconut milk.
- Serve it with rice.



These are some recipes you can try out at your convenience. When you are through with them, your understanding of the science of cooking will deepen. You will equally see the need to adopt the marination process, especially, through the efficient meat injector.



CONCLUSION

Understanding the science of cooking will help you to view cooking from another perspective. You will understand the principle behind the different tastes and aroma from different foods.

Understand both the Marination process and the Millard Reaction and you will have a perfect understanding of the science of cooking. That knowledge will have a positive impact on your cooking forever.

Take your cooking to the next level with the Kitchen Labs Co. Stainless Steel Meat Injector. It is the perfect tool for marination if you desire the right aroma and taste when cooking meat. The huge advantage of using the tool over soaking meat in marinade makes using the injector worthwhile for those who are passionate about good food.



HERE'S TO CREATING
BETTER FLAVORS
THROUGH SCIENCE!

-LUIS AND KATRINA
MARTINEZ

