Modern Pastry and Plated Dessert Techniques

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The BC Cook Articulation Committee

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1. "Open Educational Resources," *Hewlett Foundation*, https://hewlett.org/strategy/open-educational-resources/ (accessed September 27, 2018).

Preface

The world of pastry and **plated desserts** has changed immensely over the last few decades. Once the realm of cake slices and French pastries, now the modern pastry kitchen finds itself immersed in modern techniques, new flavour combinations, and a desire to introduce traditionally savoury elements into the dessert plate. In this book we will look at the techniques that are becoming commonplace and explore the principles behind designing and plating modern desserts.

Modern Pastry and Plated Dessert Techniques is one of a series of Culinary Arts books developed to support the training of students and apprentices in British Columbia's food service and hospitality industry. Although created with the Professional Cook and Baker programs in mind, these have been designed as a modular series, and therefore can be used to support a wide variety of programs that offer training in food service skills.

Other books in the series include:

- Food Safety, Sanitation, and Personal Hygiene
- Working in the Food Service Industry
- Workplace Safety in the Food Service Industry
- Meat Cutting and Processing
- Human Resources in the Food Service and Hospitality Industry
- Nutrition and Labelling for the Canadian Baker
- Understanding Ingredients for the Canadian Baker
- Basic Kitchen and Food Service Management

The series has been developed collaboratively with participation from public and private post-secondary institutions.

I

Scientific Principles and Techniques Used in Modern Pastry

Learning Objectives

- Describe the process of coagulation
- Describe the process of gelatinization
- Describe the process of crystallization
- Describe the use of hydrocolloids
- Describe the process of spherification
- Describe molecular gastronomy techniques used in the pastry shop
- Describe the use of low temperature and sous-vide cooking in the pastry shop

Today we understand more than we once did about how ingredients of food scientifically interact with one another and how to change them to make them different using methods such as jellifying, powdering, foaming—methods common to what is known as **molecular gastronomy**. As a result, modern pastry chefs are making amendments to time-honoured recipes to suit the modern palate. They are not cutting corners to make a less professional or delicious product. They are using new technology and knowledge that was not available 100 years ago, and they want to explore the creative side of pastry.

This creativity sometimes comes with an expectation of total freedom in the kitchen; an expectation that one will be able to create without following any rules or requiring traditional recipe formats. While it's good to foster a creative mindset, it's also important to acknowledge that creativity in baking must also adhere to certain scientific and professional guidelines in order to make well-executed, consistent, and delicious products. Chefs and cooks who embrace these new techniques are putting out products that may be unusual to the eye or palate and may even touch the other senses or be experimental in technique, but they are still keeping to the basic scientific principles that make baking as enjoyable as it has always been.

Many of these scientific principles are ones that cooks, bakers, and pastry chefs have been using for centuries, but in some cases have not referred to them by name, or in other cases have recently discovered different ways of achieving the same effect using new techniques, ingredients, or equipment.

1.

Coagulation

Coagulation is defined as the transformation of proteins from a liquid state to a solid form. Once proteins are coagulated, they cannot be returned to their liquid state. Coagulation often begins around 38°C (100°F), and the process is complete between 71°C and 82°C (160°F and 180°F). Within the baking process, the natural structures of the ingredients are altered irreversibly by a series of physical, chemical, and biochemical interactions. The three main types of protein that cause coagulation in the bakeshop are outlined below.

Egg proteins

Eggs contain many different proteins. The white, or **albumen,** contains approximately 40 different proteins, the most predominant being ovalbumin (54%) and ovotransferrin (12%). The yolk contains mostly lipids (fats), but also lipoproteins. These different proteins will all coagulate when heated, but do so at different temperatures. The separated white of an egg coagulates between 60°C and 65°C (140°F and 149°F) and the yolk between 62°C and 70°C (144°F and 158°F), which is why you can cook an egg and have a fully set white and a still runny yolk. These temperatures are raised when eggs are mixed into other liquids. For example, the coagulation and thickening of an egg, milk, and sugar mixture, as in custard, will take place between 80°C and 85°C (176°F and 185°F) and will start to curdle at 88°C to 90°C (190°F and 194°F).

Dairy and soy proteins

Casein, a semi-solid substance formed by the coagulation of milk, is obtained and used primarily in cheese. **Rennet**, derived from the stomach linings of cattle, sheep, and goats, is used to coagulate, or thicken, milk during the cheese-making process. Plant-based rennet is also available. Chymosin (also called rennin) is the enzyme used to produce rennet, and is responsible for curdling the milk, which will then separate into solids (curds) and liquid (whey).

Milk and milk products will also coagulate when treated with an acid, such as citric acid (lemon juice) or vinegar, used in the preparation of fresh ricotta, and tartaric acid, used in the preparation of mascarpone, or will naturally curdle when sour as lactic acid develops in the milk. In some cases, as in the production of yogurt or crème fraîche, acid-causing bacteria are added to the milk product to cause the coagulation. Similarly, tofu is made from soybean milk that has been coagulated with the use of either salt, acid, or enzyme-based coagulants.

Flour proteins (gluten)

Two main proteins are found in wheat flour: glutenin and gliadin (smaller quantities are also found in other grains). During mixing and in contact with liquid, these two form into a stretchable substance called **gluten**. The coagulation of gluten is what happens when bread bakes; that is, it is the firming or hardening of these gluten proteins, usually caused by heat, which solidify to form a firm structure.

2.

Gelatinization

Hydrocolloids

A **hydrocolloid** is a substance that forms a gel in contact with water. There are two main categories:

- Thermo-reversible gel: A gel that melts upon reheating and sets upon cooling. Examples are gelatin and agar agar.
- Thermo-irreversible gel: A gel that does not melt upon reheating. Examples are cornstarch and pectin.

Excessive heating, however, may cause evaporation of the water and shrinkage of the gel. Hydrocolloids do not hydrate (or dissolve) instantly, and that hydration is associated with swelling, which easily causes lumping. It is therefore necessary to disperse hydrocolloids in water. Classically, this has always been done with cornstarch, where a portion of the liquid from the recipe is mixed to form a “slurry” before being added to the cooking liquid. This can also be done with an immersion blender or a conventional blender, or by mixing the hydrocolloid with a helping agent such as sugar, oil, or alcohol prior to dispersion in water.

Starches

Starch **gelatinization** is the process where starch and water are subjected to heat, causing the starch granules to swell. As a result, the water is gradually absorbed in an irreversible manner. This gives the system a viscous and transparent texture. The result of the reaction is a gel, which is used in sauces, puddings, creams, and other food products, providing a pleasing texture. Starch-based gels are thermo-irreversible, meaning that they do not melt upon heating (unlike gelatin, which we will discuss later). Excessive heating, however, may cause evaporation of the water and shrinkage of the gel.

The most common examples of starch gelatinization are found in sauce and pasta preparations and baked goods.

- In sauces, starches are added to liquids, usually while heating. The starch will absorb liquid and swell, resulting in the liquid becoming thicker. The type of starch determines the final product. Some starches will remain cloudy when cooked; others will remain clear.
- Pasta is made mostly of semolina wheat (durum wheat flour), which contains high amounts of starch. When pasta is cooked in boiling water, the starch in the pasta swells as it absorbs water, and as a result the texture of the pasta softens.

Starch molecules make up the majority of most baked goods, so starch is an important part of the structure. Although starches by themselves generally can't support the shape of the baked items, they do give bulk to the structure. Starches develop a softer structure when baked than proteins do. The softness of the crumb of baked bread is due largely to the starch. The more protein structure there is, the chewier the bread.

Starches can be fairly straightforward extracts of plants, such as **cornstarch, tapioca,** or **arrowroot,** but there are also **modified starches** and **pre-gelatinized starches** available that have specific uses. See Table 1 for a list of different thickening and binding agents and their characteristics.

Table 1 – Common starches and gels used in the bakeshop

Starch or Gel	Ratio	Preparation	Characteristics and Uses
Cornstarch	20-40 g starch thickens 1 L liquid	A slurry (mixture of cornstarch and water) is mixed and added to a simmering liquid while whisking until it dissolves and the liquid thickens; **or** Cornstarch mixed with sugar, and cold liquid added Thickened mixture simmered until no starch taste remains	Used to thicken sauces when a clear glossy texture is desired, such as dessert sauces and in Asian-inspired dishes Translucent, thickens further as it cools; forms a “sliceable” gel Sensitive to extended heat exposure, so products become thin if held at heat for long periods of time
Waxy maize, waxy rice	Dissolved in cold water 20-40 g starch thickens 1 L liquid	Added to hot liquid while whisking until it dissolves and the liquid thickens	Used in desserts and dessert sauces Clear, does not thicken further as it cools Does not gel at cool temperatures, good for cold sauces Quite stable at extreme temperatures (heat and freezing)
Modified starches	Dissolved in cold water 20-40 g starch thickens 1 L liquid	Added to hot liquid while whisking until it dissolves and the liquid thickens	Modified starches are often used in commercially processed foods and convenience products Modified to improve specific characteristics (e.g., stability or texture under extreme conditions; heat and freezing) Translucent, thickens further as it cools
Pre-gelatinized starches	Powder, dissolved in cold liquid 20-40 g starch thickens 1 L liquid	Added to liquid at any temperature	Used when thickening liquids that might lose colour or flavour during cooking Become viscous without the need for additional cooking Translucent, fairly clear, shiny, does NOT gel when cold

Arrowroot	Powder, dissolved in cold liquid 20-40 g starch thickens 1 L liquid	Added to hot liquid while whisking until it dissolves and the liquid thickens	Derived from cassava root Used in Asian cuisines Very clear; possesses a gooey texture Translucent, shiny, very light gel when cold
Gelatin	15-30 g gelatin sets 1 L liquid	Powder or sheets (leaves) dissolved in cold water Added to cold or simmering liquid Activates with heat, sets when cold	Derived from collagens in bones and meats of animals Used in aspic, glazes, cold sauces, and desserts Clear, firm texture Dissolves when reheated, thickens when cold
Agar agar	15-30g agar agar sets 1 L liquid	Powder dissolved in cold water Added to cold or simmering liquid Activates with heat, sets when cold	Extracted from seaweed Used in Asian desserts and molecular gastronomy cooking Used in place of gelatin in vegetarian dishes Clear firm texture Does not thin when reheated, thickens more when cold

Gelling agents

Gelatin is a water-soluble protein extracted from animal tissue and used as a gelling agent, a thickener, an emulsifier, a whipping agent, a stabilizer, and a substance that imparts a smooth mouth feel to foods. It is thermo-reversible, meaning the setting properties or action can be reversed by heating. Gelatin is available in two forms: powder and sheet (leaf).

Gelatin is often used to stabilize whipped cream and mousses; confectionery, such as gummy bears and marshmallows; desserts including pannacotta; commercial products like Jell-O; “lite” or low-fat versions of foods including some margarines; and dairy products such as yogurt and ice cream. Gelatin is also used in hard and soft gel capsules for the pharmaceutical industry.

Agar agar is an extract from red algae and is often used to stabilize emulsions or foams and to thicken or gel liquids. It is thermo-reversible and heat resistant.

It is typically hydrated in boiling liquids and is stable across a wide range of acidity levels. It begins to gel once it cools to around 40ºC (100ºF) and will not melt until it reaches 85ºC (185ºF).

Pectin

Pectin is taken from citrus and other tree fruits (apples, pears, etc.). Pectin is found in many different foods such as jam, milk-based beverages, jellies, sweets, and fruit juices. Pectin is also used in molecular gastronomy mainly as a gelling agent, thickener, and stabilizer.

There are a variety of types of pectin that react differently according to the ingredients used. Low-methoxyl pectin (which is activated with the use of calcium for gelling) and high-methoxyl pectin that requires sugar for thickening are the two most common types used in cooking. High-methoxyl pectin is what is traditionally used to make jams and jellies. Low-methoxyl pectin is often used in modern cuisine due to the thermo-irreversible gel that it forms and its good reaction to calcium. Its natural capability to emulsify and gel creates stable preparations.

Increasingly, cooks, bakers, and pastry chefs are turning to many different gels, chemicals, and other substances used in commercial food processing as new ingredients to modify liquids or other foods. These will be outlined in detail in the section on molecular gastronomy.

3.

Crystallization

Many factors can influence **crystallization** in food. Controlling the crystallization process can affect whether a particular product is spreadable, or whether it will feel gritty or smooth in the mouth. In some cases, crystals are something you try to develop; in others, they are something you try to avoid.

It is important to know the characteristics and quality of the crystals in different food. Butter, margarine, ice cream, sugar, and chocolate all contain different types of crystals, although they all contain fat crystals. For example, ice cream has fat crystals, ice crystals, and sometimes lactose crystals.

The fact that sugar solidifies into crystals is extremely important in candy making. There are basically two categories of candies: crystalline (candies that contain crystals in their finished form, such as fudge and fondant); and non-crystalline (candies that do not contain crystals, such as lollipops, taffy, and caramels). Recipe ingredients and procedures for non-crystalline candies are specifically designed to prevent the formation of sugar crystals because they give the resulting candy a grainy texture. One way to prevent the crystallization of sucrose in candy is to make sure that there are other types of sugar—usually fructose and glucose—to get in the way and slow down or inhibit the process. Acids can also be added to "invert" the sugar, and to prevent or slow down crystallization. Fats added to certain confectionary items will have a similar effect.

When boiling sugar for any application, the formation of crystals is generally not desired. These are some of the things that can promote crystal growth:

- Pot and utensils that are not clean
- Sugar with impurities in it (A scoop used in the flour bin, and then used for sugar, may have enough particles on it to promote crystallization.)
- Water with a high mineral content ("hard water")
- Too much stirring (agitation) during the boiling phase

Crystallization may be prevented by adding an interferent, such as acid (lemon, vinegar, tartaric, etc.) or glucose or corn syrup, during the boiling procedure.

As mentioned above, ice cream can have ice and fat crystals that co-exist along with other structural elements (emulsion, air cells, and hydrocolloid stabilizers such as locust bean gum) that make up the "body" of the ice cream. Some of these components crystallize either partially or completely. The bottom line is that the nature of the crystalline phase in the food will determine the quality, appearance, texture, feel in the mouth, and stability of the product. The texture of ice cream is derived, in part, from the large number of small ice crystals. These small ice crystals provide a smooth texture with excellent melt-down and cooling properties. When these ice crystals grow larger during storage (recrystallization),

the product becomes coarse and less enjoyable. Similar concerns apply to sugar crystals in fondant and frostings, and to fat crystals in chocolate, butter, and margarine.

Control of crystallization in fats is important in many food products, including chocolate, margarine, butter, and shortening. In these products, the aim is to produce the appropriate number, size, and distribution of crystals in the correct shape because the crystalline phase plays such a large role in appearance, texture, spreadability, and flavour release. Thus, understanding the processes that control crystallization is critical to controlling quality in these products.

To control crystallization in foods, certain factors must be controlled:

- Number and size of crystals
- Crystal distribution
- Proper polymorph (crystal shape)

Crystallization is important in working with chocolate. The **tempering** process, sometimes called pre-crystallization, is an important step that is used for decorative and moulding purposes, and is a major contributor to the mouth feel and enjoyment of chocolate. Tempering is a process that encourages the cocoa butter in the chocolate to harden into a specific crystalline pattern, which maintains the sheen and texture for a long time.

When chocolate isn’t tempered properly it can have a number of problems. For example, it may not ever set up hard at room temperature; it may become hard, but look dull and blotchy; the internal texture may be spongy rather than crisp; and it can be susceptible to fat **bloom**, meaning the fats will migrate to the surface and make whitish streaks and blotches.

4.

Molecular Gastronomy Techniques That May Be Used in the Pastry Shop

Non-traditional thickeners

In addition to traditional starches, there are new ways to thicken sauces and to change the texture of liquids. Some of these thickening agents work without heating and are simply blended with the cold liquid, such as modified starch or xanthan gum. These allow the creation of sauces and other liquids with a fresh, uncooked taste.

Foams, froths, and bubbles

Liquids can be stabilized with gelatin, **lecithin**, and other ingredients, and then used to create foams by whipping or using a special dispenser charged with nitrogen gas. A well-made foam adds an additional flavour dimension to the dish without adding bulk, and an interesting texture as the foam dissolves in the mouth (Figure 1).

Figure 1.

Espuma

Espuma is the Spanish term for froth or foam, and it is created with the use of a siphon (ISO) bottle. This is a specific term, since culinary foams may be attained through other means.

Espuma from a siphon creates foam without the use of an emulsifying agent such as egg. As a result, it offers an unadulterated flavour of the ingredients used. It also introduces much more air into a preparation compared to other culinary aerating processes.

Espuma is created mainly with liquid that has air incorporated in it to create froth. But solid ingredients can be used too; these can be liquefied by cooking, puréeing, and extracting natural juices. It should be noted, though, that the best flavours to work with are those that are naturally diluted. Otherwise, the espuma tends to lose its flavour as air is introduced into it.

Stabilizers may be used alongside the liquids to help retain their shape longer; however, this is not always necessary. Prepared liquids can also be stored in a siphon bottle and kept for use. The pressure from the bottle will push out the aerated liquid, producing the espuma.

Foam

Foam is created by trapping air within a solid or liquid substance. Although culinary foams are most recently associated with molecular gastronomy, they are part of many culinary preparations that date back to even earlier times. Mousse, soufflé, whipped cream, and froth in cappuccino are just some examples of common foams. Common examples of "set" foams are bread, pancakes, and muffins.

Foam does not rely on pressure to encase air bubbles into a substance. Like espuma, foam may also be created with the help of a surfactant and gelling or thickening agents to help it hold shape. The production of a culinary foam starts with a liquid or a solid that has been puréed. The thickening or gelling agent is then diluted into this to form a solution. Once dissolved, the solution is whipped to introduce air into it.

The process of whipping is done until the foam has reached the desired stiffness. Note that certain ingredients may break down if they are whipped for too long, especially without the presence of a stabilizing agent.

Gels

Turning a liquid, such as a vegetable juice or raspberry purée, into a solid not only gives it a different texture but also allows the food to be cut into many shapes, enabling different visual presentations (Figure 2). Regular gelatin can be used as well as other gelling agents, such as agar agar, which is derived from red algae.

Figure 2.

Brittle gels

Gelling agents are often associated with jelly-like textures, which may range from soft to firm. However, certain gels produced by specific agents may not fit this description.

Rather than forming an elastic or pliable substance, brittle gels may also be formed. These are gels that are firm in nature yet fragile at the same time. This characteristic is caused by the formation of a gel network that is weak and susceptible to breaking. This property allows brittle gels to crumble in the mouth and create a melt-in-the-mouth feeling. As a result, new sensations and textures are experienced while dining. At the same time, tastes within a dish are also enhanced due to the flavour release caused by the gel breakdown.

Brittle gels are made by diluting the gelling agent into a liquid substance such as water, milk, or a stock. This mixture is left to set to attain a gelled end product. It should be noted that the concentration of gelling agents used, as well as the amount of liquid, both affect gelation.

Agar agar is a common agent used to create brittle gels. However, when combined with sugar it tends to create a more elastic substance. Low-acyl gellan gum, locust bean gum, and carrageenan also create brittle gels.

Fluid gels

A fluid gel is a cross between a sauce, gel, and purée. It is a controlled liquid that has properties of all three preparations. A fluid gel displays viscosity and fluidity at the same time, being thick yet still spreadable.

Fluid gels behave as solids when undisturbed, and flow when exposed to sufficient agitation. They are used in many culinary dishes where fluids need to be controlled, and they provide a rich, creamy texture.

A fluid gel is created using a base liquid that can come from many different sources. The base liquid is commonly extracted from fruits and vegetables, taken from stocks, or even puréed from certain ingredients. The longer the substance is exposed to stress, and the more intense the outside stress, the more fluidity is gained. More fluidity causes a finer consistency in the gel.

Fluid gels can be served either hot or cold, as many of the gelling agents used for such preparations are stable at high temperatures.

Drying and powdering

Drying a food intensifies its flavour and, of course, changes its texture. Eating a piece of apple that has been cooked and then dehydrated until crisp is very different from eating a fresh fruit slice. If the dehydrated food is powdered, it becomes yet another flavour and texture experience.

When maltodextrin (or tapioca maltodextrin) is mixed with fat, it changes to a powder. Because maltodextrin dissolves in water, peanut butter (or olive oil) that has been changed to a powder changes back to an oil in the mouth.

Freezing

In molecular gastronomy, liquid nitrogen is often used to freeze products or to create a frozen item without the use of a freezer.

Liquid nitrogen is the element nitrogen in a liquefied state. It is a clear, colourless liquid with a temperature of -196°C (-321°F). It is classified as a cryogenic fluid, which causes rapid freezing when it comes into contact with living tissues.

The extremely cold temperatures provided by this liquefied gas are most often used in modern cuisine to produce frozen foams and ice cream. After freezing food, nitrogen boils away, creating a thick nitrogen fog that may also add to the aesthetic features of a dish.

Given the extreme temperature of liquid nitrogen, it must be handled with care. Mishandling may cause serious burns to the skin. Nitrogen must be stored in special flasks and handled only by trained people. Aprons, gloves, and other specially designed safety gear should be used when handling liquid nitrogen.

Used mainly in the form of a coolant for molecular gastronomy, liquid nitrogen is not ingested. It is

poured directly onto the food that needs to be cooled, causing it to freeze. Any remaining nitrogen evaporates, although sufficient time must be provided to allow the liquefied gas to be eliminated and for the dish to warm up to the point that it will not cause damage during consumption.

Spherification

Spherification is a modern cuisine technique that involves creating semi-solid spheres with thin membranes out of liquids. Spheres can be made in various sizes and of various firmnesses, such as the “caviar” shown in Figure 3. The result is a burst-in-the-mouth effect, achieved with the liquid. Both flavour and texture are enhanced with this culinary technique.

There are two versions of the spherification process: direct and reverse.

In direct spherification, a flavoured liquid (containing either sodium alginate, gellan gum, or carrageenan) is dripped into a water bath that is mixed with calcium (either calcium chloride or calcium lactate). The outer layer is induced by calcium to form a thin gel layer, leaving a liquid centre. In this version, the spheres are easily breakable and should be consumed immediately.

Calcium chloride and sodium alginate are the two basic components used for this technique. Calcium chloride is a type of salt used in cheese making, and sodium alginate is taken from seaweed. The sodium alginate is used to gel the chosen liquid by dissolving it directly into the fluid. This causes the liquid to become sticky, and proper dissolving must be done by mixing. The liquid is then left to set to eliminate any bubbles.

Once ready, a bath is prepared with calcium chloride and water. The liquid is then dripped into the bath using a spoon or syringe depending on the desired sphere size. The gel forms a membrane encasing the liquid when it comes into contact with the calcium chloride. Once set, the spheres are then removed and rinsed with water to remove any excess calcium chloride.

In reverse spherification, a calcium-containing liquid (or ingredients mixed with a soluble calcium salt) is dripped into a setting bath containing sodium alginate. Surface tension causes the drop to become spherical. A skin of calcium alginate immediately forms around the top. Unlike in the direct version, the gelling stops and does not continue into the liquid orb. This results in thicker shells so the products do not have to be consumed immediately.

Figure 3.

Videos on spherification:

Direct spherification video: Molecular Gastronomy: Basic Spherification to Make Caviar

Reverse: Molecular Gastronomy: Reverse Spherification to Make Spheres with Liquid Inside

Specialty ingredients used in molecular gastronomy

There are a number of different ingredients used in molecular gastronomy as gelling, thickening, or emulsifying agents. Many of these are available in specialty food stores or can be ordered online.

Algin

Another name for sodium alginate, algin is a natural gelling agent taken from the cell walls of certain brown seaweed species.

Calcium chloride

Calcium chloride, also known as $CaCl_2$, is a compound of chlorine and calcium that is a by-product of sodium bicarbonate (baking soda) manufacturing. At room temperature it is a solid salt, which is easily dissolved in water.

This is very salty and is often used for preservation, pickling, cheese production, and adding taste without increasing the amount of sodium. It is also used in molecular gastronomy in the spherification technique (see above) for the production of ravioli, spheres, pearls, and caviar (Figure 3).

Calcium lactate

Calcium lactate is a calcium salt resulting from the fermentation of lactic acid and calcium. It is a white crystalline power when solid and is highly soluble in cold liquids. It is commonly used as a calcium fortifier in various food products including beverages and supplements.

Calcium lactate is also used to regulate acidity levels in cheese and baking powder, as a food thickener, and as a preservative for fresh fruits. In molecular gastronomy, it is most commonly used for basic spherification and reverse spherification due to the lack of bitterness in the finished products.

Like calcium chloride, calcium lactate is used alongside sodium alginate. In regular spherification, it is used in the bath. It is also used as a thickener in reverse spherification.

Carob bean gum

Carob bean gum is another name for locust bean gum. It is often used to stabilize, texturize, thicken, and gel liquids in the area of modern cuisine, although it has been a popular thickener and stabilizer for many years.

Carrageenan

Carrageenan refers to any linear sulfated polysaccharide taken from the extracts of red algae. This seaweed derivative is classified mainly as iota, kappa, and lambda. It is a common ingredient in many foods.

There are a number of purposes that it serves, including binding, thickening, stabilizing, gelling, and emulsifying. Carrageenan can be found in ice cream, salad dressings, cheese, puddings, and many more foods. It is often used with dairy products because of its good interaction with milk proteins. Carrageenan also works well with other common kitchen ingredients and offers a smooth texture and taste that blends well and does not affect flavour.

More often than not, carrageenan is found in powder form, which is hydrated in liquid before being used. For best results, carrageenan powder should be sprinkled in cold liquid and blended well to dissolve, although it may also be melted directly in hot liquids.

Citric acid

Classified as a weak organic acid, citric acid is a naturally occurring preservative that can be found in citrus fruits. Produced as a result of the fermentation of sugar, it has a tart to bitter taste and is usually in powder form when sold commercially. It is used mainly as a preservative and acidulent, and it is a common food additive in a wide range of foods such as candies and soda. Other than extending shelf life

by adjusting the acidity or pH of food, it can also help enhance flavours. It works especially well with other fruits, providing a fresh taste.

In modern cooking, citric acid is often used as an emulsifier to keep fats and liquids from separating. It is also a common component in spherification, where it may be used as an acid buffer.

Gellan gum

Gellan gum is a water-soluble, high-molecular-weight polysaccharide gum that is produced through the fermentation of carbohydrates in algae by the bacterium *Pseudomonas elodea*. This fermented carbohydrate is purified with isopropyl alcohol, then dried and milled to produce a powder.

Gellan gum is used as a stabilizer, emulsifier, thickener, and gelling agent in cooking. Aspics and terrines are only some of the dishes that use gellan. It comes in both high-acyl and low-acyl forms. High-acyl gellan gum produces a flexible elastic gel, while low-acyl gellan gum will give way to a more brittle gel.

Like many other hydrocolloids, gellan gum is used with liquids. The powder is normally dispersed in the chosen liquid to dissolve it. Once dissolved, the solution is then heated to facilitate liquid absorption and gelling by the hydrocolloid. A temperature between 85°C and 95°C (185°F and 203°F) will start the dissolution process. Gelling will begin upon cooling around 10°C and 80°C (50°F and 176°F).

Gellan gum creates a thermo-irreversible gel and can withstand high heat without reversing in form. This makes it ideal for the creation of warm gels.

Guar gum

Guar gum, or guaran, is a carbohydrate. This galactomannan is taken from the seeds of the guar plant by dehusking, milling, and screening. The end product is a pale, off-white, loose powder. It is most commonly used as a thickening agent and stabilizer for sauces and dressings in the food industry. Baked goods such as bread may also use guar gum to increase the amount of soluble fibre. At the same time, it also aids with moisture retention in bread and other baked items.

Being a derivative of a legume, guar gum is considered to be vegan and a good alternative to starches. In modern cuisine, guar gum is used for the creation of foams from acidic liquids, for fluid gels, and for stabilizing foams.

Guar gum must first be dissolved in cold liquid. The higher the percentage of guar gum used, the more viscous the liquid will become. Dosage may also vary according to the ingredients used as well as desired results and temperature.

Iota carrageenan

Iota carrageenan is a hydrocolloid taken from red seaweed (*Eucheuma denticulatum)*. It is one of three varieties of carrageenan and is used mainly as a thickening or gelling agent.

Gels produced from iota carrageenan are soft and flexible, especially when used with calcium salts. It

produces a clear gel that exhibits little syneresis. Iota is a fast-setting gel that is thermo-reversible and remains stable through freezing and thawing. In modern cuisine it is used to create hot foams as well as custards and jellies with a creamy texture.

Like most other hydrocolloids, iota carrageenan must first be dispersed and hydrated in liquid before use. Unlike lambda carrageenan, it is best dispersed in cold liquid. Once hydrated, the solution must be heated to about 70°C (158°F) with shear to facilitate dissolution. Gelling will happen between 40°C and 70°C (104°F and 158°F) depending on the number of calcium ions present.

Kappa carrageenan

Kappa carrageenan is another type of red seaweed extract taken specifically from *Kappaphycus alvarezii*. Like other types of carrageenan, it is used as a gelling, thickening, and stabilizing agent. When mixed with water, kappa carrageenan creates a strong and firm solid gel that may be brittle in texture.

This particular variety of carrageenan blends well with milk and other dairy products. Since it is taken from seaweed, it is considered to be vegan and is an alternative to traditional gelling agents such as gelatin.

Kappa carrageenan is used in various cooking preparations including hot and cold gels, jelly toppings, cakes, breads, and pastries. When used in molecular gastronomy preparations and other dishes, kappa carrageenan should be dissolved in cold liquid.

Once dispersed, the solution must be heated between 40°C and 70°C (104°F and 158°F). Gelling will begin between 30°C and 60°C (86°F and 140°F). Kappa carrageenan is a thermo-reversible gel and will stay stable up to 70°C (158°F). Temperatures beyond this will cause the gel to melt and become liquid once again.

Locust bean gum

Locust bean gum, also known as LBG and carob bean gum, is a vegetable gum derived from Mediterranean-region carob tree seeds. This hydrocolloid is used to stabilize, texturize, thicken, and gel liquids in modern cuisine, although it has been a popular thickener and stabilizer for many years.

It has a neutral taste that does not affect the flavour of food that it is combined with. It also provides a creamy mouth feel and has reduced syneresis when used alongside pectin or carrageenan for dairy and fruit applications. The neutral behaviour of this hydrocolloid makes it ideal for use with a wide range of ingredients.

To use locust bean gum, it must be dissolved in liquid. It is soluble with both hot and cold liquids.

Maltodextrin

Maltodextrin is a sweet polysaccharide that is produced from starch, corn, wheat, tapioca, or potato through partial hydrolysis and spray drying. This modified food starch is a white powder that has the

capacity to absorb and hold water as well as oil. It is an ideal additive since it has fewer calories than sugar and is easily absorbed and digested by the body in the form of glucose.

Coming from a natural source, it ranges from nearly flavourless to fairly sweet without any odour. Maltodextrin is a common ingredient in processed foods such as soda and candies. In molecular gastronomy, it can be used both as a thickener and a stabilizer for sauces and dressings, for encapsulation, and as a sweetener. In many cases, it is also used as an aroma carrier due to its capacity to absorb oil. It is also often used to make powders or pastes out of fat.

Sodium alginate

Sodium alginate, which is also called algin, is a natural gelling agent taken from the cell walls of certain brown seaweed species. This salt is obtained by drying the seaweed, followed by cleaning, boiling, gelling, and pulverizing it. A light yellow powder is produced from the process. When dissolved in liquids, sodium alginate acts as a thickener, creating a viscous fluid. Conversely, when it is used with calcium it forms a gel through a cold process.

In molecular gastronomy, sodium alginate is most commonly used as a texturizing agent. Foams and sauces may be created with it. It is also used in spherification for the creation of pearls, raviolis, mock caviar, marbles, and spheres. Sodium alginate can be used directly by dissolving it into the liquid that needs to be gelled, as in the case of basic spherification. It may also be used inversely by adding it directly to a bath, as in the case of reverse spherification.

This versatile product is soluble in both hot and cold liquids, and gels made with it will set at any temperature.

Soy lecithin

Soy lecithin, also called just lecithin, is a natural emulsifier that comes from fatty substances found in plant tissues. It is derived from soybeans either mechanically or chemically, and is a by-product of soybean oil creation. The end product is a light brown powder that has low water solubility.

As an emulsifier, it works to blend immiscible ingredients together, such as oil and water, giving way to stable preparations. It can be whisked directly into the liquid of choice.

Soy lecithin is also used in creating foams, airs, mousses, and other aerated dishes that are long lasting and full of flavour. It is used in pastries, confections, and chocolate to enhance dough and increase moisture tolerance.

As with most ingredients, dosage and concentration for soy lecithin will depend on the ingredients used, specific properties desired in the resulting preparation, as well as other conditions.

Tapioca maltodextrin

Tapioca maltodextrin is a form of maltodextrin made from tapioca starch. It is a common ingredient in molecular gastronomy because it can be used both as a thickener and stabilizer for sauces and dressings,

for encapsulation, and as a sweetener. In many cases it is also used as an aroma carrier due to its capacity to absorb oil. It is often used to make powders or pastes out of fat.

Xanthan gum

Xanthan gum is a food additive used as a thickening agent. It is produced through the fermentation of glucose. As a gluten-free additive it can be used as a substitute in cooking and baking.

As a thickener, when used in low dosages, xanthan gum produces a weak gel with high viscosity that is shear reversible with a high pourability. It also displays excellent stabilizing abilities that allow for particle suspension.

Moreover, xanthan gum mixes well with other flavours without masking them and provides an improved mouth feel to preparations. The presence of bubbles within the thickened liquids often makes way for light and creamy textures. It is used in the production of emulsions, suspensions, raviolis, and foams.

Being a hydrocolloid, xanthan gum must be hydrated before use. High versatility allows it to be dissolved over a wide range of temperatures, acid, and alcohol levels. Once set, xanthan gum may lose some of its effectiveness when exposed to heat.

Media Attributions

5.

Low-temperature and sous-vide cooking in the pastry shop

Sous-vide cooking is about immersing a food item in a precisely controlled water bath, where the temperature of the water is the same as the target temperature of the food being cooked. Food is placed in a food-grade plastic bag and vacuum-sealed before going into the water bath. Temperatures will vary depending on desired end result. This allows the water in the bath to transfer heat into the food while preventing the water from coming into direct contact with it. This means the water does not chemically interact with the food: the flavours of the food remain stronger, because the water is unable to dissolve or carry away any compounds in the food (Figure 4).

Figure 4.

Applications for the bakeshop

Sous-vide fruits and vegetables

Cooking vegetable and fruits sous-vide is a great way to tenderize them without losing as many of the vitamins and minerals that are normally lost through blanching or steaming. Fruits can also be infused

with liquid when cooked at lower temperatures by adding liquid to the bag. Sous-vide helps preserve the nutrients present in fruits and vegetables by not cooking them above the temperatures that cause the cell walls to fully break down. This allows them to tenderize without losing all their structure. The bag also helps to catch any nutrients that do come out of the vegetable.

While time and temperature do not factor into safety for fruits and vegetables, they do have a unique effect on their structure. There are two components in fruits and vegetables that make them crisp: pectin and starch. Pectin, which is a gelling agent commonly used in jams and jellies for structure, breaks down at 83ºC (183ºF) at a slower rate than the starch cells do. In many cases this allows for more tender fruits and vegetables that have a unique texture to them.

Custards

The term *custard* spans so many possible ingredients and techniques that it is most useful to think of a custard as simply a particular texture and mouth feel. Custards have been made for centuries by lightly cooking a blend of eggs, milk, and heavy cream, but modernist chefs have invented myriad ways to make custards.

Using the sous-vide method to prepare crème anglaise, curds, ice cream bases, custard bases, sabayons, and dulce de leche is possible. The technique offers greater consistency and more control over the texture, which can range from airy, typical of a sabayon, to dense, as in a posset. For custards, eggs will be properly cooked at 82°C (180ºF), so if the water bath is set to this temperature, no overcooking can happen. The one constant among custards is the use of plenty of fat, which not only provides that distinctive mouth feel but also makes custard an excellent carrier of fat-soluble flavours and aromas. Lighter varieties of custard, prepared sous-vide style and cooled, can be aerated in a whipping siphon into smooth, creamy foams.

Other applications for vacuum-seal processes

Fruit compression

Vacuum-compressing fruits and vegetables is a popular modern technique that can give many plant foods an attractive, translucent appearance (as shown in the watermelon in Figure 5) and a pleasant, surprising texture. This technique exploits the ability of a vacuum chamber to reduce surrounding pressure, which causes air and moisture within the plant tissue to rapidly expand and rupture the structures within the food. When the surrounding pressure is restored to a normal level, the labyrinth of air-filled spaces collapses. As a result, light tends to pass through the food rather than being scattered and diffused, which is why vacuum-compressed plant foods appear translucent. Causing the porous structure of a plant food to collapse also imparts a somewhat dense, toothsome texture that can give a familiar ingredient, such as watermelon, an entirely new appeal.

Figure 5.

Infusions

When adding liquids, the vacuum-seal process creates a rapid infusion—especially with more porous foods (such as adding spices to cream or herbs to melon). This can add flavour and texture in a shorter time than traditional infusions.

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6.

Activities

Activities

- Use the spherification method (both direct and reverse) to create a component for a dessert plate.
- Use the sous-vide process to cook a custard.
- Use the vacuum-seal process to compress fruit.

II

Plated Desserts

Learning Objectives

- Describe how to design a plated dessert
- Learn factors that will contribute to a successful plated dessert
- Apply design principles

What makes a worthy plated dessert? Many will argue presentation, complexity, or the type of plate it is served on are important factors. Texture is also critical in making a dish successful. Mushy apples would ruin an otherwise perfect apple pie, and how helpful is the granulated sugar **garnish** on the crust? But most will still agree that the most important factor in creating an exceptional plated dessert is flavour. Whether it is a simple slice of pie served in a casual restaurant, or an intricate, multicomponent dessert crafted for a fine dining establishment, flavour is what makes a dessert memorable.

Dessert plating styles are constantly changing and evolving thanks to today's creative pastry chefs and cooks. Past trends included towering architectural assemblies that were impressive and beautiful to look at but were difficult to eat, or making complex designs on the rims of plates with squirts of sauce or dustings of cocoa or icing sugar (which often ended up on the diners' sleeves). Gradually the trend has shifted back to focus on flavour, and we have discovered that great-looking and great-tasting desserts are obtainable without unnecessary complexity.

An important factor in the development of a plated dessert is to consider how it will work in relationship to the restaurant's theme and menu. Desserts and dessert menus should be considered a continuation of the dining experience. It is essential to recognize that the dessert choices should not just be tacked on at the end of a meal without first thinking through the style of menu, the type of business (pastry shop, hotel, or restaurant; casual or high-end), and the clientele. You can make the most beautiful and flavourful food possible, but if it doesn't sell, you are doing a disservice to the business owners and missing out on customer satisfaction. Desserts prepared with these concepts in mind are seen as products that will not only increase the average cheque but will also draw public attention to the establishment and to the creativity of the kitchen, thus bringing in more customers.

Because it is difficult to agree on how best to present a dessert, it is impossible to set down a list of hard-and-fast rules to follow. Therefore, in this section we discuss a number of ideas that influence chefs and cooks in their decisions and some of the factors to consider when planning a plated dessert.

7.

Plan Dessert Plating

Customers love desserts, but not all customers will order them. In most restaurants, perhaps 50% of the customers, at most, will have dessert. A majority of diners are simply too full to order a traditional full, large dessert, but they would welcome something a little sweet or something to share. Most customers who don't order dessert might be interested if something light, refreshing, and intriguing were offered. Therefore, when planning for variety, don't forget to include simpler, lighter options that will appeal to diners with smaller appetites. Having a cheese platter or perhaps a savoury dessert are popular options too.

There are two stages to the art of the baker or pastry chef: first, making and baking all the doughs, batters, fillings, creams, and sauces (with the correct techniques); and second, assembling these components into finished desserts and pastries. The same principle is applied to plating dessert presentations. A plated dessert is an arrangement of one or more components. For most desserts, all the components are prepared well in advance. A plated dessert itself, however, is assembled **à la minute** (at the last minute). All the components needed—including mousses, meringues, ice creams and sorbets, cookies, dough, cake layers, pastry cream, and dessert sauces—are used to make a presentation that is more than the sum of its parts.

When planning for a plated dessert, there are five characteristics that should be considered. Three apply to mouth feel and flavour, and are the most important:

- Flavour
- Texture
- Temperature

The other two are visual:

- Colour
- Shape

Flavours should enhance or complement each other, such as a caramel sauce served with roasted fruit, or offer a pleasing contrast, as a tart flavour (lemon) paired with a sauce that is sweetened. To achieve this, taste the components separately and then together to evaluate and make sure they work together.

Plan for pleasing combinations of texture and temperature. If the main item is soft, such as a mousse or ice cream, add a crisp or crunchy component such as small cookies or **caramelized** nuts for a texture contrast. Temperature contrasts are also pleasing, such as a scoop of ice cream with a warm fruit tart.

Visually, a variety of colours and shapes can be attractive, but be careful not to include too much or the

result will come across as a jumble. The plate needs to be visually appealing. Through the balanced use of colour and shape, you can present a dessert simply and elegantly. Let the food speak for itself. Brown is a good colour, and a well-prepared dessert with a few shades of brown can look very appealing. A traditional tarte tatin, for example, needs little or no garnish to make it look appealing if the apples have been caramelized properly.

All of these elements together create a palette from which an infinite number of combinations affect you differently whenever you put food on your table. Chefs and, now more than ever, pastry chefs are always trying to push the senses to the limits in never-before-thought-of ways, but the underlying principles that make food taste good are unchanged. Here is a short summary:

- Variety and diversity in textures and the elements of taste make for interesting food; avoid monotony.
- Contrast is as important as harmony, but avoid extremes and imbalance.
- Food that comes from the same place (time/season or location) usually works together.
- Fresh and ripe rules every time.

Let’s now walk through the process of deciding on and preparing a finished dish.

Step 1: Visualize

When deciding what to make, you need to draw on what you have to work with. Consider the following:

- Available ingredients: what do I have, or what can I get now?
- Past experiences: what worked, what didn’t, likes, dislikes, etc.
- Olfactory (smell) and gustatory (taste) memory: picture in your mind how something will taste or smell.
- Sensory triggers: what catches your eye, or what smell, sound, or feel of a raw ingredient gets you thinking of an idea?

Step 2: Flavour profile

Once you have the basic idea or main ingredients in mind, think of the flavour profile.

There are a number of elements making up all of the things you taste, depending on your cultural background, but essentially there are only a handful of elements that compose all of the taste profiles. Western definitions traditionally break taste into four major elements:

- Salty
- Sweet
- Sour

- Bitter

Asian cultures have added the following to the list:

- Umami (literally, “pleasant savoury taste”)
- Spiciness
- Astringency

Step 3: Introduce the other senses

The other senses contribute to the overall experience in a variety of ways. Imagine if food didn’t have the following attributes, which in many cases provide our first impressions, lasting memories, and overall like or dislike of a certain dish or dining experience:

- Temperature: both real and perceived (such as mint as a cooling sensation or spice as heat)
- Colour: use a wide palette
- Shape: create visual interest
- Texture: some of each creates contrast
- Mouth feel: dry, fat, rich
- Smells: avoid overpowering or distracting
- Sound: noisy, difficult foods may spoil a mood or setting

And always try to remember a few guidelines as you go along:

- Think outside the box; try new things.
- Too much of anything is never a good idea.
- Great dishes hit on multiple senses in a variety of ways.
- Look to classic combinations for inspiration, then make logical leaps. If flavours work together in one context, they will do so in another. A great example of this is the recent trend of bringing savoury pantry items into desserts.

III

Dessert Garnishes and Sauces

Learning Objectives

- Describe the effect of garnishes on presentation
- Describe the additional effects garnishes can have on a plated dessert
- Prepare garnishes from a variety of mediums
- Describe the contributing roles of sauces in a plated dessert
- Prepare dessert sauces

Many, if not most, dessert presentations can be improved with one or more items added to enhance them. But before you add anything, take a moment to consider whether serving the dessert alone would be effective. A simple, ungarnished plating is usually all that's needed for a home-style dessert, and at the opposite extreme, an elegant pastry or gateaux that is beautiful on its own may not need any additional elements.

8.

Garnishes

A garnish, simply put, can be just an add-on whose main purpose is decoration. However, carefully selected garnishes have other functions too. This “decorative” item can add important flavour, texture, and functional elements to the plating of the dessert, and can enhance the enjoyment of the dish.

Garnishes can solve the problem of serving a frozen component (ice cream or sorbet, for example) as part of a plated dessert. If a scoop of ice cream is placed directly onto the plate, it will start melting immediately, marring the presentation. If that scoop is placed onto an item, such as a cookie base, it will slow down the rate of melting, making it easier to serve, and allowing the customer to enjoy and appreciate the effort spent on the presentation.

Other garnishes that can be used to help present a frozen component are:

- Tuiles, which will also add visual, flavour, and texture (crunchy) elements
- Sliced fruit
- Meringue disk
- Small cookie
- Chocolate garnish
- Crumbs (cake, crushed nuts, or brittle)

Some of the more popular items that can be used as garnishes are described below.

Tuiles

These thin cookies can be shaped in numerous ways: with a stencil, spread onto a silicone baking sheet; combed; piped; or spread onto a textured flexible baking mat and then shaped while still warm. For a recipe and variations, see the Appendix.

Meringues (hard)

When making meringues, keep the ratio of sugar to egg whites 1.5-2 to 1. Meringues can be made with the common or Swiss technique, and must be dried in a low-temp oven for 12 to 36 hours. Meringue can be piped into sticks, disks, or baskets such as those made to produce the classic French dessert vacherin.

Sugar

Sugar can be used to make garnishes using several different methods. **Pulled sugar** is prepared by cooking a sugar syrup to between 155°C and 160°C (310°F and 320°F) and then cooling, colouring, folding, and stretching it into various shapes such as ribbons or bows. The same mixture can also be used to make **blown sugar** garnishes, which are created by using a pump to create a balloon out of the slightly cooled sugar syrup. Blown sugar is used to make things such as fruits, with many other possibilities. Bubble sugar is made by pouring liquid sugar (150°C or 310°F) onto a special type of paper and then lifting the paper and allowing it to run down, creating a bubbly effect.

Caramelized sugar: A sugar syrup is cooked to between 165°C and 185°C (330°F and 365°F), depending on how dark you want the caramel to be. Once cooled to the proper consistency, it can be used to make **spun sugar**, can be piped into shapes or sticks or drizzled over the back of a bowl to make a "caramel cup," or nuts can be dipped into the caramel and pulled to create spikes.

Isomalt sugar: Isomalt is a special type of sugar which can be cooked to the same temperature as caramel without colouring. It also is less susceptible to moisture, so garnishes made with isomalt will hold up better in conditions with high humidity. It can be used much like regular sugar to create pulled and blown sugar, or sprinkled between two silicone baking sheets and baked at 175°C (350°F) for 12 to 15 minutes. For additional effect, it can be dusted with powdered food colours before baking.

Chocolate

Chocolate has many different applications. Too thick a chocolate garnish can overpower the dessert, so it must be delicate. In all cases, chocolate must be correctly tempered, which will ensure a crisp texture and proper sheen. Some garnishes that can be prepared are chocolate curls, fans, and cigarettes, formed by spreading a thin layer of tempered chocolate onto a marble slab and then shaping once partially set. Chocolate can also be piped into shapes, mixed with nuts and poured to form bark, or mixed with cream and used for spherification to create chocolate caviar.

Marzipan/rolled fondant

Marzipan and fondant can be rolled and cut out into shapes and figurines, or used for bases.

Dough and Pastry

Filo pastry: Filo can be buttered and layered, with flavours, such as nuts, seeds, cocoa powder, herbs, and spices, added between layers. It can also be cut into shapes and made into cups, etc., and baked.

Kataifi dough: Similar to a filo pastry but in thin strands, kataifi dough is commonly brushed with butter before being baked. Can be tied into knots or baskets and baked off. Found in Middle Eastern cuisines.

Bric dough: Bric comes in sheets and is brushed with water, baked with cinnamon sugar, and cut to make interesting shapes. Found in Middle Eastern cuisines.

Puff pastry: Puff pastry can be rolled into sheets and used as a base, cut and twisted to form straws and allumettes, etc. Puff pastry also adds a textural component to desserts.

Choux paste: Choux paste can be piped or combed into long strands and dusted with seeds or nuts before baking.

Cheese

Sprinkle grated hard cheese carefully onto a baking sheet and bake until crisp, approximately 5 to 10 minutes at 175°C (350°F). The pieces can be broken into shards when cool.

Berries and fruit

Berries and other fruits can be used fresh or dried to make fruit leather or powders.

Dried fruit: Firm fruits can be sliced thinly and soaked in sugar syrup with lemon juice briefly before drying in a low-temperature (95°C or 200°F) oven on a silicone baking sheet for several hours. Fruit treated the same way can also be dried in a dehydrator.

Candied zest: Citrus peels can be poached in sugar syrup and then cooled and coated in finely granulated sugar.

Candied nuts and brittles

Heat sugar syrup to the hard crack stage (148°C to 155°C or 310°F to 330°F) and add toasted nuts. Remove, drain excess syrup, and cool. Nuts can also be chopped and cooked in a syrup to form a nut brittle, which can be broken into pieces or ground to make a powder. A recipe is found in the Appendix.

Rice noodles

Rice or other noodles can be deep-fried briefly and tossed in cinnamon sugar.

Cookies

A wide range of cookies, such as sugar cookies, shortbreads, etc., can be used as garnishes. Cookies can also be made from sweet dough (pate sucré), tart dough, etc.

Sponges

Different types of cakes and sponges, such as genoise, angel food, japonaise, joconde, and baumkuchen, can be sliced thinly and cut into different shapes.

“Caviar” and other interesting garnishes can be made with the reverse spherification method.

9.

Dessert Sauces

Sauces enhance desserts by both their flavour and their appearance, just as savoury sauces enhance meats, fish, and vegetables. Crème anglaise, chocolate sauce, caramel sauce, and the many fruit sauces and coulis are the most versatile. One or another of these sauces will complement nearly every dessert.

Examples of dessert sauces

Caramel sauce: A proper caramel flavour is a delicate balance between sweetness and bitterness. As sugar cooks and begins to change colour, a flavour change will occur. The darker the sugar, the more bitter it will become. Depending on the application for the finished caramel, it can be made mild or strong. At this point, a liquid is added. This liquid will serve several roles: it will stop the cooking process, it can add richness and flavour, and it will soften the sauce. The fluidity of the finished sauce will depend on the amount of liquid added to it, and the temperature it is served at. Dairy products, such as cream, milk, or butter, will add richness; use water for a clear sauce; use fruit purées to add different flavour elements.

Chocolate sauce: Sometimes called fudge sauce, chocolate sauce is generally made from cream (or milk), butter, and chocolate, and can be served hot or cold. The proportion of each of the ingredients will affect the thickness of the final product.

Compote: French for “mixture,” a compote is cooked fruit served in its own cooking liquid, usually a sugar syrup. Compotes can be made with fresh, frozen, or dried fruits, and served hot or cold.

Coulis: French for “strained liquid,” a coulis is most often an uncooked, strained purée. Flavours remain pure, and the colours bright. One of the drawbacks of using a coulis is that it may separate quickly when used as a plating sauce. It’s best to use à la minute.

Crème anglaise: French for “English custard,” crème anglaise is a rich, pourable custard sauce that can be served hot or cold over cake, fruits, or other desserts. Made with eggs, sugar, and milk or cream, it is stirred over heat until it thickens into a light sauce. However, it’s a delicate operation: too much heat turns it into scrambled eggs! It should not get above 85°C (185°F) during the cooking process. Vanilla is the classic flavouring, but coffee, spices, chocolate, or liqueurs can be added. With additional yolks and heavy cream, it becomes the “custard” used for French ice cream. With additional yolks, gelatin, whipped cream, and flavouring, it becomes Bavarian cream.

Curd: A curd is creamy and fruit based, with citrus and berry flavours being the most popular. Made from fruit juices, eggs, butter, and sugar cooked in a process similar to crème anglaise, curds can be thick, pourable sauces or spreads.

Fruit butter: Fruit butter is a spread made from whole fruits, cooked, reduced, and puréed (if you don't want any chunks in it) until very thick. It does not contain any butter; the term refers to the consistency.

Fruit sauce**:** A fruit sauce is a fruit purée, cooked and thickened with a starch. It is normally served cold.

Hard sauce: This traditional sauce for Christmas pudding, or any steamed pudding, is made by combining butter, sugar, and flavourings, often liqueurs. It is normally piped into shapes and chilled, then placed on the warm dessert just before serving.

Sabayon: Sabayon is a mixture of egg yolks, flavouring, and sugar beaten over simmering water until thick, then beaten until cool. It is traditionally flavoured with sweet white wine or liquor, then served over fresh fruit and grilled (when it is called a gratin). The Italian version of this is called a **zabaglione** and is flavoured with Madeira wine.

Whipped cream: This very popular dessert topping can be served plain, sweetened, or flavoured. **Crème chantilly**, a classic version of this, is a combination of whipped cream, sugar, and vanilla.

Applying dessert sauces

Except in the case of some home-style or frozen desserts, sauces are usually not ladled over the dessert because doing so would mar the appearance. Instead, the sauce is applied in a decorative fashion to the plate rather than the dessert. Many different styles of plate saucing are available.

Pouring a pool of sauce onto the plate is known as *flooding*. Although plate flooding often looks old-fashioned today, it can still be a useful technique for many desserts. Flooded plates can be made more attractive by applying a contrasting sauce and then blending or feathering the two sauces decoratively with a pick or the end of a knife. For this technique to work, the two sauces should be at about the same fluidity or consistency.

Rather than flooding the entire plate, it may be more appropriate for some desserts to apply a smaller pool of sauce to the plate, as this avoids overwhelming the dessert with too much sauce.

A variation of the flooding technique is outlining, where a design is piped onto the plate with chocolate and allowed to set. The spaces can then be flooded with colourful sauces.

A squeeze bottle is useful for making dots, lines, curves, and streaks of sauce in many patterns. Or just a spoon is needed to drizzle random patterns of sauce onto a plate. Another technique for saucing is applying a small amount of sauce and streaking it with a brush, an offset spatula, or the back of a spoon.

Sauces are a great way to highlight flavours. Choose ones that will create balance on the plate, not just for colour, but with all the components. A tart berry sauce will complement a rich cheesecake or chocolate dessert because sourness (acid) will cut through fat, making it taste lighter than it is. A sweet sauce served with a sweet dessert will have the overall effect of hiding flavours in both. Hold back on sweetness in order to intensify other flavours.

Many modern presentations may have a minimal amount of sauce. Sometimes this is done just for

aesthetic reasons and not for how it will complement the dessert. Think of the dish and the balance of the components. This is the most important factor: flavour first, presentation second.

IV

Dessert Presentation

Learning Objectives

- Describe the principles of plate presentation
- Prepare and plan dessert menus
- Apply dessert presentation techniques

After flavour, the second-most-important element in the design of a great plated dessert is presentation. Simple, clean designs work very well. Simple desserts are more challenging because every detail counts and flaws become more apparent. In order to appear appetizing, the dessert presentation must look effortless and harmonious, with each component fitting together and contributing to the look and taste.

The presentation of food can be broken down into a checklist of design principles. In every medium, artists learn through study and practice how to make something attractive to the eye. Our minds are always trying to find a pattern, as we tend to look for symmetry and repetition of design. This will assist in making a beautiful presentation. When served a plate, customers will look at a dish and think immediately “this looks beautiful,” or they may have the opposite reaction. They may not be able to tell you why it is attractive, just that it is nice to look at. The principles presented in this section will give you the tools to apply presentation techniques to any plated dish.

10.

Design Principles for Plating Food

A checklist:

- Flow from left to right
- Splash of colour on left
- Height on right side

In the western world, we read from left to right. When a new image is presented to us, we tend to scan it from the left side to the right side. You can use this knowledge to influence the placement of food on the plate. If you have a bit of colour on the left side of the plate (sauce, fresh fruit, etc.), the eye will be attracted to that. If you plan to have height on the right side of the plate (garnish, ramekin, etc.), it will draw the eye across the plate (Figure 6).

Figure 6.

Your eye should be able to flow across the components. There should be movement on the plate. An upward curve of a tuile or chocolate garnish, a connection between two components with a caramel stick, or the flow of coulis can help direct movement and create a **focal point**. All these items combined will make a plate more appealing visually and attract the eye of the diner before the dessert is eaten.

The main component of the dessert does not always need to be centred, but can be placed slightly offset. Generally, sauce, ice cream or sorbet, and the main garnishes should radiate from the main component without a lot of separation. This allows the plate to have a balance of white space and not look too busy or confusing. Keeping components away from the outside edge of the plate will also help balance the presentation.

Placement on the plate

Figure 7a.

Figure 7b.

On the plate in Figure 7a, the two main components are pushed to the outside of the plate, causing the eye to focus on the emptiness (or **negative space**) in the middle. On the plate in Figure 7b, the components have been brought together, making a connection between all three items. This creates visual harmony.

Using the serving area of the plate well

Figure 8a.

Figure 8b.

Figure 8a shows the correct design principles (colour on the left, and a garnish that is high on the right side), which do cause the eye to move left to right, but the cake is pushed back almost to the very edge of

the plate. The sauce is all on the left side. The combination of the two uses only about half of the surface area. This highlights the negative space on the plate.

In Figure 8b, the sauce is piped across the entire surface of the plate, and the cake is brought almost to the centre, creating more balance.

Flow

Figure 9a.

Figure 9b.

Figure 9a shows a dessert with a lot of sauce, done in similar shapes. The highest item is placed incorrectly, in the bottom left corner.

In Figure 9b, the presentation is simplified. Movement is controlled, drawing the eye to the tallest component. To help balance the plate, perhaps another component could have been added in the middle. Think about what might make an appropriate addition.

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11.

Prepare and Plan Dessert Menus

Finding inspiration and developing a great plated dessert is a chore in itself. But having to plan an entire dessert menu, to strike a balance of items to be offered, to choose items that will be attractive to your customers and promote good sales takes planning.

Establishments that have the most success with their dessert menu (and sales) tend to stick to the most popular flavours. Innovation just for innovation's sake is generally not a good idea. Non-traditional ingredient pairings may work, for example, and chocolate always sells well—but if it is combined with something like beets, it will turn most people off. There is a time and place for uncommon dessert ingredients: special events, tasting menus, catering events. Desserts are a comfort food to most people, and to have an approachable menu with popular flavours will lead to the highest customer satisfaction.

A good starting point is the 5 Cs:

- Chocolate
- Citrus
- Coffee
- Custard or cheesecake
- Caramel

Chocolate

The chocolate dessert is probably the most popular one at any restaurant. Always have one dark chocolate dessert. If you need a second chocolate dessert, go with one made with white chocolate, milk chocolate, or some variation. Using a good-quality chocolate can turn a simple dessert into one with a "wow factor." Many consumers have an understanding of the differences in chocolates, so by using a high-percentage, single-origin chocolate, the unique flavours can tell a "story" on the dessert menu.

Citrus

Many people who aren't chocolate lovers tend to be fans of citrus. Citrus is very refreshing and can be used in many different applications.

Coffee

Tiramisu is a modern classic made with coffee. An affogato is a super-easy dessert that combines two popular items: coffee and dessert. This can be a great starting point for designing a dessert: take a popular and enjoyable flavour combination, and add other elements to it.

Custard (or cheesecake)

Having a rich, creamy, custard-based dessert is always popular. Whether it is a classic cheesecake, a crème brûlée, a flan, or a bread pudding, this style of dessert will always be popular.

Caramel

There are so many delicious treats you can make with this flavour—toffee pudding, caramel parfait, caramel candies, caramel apples, caramel sundae, caramel ice cream served with crunchy toffee bits, and a heaping spoonful of crème fraîche caramel sauce.

Other principles to consider

- Keep the wording simple and straightforward.
- Try not to repeat ingredients. If bananas are used in one item, keep it that way. Why have two desserts with the same ingredient?
- You don’t always have to use fruit. If you are in an area that doesn’t produce much fruit in the shoulder seasons, use other ingredients.
- When it’s in season, use fruit. It is a great way to showcase an ingredient that people want to taste after a year of not having it. Using fruit will also lower your food costs, and you will have an ingredient that requires little manipulation.
- Not every dessert requires a frozen component.
- The number of dessert items on the menu depends on how the kitchen can handle serving them during busy production times, without compromising the customers’ experience. Normally five to eight items on the dessert menu is a reasonable amount.
- Design a dessert menu that suits the style and cuisine type of the establishment, as well as the type of customers being served.
- Think about seasonality: offer lighter desserts in summer, richer, warmer desserts in the winter.
- Put the popular items on the very top and bottom of the menu so that customers will see the other options and perhaps choose them. Also, statistically, when a person views a menu, the eye will be drawn to the top, right-hand side of the page. Placing a less popular item in this area can help promote sales of desserts that are not the “stars.”

- Keep it small. There is nothing that better promotes customer satisfaction than to have them wishing for a “little bit more” of a dessert. You don’t want to serve a dessert that is so big it can’t be finished. This will have an effect on the customer (“I’ve had too much”), and is wasteful. Food costs can be lowered if reasonable portion sizes are used. By serving smaller amounts, greater yield can come from the recipes.

Designing a dessert

Where do you start in planning a new dessert? Once you have the main ingredient or flavour profile figured out, there are many options:

Favourites

Take classic, popular desserts (hot soufflés, crème brûlée, lemon tarts, etc.) and prepare and present them in a clean, straightforward manner. Remember that classics are classics for a reason. They are great dishes, have wonderful contrasts, and are comforting. They can remind customers of times past and conjure the great memories that accompany them. A dessert that is simple, but executed perfectly, is very satisfying on many levels.

Ingredient driven

Say you have fresh, ripe, juicy peaches. By using the principles listed above about contrast between flavour, texture, and temperature, you can design a peach dessert. For example, you might offer a slice of sponge cake soaked with a vanilla syrup and topped with sliced peaches. Or you might present a white wine sabayon pooled on top of the peaches and then flashed under a broiler, or use a hand torch to caramelize the top, finished off with a drizzle of wildflower honey. Use the different textures from the fruit and sponge cake, and the creamy sabayon, which is on the tart side, to balance the sweetness of the fruit and honey. Warmth from the broiler will contrast the lower temperature of the other components. Figure 10 shows an example of a dessert that features peaches and walnuts.

Seasonal

Use a fruit (or vegetable) and make it a “star” in the season it is harvested. For example, prepare apple desserts to serve in the fall and winter, and local strawberries and ice cream in the summer.

Figure 10.

Deconstruct a recipe

Take the main flavour profiles of a classic dessert or combination, and reinterpret them in an intriguing fashion. For example, turn a black forest cake (Figure 11) into a plated dessert. The eponymous black forest cake of chocolate layers, whipped cream, cherry centre, and cherry topping has been very popular for over half a century, and it is a combination of flavours that everyone knows.

Figure 11.

First, take the key components of the black forest cake (chocolate, cherries, and whipped cream) and come up with different ways to reimagine them in a modern context (Table 2).

Table 2: Deconstructing a black forest cake

Component	**Reimagined**
Chocolate cake	Rich chocolate brownie, broken into pieces; chocolate “sand” made with tapioca maltodextrin
Whipped cream	Crème fraiche – shaped into a quenelle
Cherries soaked in kirsch	Candied cherries and cherry–kirsch sorbet

Next, think about assembly. One option is to assemble the dessert with the brownie pieces placed on the plate first, then the crème fraiche in the centre of that, garnished with candied cherries and finished with a scoop of the cherry sorbet resting on the chocolate “sand.” The plate could be finished with some sauce and garnishes (Figure 12). This “deconstruction” has all the flavours of a classic black forest cake, but is presented in a novel format and designed with contrasts of flavour, textures, and temperatures in mind.

Figure 12.

Now that you have an inspiration for a dessert, next comes the planning stage. This is where the design principles mentioned above apply. An easy way to plan is to draw the dessert. Putting the idea on paper can assist with placement of the components, the shapes, the scale of each component to the others, and potential garnishes. To ensure the execution of all the components balances, be prepared to make the dish over and over, tweaking the items each time. That will be the only way to ensure that you have created a memorable dessert!

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12.

Activities

Activities

- Prepare a dessert menu using the five Cs.
- Prepare the following dessert sauces:
    - Fruit coulis
    - Caramel sauce
    - Crème anglaise
- Prepare a “deconstructed” version of a classic dessert.

Appendix: Standard recipes for dessert garnishes

Tuiles and Variations

Basic Tuiles

Ingredients

240 g sugar

180 g flour

2 g salt

120 g egg whites

90 g butter, melted

Method

Combine sugar, flour, and salt in mixer until well combined. Add egg whites and mix ingredients until smooth. Spread thinly into desired shape or stencil, and bake in a moderate oven (170°C or 350°F) until golden brown (10 to 15 minutes). Bend or shape while still warm.

Chocolate Tuiles

Ingredients

240 g sugar

120 g flour

60 g cocoa powder

2 g salt

120 g egg whites

90 g butter, melted

Method

Same as above; add cocoa to flour.

Cinnamon Almond Tuiles

Ingredients

240 g sugar

120 g flour

60 g ground almonds

5 g cinnamon

2 g salt

120 g egg whites

90 g butter, melted

Method

Same as above; add cinnamon and almonds to flour.

Meringues

Ingredients

180 g egg whites

Pinch cream of tartar

270 to 360 g sugar (Depending on how firm you want the meringue to be. More sugar creates harder meringues)

Method

French or traditional meringues: Beat egg whites and cream of tartar until foamy. Gradually add sugar while beating, then whip to stiff peaks. Pipe into desired shapes and bake in a very low oven (80°C to 95°C or 175°F to 200°F) for 12 to 24 hours, until dry and firm.

Swiss meringue: Add all ingredients to a stainless bowl and beat over a bain marie until thick, glossy and in stiff peaks. Pipe into desired shapes and bake in a very low oven (80°C to 95°C or 175°F to 200°F) for 12 to 24 hours, until dry and firm.

Cool and store in an airtight container.

Nut brittle

Ingredients

400 g glucose

500 g sugar

400 g sliced almonds

100 g butter

Method

Combine sugar and glucose with enough water to dissolve. When the mixture is a light caramel colour, stir in almonds and butter. Roll immediately between two sheets of parchment paper to desired thickness. Can be rewarmed in oven briefly in order to roll thinner.

Key Terms

agar agar
A natural vegetable gelatin counterpart derived from red algae.

à la minute
Items prepared to order.

albumen
The white portion of the egg. It consists primarily of proteins and water.

arrowroot
A starch derived from the root of tropical plants; used to produce clear, thickened sauces that will not go cloudy.

bloom
A whitish coating that can appear on the surface of chocolate. There are two types of bloom: fat bloom, arising from changes in the fat in the chocolate; and sugar bloom, formed by the action of moisture on the sugar ingredients.

blown sugar
Garnish made by taking caramelized sugar and pumping air into it to form round shapes or balls like glass.

caramelization
Process that occurs when sugar reaches a certain temperature and starts to brown, at approximately 170°C (340°F).

coagulation
Process where a protein changes from a fluid into a thickened mass.

compote
Cooked fruit served in its own cooking liquid.

cornstarch
Starch derived from corn; used as a thickening agent in liquid-based foods. It is mixed in with a cold liquid to form a paste or a slurry and then added to simmering liquids to thicken.

coulis
A fruit purée, used as a sauce.

crystallization
The process of formation of solid crystals precipitating from a solution.

crème anglaise
Thin vanilla custard used as a sauce or base for frozen desserts.

crème chantilly
Whipped cream with sugar and vanilla.

curd
Thickened custard made from egg yolks, sugar, and a liquid, usually lemon juice.

focal point
Visual accents on a plate, buffet, or platter.

fruit butter
Sauce made from cooked fruit that has been puréed and cooked until thick.

garnish
Decorative element on a food item or platter.

gelatin
A gelling agent derived from collagen obtained from various animal by-products.

gelatinization
A process that breaks down the bonds of starch molecules in the presence of water and heat, allowing the starch to thicken the mixture

gluten
A protein composite present in cereal grains, especially wheat, but also found in barley, oats, and rye. Composed mainly of two proteins, gliadin and glutenin. Gluten contributes to elasticity and texture in bread doughs and other products containing wheat.

hydrocolloid
A substance that forms a gel in contact with water.

lecithin
Naturally occurring substance in animal and plant tissues (most notably egg yolks and soybeans) that is an excellent emulsifier.

modified starch
A starch that has been physically, enzymatically, or chemically treated for use in food products as a thickening agent, stabilizer, or emulsifier.

modified starches
also called starch derivatives, are prepared by physically, enzymatically, or chemically treating native starch to change its properties.

molecular gastronomy
The study or use of scientific principles in food preparation.

negative space
The empty space between items on a plate or buffet that is used to make the presentation more appealing.

plated dessert
A dessert that is assembled from several components.

pre-gelatinized starches
Starches that have been cooked and then dried, making them soluble in cold water.

pulled sugar
Garnish made by shaping caramelized sugar by hand by pulling it into long ribbons or other shapes.

Rennet
derived from the stomach linings of cattle, sheep, and goats, is used to coagulate, or thicken, milk during the cheese-making process

sabayon
A thick, frothy sauce, either sweet or savoury, made by whisking egg yolks and liquid over low heat.

sous-vide
Process of cooking food in vacuum-sealed packaging at consistent, low temperatures.

spherification
Process of creating spheres of liquid with a firm surface that will hold.

spun sugar
Garnish made by drizzling caramelized sugar from a fork or whisk into long, very fine threads.

tapioca
A starch extracted from cassava roots.

tempering
A) To add a hot liquid to egg yolks slowly so the yolks are not cooked too quickly.
B) To allow an item to soften slightly by coming to room temperature slowly.
C) A process used to heat and cool chocolate to create a crystal structure that will result in shiny and crisp finished chocolate.

zabaglione
Italian for “sabayon.”

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