MAPLE 201

A Culinary Exploration of Maple

Québec
Maple Syrup
Producers

This textbook was created for the use of students and instructors in hospitality courses, chefs, and those involved in the hotel, restaurant and institutional (HRI) food service industry.

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INTRODUCTION

Module 201 of our maple curriculum builds on the basic knowledge acquired in our 101 module. That covered the vast range of maple products and their characteristics. In this second step, we will further your knowledge with specific culinary applications: cooking, baking, pastries, gluten-free and lactose-free dishes, as well as spices. Following our lead, we are certain you will discover interesting combinations leading to your own explorations. Let's go!

- **Demonstrate the uses, characteristics, and benefits of Québec maple products in cuisine and pass this knowledge on to food professionals and apprentices.**

Science and the culinary arts may, at first glance, seem to be fields of expertise miles apart. In fact, they are closely related. Cooking employs chemical reactions to achieve desired texture, colour, and flavour. Procedures as simple as making caramel or dissolving gelatin involve the interactions of a multitude of compounds. Insufficient understanding and mastery of such techniques can lead to kitchen disasters. The Centre ACER has demystified some of the elements of maple's chemistry to help you create dishes that bring forth the exceptional flavour of this unique product.

CULINARY APPROACH

Chefs Philippe Mollé and Arnaud Marchand put their kitchen teams to work, testing recipes with various maple products to demonstrate a great diversity of culinary uses, especially in the creation of new recipes and flavours. Pastry Chef Jean-Marc Guillot also contributed to this text in the section dealing with confectionery and chocolate. We will cover:

- Exploration of the different grades of maple syrup (from light to dark), demonstrating added value in certain recipes;
- Exploration of the different granulometries of maple sugar to reveal their significance, particularly in pastries;
- Exploration of cooking with maple water, a technique with advantages that chefs should know.

The concentration of flavours, umami (savoury taste), and Asian inspirations brought us to important conclusions that accentuate the singular flavour of maple. We will explore spices such as the great peppers and curries of the world. Our chefs were also careful to delve into current food trends and issues, such as allergies and intolerances to lactose and gluten. They were pleasantly surprised by the results, as they were with the use of maple water, the differing granulometries of maple sugar, and maple syrup's multiple applications in its four colours.

We share their experiments with you in the hope that your horizons will expand with the possibilities that maple offers in the kitchen. It goes so marvellously well with so many other ingredients.

A final word before we get to work: our pursuit of learning is constantly evolving. As it does so, we will be adding recipes developed by students and chefs because, as time goes by, maple never ceases to bring us new surprises!

01

The Chemistry of Sugars

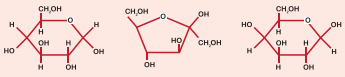
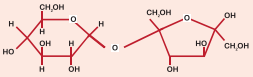
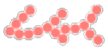
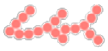
Chapter

01

WHAT IS A SUGAR?

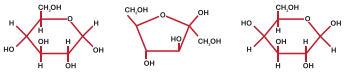
Sugars, or carbohydrates, are among the most abundant biomolecules on earth and are **one of the 13 core nutrients listed on the Nutrition Facts tables** of most packaged foods.

Carbohydrates are hydrates of carbon
(consisting of carbon, hydrogen, and oxygen atoms bonded into various compounds)

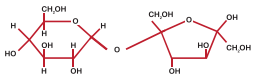
Simple Sugars						Complex Sugars		
Monosaccharides (1 unit with 6 carbon atoms) 			Disaccharides (2 joined units) 			Polysaccharides (several joined units)		
Glucose (Dextrose) ●	Hydrolysis of Corn Starch	Pastries Fermentation Industrial Concentrate	Sucrose ●+▲	Plants (cane, beetroot, maple)	Confections Pastries Jams Beverages	Starch 	Plant Cell Walls	Texturizing Agents
Fructose ▲	Honey Fruits	Beverages Jams Baking Confections	Lactose ●+■	Milk	Confections Baking Prepared Meats and Dishes	Cellulose 		
Galactose ■	Honey Certain Vegetables Milk	Edible Gums	Maltose ●+●	Barley Corn Potatoes	Sport Beverages Fermentation	Pectin		

Sucrose (table sugar) is the most commonly used disaccharide. It is extracted primarily from sugar cane and sugar beet but can also be obtained from plants such as the sugar maple tree. Mono and disaccharides are classified as "Sugars" in Nutrition Facts tables.

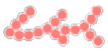
Polysaccharides are complex sugars, several monosaccharides joined together. Starch, cellulose, hemicellulose, and pectin are polysaccharides of interest to the food industry. Derived from the cell walls of plants, they may be soluble (e.g. oats, barley) or insoluble (leafy vegetables) and their structure is relatively complex. They are mainly found in the dietary fibre category. Fibre is the non-digestible carbohydrate found in plants. It plays multiple roles in the body, so fibre is an important part of a healthy diet. Starch, however, is undoubtedly the most important carbohydrate to humans. Starch is the energy reserve of cereal plants and root vegetables. It is composed of a variable ratio of amylose and amylopectin, depending on the type of plant, a characteristic that underlies its functional properties in foods.



Disaccharides



Monosaccharides



Polysaccharides

THE SUGARS IN MAPLE SAP/WATER

The sap of the sugar maple tree, when harvested and packaged as maple water, is rich in many nutrients and has a subtle, fresh, and delicately sweet taste. Its sweetness is due to the presence of various sugars: sucrose, glucose, fructose, and some complex sugars. It's delicious to drink as is and adds a touch of maple flavour to preparations without masking other ingredients. It may be concentrated into syrup by warming over low heat on the stovetop.

Glucose ● **Fructose** ▲ **Sucrose** ● + ▲

CONCENTRATING MAPLE WATER

Starting Quantity	Reduction Time (over low heat)	Final Quantity	Degrees Brix
4 cups (1 litre)	--	--	2 - 2.5
4 cups (1 litre)	30 min	3 cups (750 ml) - **LIQUID**	6
3 cups (750 ml)	20 min	2 cups (500 ml) - **LIQUID**	12
2 cups (500 ml)	20 min	1 cup (250 ml) - **SYRUP**	24

CHARACTERISTICS *(Data Sheet for Québec Maple Water in bulk—PPAQ 2018)*

Sugar Concentration	**1.9 – 2.8° Brix**
Sweetening Power	**0.04 (sucrose = 1) / 0.06 (glucose = 1)**
pH	**6.60 – 7.50**
Organoleptic Properties	**Clear, translucent appearance, like pure water, sometimes a very light amber. Slightly sweet-tasting with a subtle maple flavour. Free of any foreign taste or odour.**

Valeur nutritive
Nutrition Facts
pour 100 ml
Per 100 ml

Calories 10	% valeur quotidienne* / % Daily Value*
Lipides / Fat 0 g	0 %
saturés / Saturated 0 g + trans / Trans 0 g	0 %
Glucides / Carbohydrate 2 g	
Fibres / Fibre 0 g	0 %
Sucres / Sugars 2 g	2 %
Protéines / Protein 0 g	
Cholestérol / Cholesterol 0 mg	
Sodium 0 mg	0 %
Potassium 10 mg	0 %
Calcium 0 mg	0 %
Fer / Iron 0,3 mg	2 %
Zinc 0,1 mg	1 %
Cuivre / Copper 0,09 mg	10 %
Manganèse / Manganese 0,225 mg	10 %

* 5% ou moins c'est **peu**. 15% ou plus c'est **beaucoup**
* 5% or less is **a little**. 15% or more is **a lot**

THE SUGARS IN MAPLE SYRUP

Maple syrup is a staple food rich in nutrients of all kinds. It is much more than a sweetener. Authentic and 100% pure, its sugars are sucrose, glucose, fructose, and complex sugars. Maple syrup and maple sugar are excellent replacements for other sweeteners in most recipes.

Glucose ● **Fructose** ▲ **Sucrose** ● + ▲

CARBOHYDRATE CONTENT OF SWEETENING AGENTS

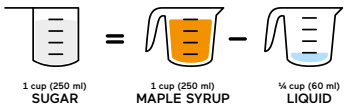
(g/l)

	Poly-saccharides	Oligo-saccharides	Sucrose	Glucose	Fructose	Total Carbs
Maple Syrup	2%	0%	95%	1%	BDL	100 %
Molasses	4%	7%	44%	24%	22%	100 %
Brown Rice Syrup	22%	21%	42%	15%	BDL	100 %
Agave Syrup	BDL	BDL	3%	10%	87%	100 %
Corn Syrup	33%	16%	19%	31%	1%	100 %
Honey	0%	1%	3%	47%	49%	100 %

BDL: Below Detection Limit

Sweetening Power: 0.6 (sucrose = 1) / 0.91 (glucose = 1)
Sugar Concentration = 66 – 68.9° Brix
pH = 5.5 – 8.0

Replace sugar with maple syrup



Valeur nutritive
Nutrition Facts
pour 1/4 tasse (60 ml)
Per 1/4 cup (60 ml)

Calories 220	% valeur quotidienne* / % Daily Value*
Lipides / Fat 0 g	0 %
saturés / Saturated 0 g + trans / Trans 0 g	0 %
Glucides / Carbohydrate 54 g	
Fibres / Fibre 0 g	0 %
Sucres / Sugars 53 g	53 %
Protéines / Protein 0 g	
Cholestérol / Cholesterol 0 mg	
Sodium 0 mg	0 %
Potassium 200 mg	4 %
Calcium 75 mg	6 %
Fer / Iron 0,4 mg	2 %
Thiamine 0,05 mg	4 %
Riboflavine / Riboflavin 0,35 mg	27 %
Niacine / Niacin 0,2 mg	1 %
Magnésium / Magnesium 15 mg	4 %
Zinc 0,3 mg	3 %
Cuivre / Copper 0,15 mg	17 %
Manganèse / Manganese 1,65 mg	72 %

* 5% ou moins c'est **peu**. 15% ou plus c'est **beaucoup**
* 5% or less is **a little**. 15% or more is **a lot**

THE COMPOSITION OF DIFFERENT TYPES OF SUGAR

Unlike sucrose, unrefined sugars such as brown and maple sugar contain compounds that can impede caramelization or searing at conventional temperatures. Maple sugar has already undergone a heat transformation and, because of its composition, may colour more intensely in caramelization or the Maillard reaction. Simply put, it burns more easily under the effect of heat.

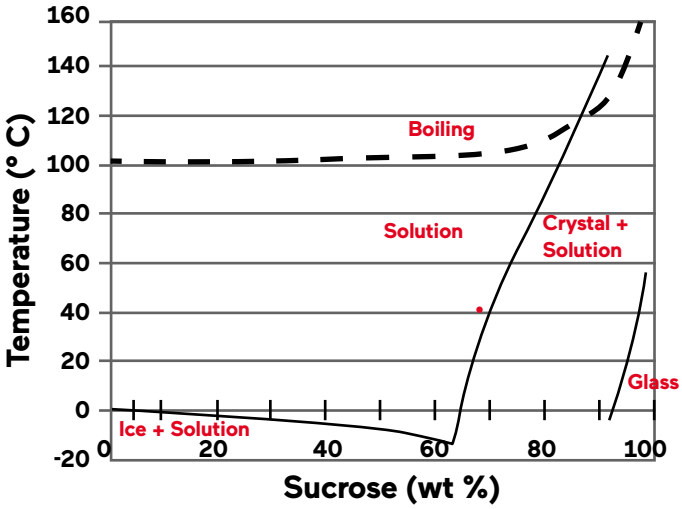
Refined white sugar contains sucrose only (over 99%) and traces of water. Maple sugar is unrefined with a composition similar to that of maple syrup. With slightly more than 95% in sucrose and a number of other components, it often presents in coarser crystals than white sugar. It can also be more difficult to incorporate, depending on the preparation's water content. In moister doughs (such as cake batter), water helps to dissolve maple sugar to produce a good texture. In drier batters or doughs (muffins, cookies, shortbread), the final texture may be less interesting because the lower moisture does not fully dissolve the larger sugar crystals. For this reason, fine maple sugar is recommended in baking.

THE PROPERTIES OF SUGARS

Sugars are quite soluble in water. Their solubility depends on the type of sugar, the temperature, and the presence of other molecules in the solution. At 20° C, for example, up to 2,000 g of pure sucrose will dissolve in 1 litre of water. Under these conditions, the solution is said to be saturated, i.e. if more sugar is added, it will not dissolve. As the solubility of sugars is dependent on temperature, it becomes possible to dissolve more in the same volume of water by heating it: the solution is thereby supersaturated (e.g. sucrose: 2886 g/l at 60° C). This characteristic of sugars modifies the properties of water and is the basis of many culinary applications.

The properties of sugars such as sucrose, glucose, and fructose are well known and documented. Those of maple sugar are lesser known. Université Laval, in collaboration with Québec Maple Syrup Producers, is currently at work documenting the properties of maple sugars in order to better understand their behaviour in solution and, consequently, their reactions in culinary applications.

Physical Properties of Sugars: lowering the melting point, raising the boiling point, solubility (diagrams of phases), viscosity, osmotic pressure, etc.



CARAMELIZATION

Food Browning

When food turns brown, it is either an enzymatic or non-enzymatic reaction—with or without the activity of enzymes. Some fruits and vegetables (apples, avocados, bananas, mushrooms) turn brown due to enzymatic activity. Non-enzymatic browning is also a chemical process that turns foods brown, but without the involvement of enzymes. Also falling into this category is browning caused by oxidation of fats or ascorbic acid (Vitamin C), **caramelization of sugars**, or by the **Maillard reaction**. During the cooking of most foods, these latter two reactions may occur simultaneously and form compounds that contribute to browning and flavour development.

"Caramelization" is a term used to describe a variety of cooking techniques. For example, a rice pudding may be caramelized with butterscotch, fruit may be caramelized with sugar, and vegetables may be caramelized with maple syrup or sugar. You may caramelize a sugar-powdered pastry under the grill or meat juices in the pan. In all these cases, "caramelization" gives the appearance, taste, or colour of caramel.

Caramelization—the addition of caramel to certain preparations—brings flavour and colour to food. But what is it, really? Caramelization is the breakdown of sugars which then react with one another under the effect of heat, provoking the formation of coloured pigments and many flavourful compounds. This occurs when sugars are heated to high temperatures in the absence of amino compounds (proteins, amino acids) under acidic or basic conditions. The temperature required for this reaction is higher (160° C - 180° C) than that for the Maillard reaction (100° C - 140° C) and depends on the type of sugar used.

Melting point reached, breaking complex sugars into simple sugars by hydrolysis.

Simple sugars react with one another to form coloured polymers and volatile aromatic molecules (fruity, nutty, buttery, etc).

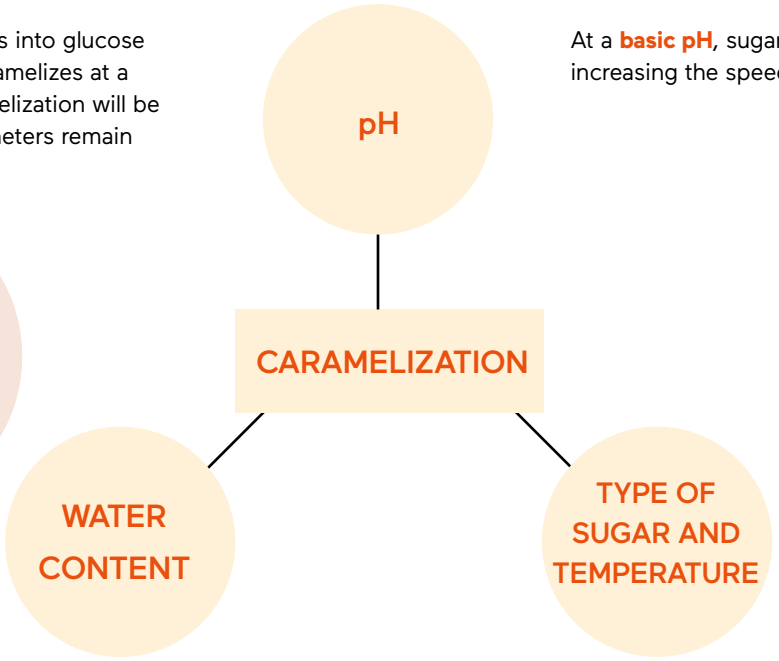
If applied temperatures are too high, there is a risk of carbonizing the sugar, which will create unwanted flavours.

The degree of caramelization and the properties of the caramel depend on the type of sugar used, the chemical environment of the reaction, and time/temperature control throughout the process: from blond caramels, lightly cooked and very sweet, to dark caramels with a bitter, burnt taste.

Factors Influencing Caramelization

At an **acidic pH**, sucrose splits into glucose and fructose. As fructose caramelizes at a lower temperature, the caramelization will be accentuated if all other parameters remain constant.

At a **basic pH**, sugars break down more rapidly, increasing the speed of caramelization.



Conditions for caramelization are ideal when the proportions of water and sugar are roughly equivalent.

If the water content in the sucrose solution is very low or almost zero, the reaction will be very weak. Even though the reagents are concentrated, their low dilution does not allow the reagents to "meet".

Conversely, if the water content is very high, the reaction is also very weak because, despite the reagents' mobility, they are overly diluted and "meet" at a very low level.

The temperature at which caramelization is induced depends on the melting point of the sugar being used.

Sugar	Temperature	Example
Fructose	110° C	Honey
Galactose	160° C	Milk Sugar
Glucose	160° C	Glucose Syrup
Sucrose	160° C	Table Sugar
Maltose	180° C	Malt Sugar

- Foods cooked with fructose (such as honey) brown more quickly and intensely than with, for example, table sugar. If the temperature is too high, there is a risk of carbonizing the sugar and creating undesirable flavours.

- A catalyst can be used to lower the reaction temperature and accelerate caramelization. For this reason, lemon juice (an acid) is sometimes added to the mixture of table sugar and water to speed up the production of caramel.

- Most chefs say that only white sugar can be successfully caramelized. This is because others, such as brown sugar, unrefined sugar, and maple sugar, contain compounds that impede caramelization or burn before the sugar has time to caramelize.

- Maple syrup (and therefore the maple sugar produced from it) contains a mixture of sucrose, glucose, and fructose, the proportions of which vary by colour: the darker the syrup, the higher its glucose and fructose content. A lighter maple syrup or sugar may react a little less quickly to caramelization and the Maillard reaction than a darker syrup. Despite this, maple sugar has been observed to burn and carbonize, for example, in the preparation of a crème brûlée. Why?

- Compared to white sugar, maple sugar is a product in which the sugars have already been transformed by heat and which, due to its composition, can develop colouration even more significantly through intensified caramelization and Maillard reaction. This is why it burns more easily under the effect of intense heat. Adding a liquid (such as water) to the sugar helps alleviate this problem.

THE MAILLARD REACTION

The Maillard reaction is in fact a series of very complex chemical reactions that occur in cooking at temperatures greater than 50° C and under normal food pH conditions (close to neutrality). It's named for French doctor and scientist Louis Camille Maillard, who first identified it in 1913.

The Maillard reaction is quite significant. It promotes the browning and flavour development of food.

But it also produces certain compounds with beneficial properties (antioxidants) and others somewhat harmful to human health (acrylamide).

The Maillard reaction creates the pleasant smell and flavour characteristic of toasted bread and fried meat. It is also at play in the browning of beer, roasted meat, coffee, and chocolate.

The Maillard reaction can occur in all types of preparation: boiling, poaching, steaming, grilling, or even at room temperature.

Maple syrup, for instance, may become darker over time at room temperature because it holds elements capable of reacting (amino acids and reducing sugars). Imagine then, what happens when you heat it!

The Maillard reaction produces outcomes that vary greatly, depending on amino acids, the sugars present, and the level of heat applied.

FACTORS AT PLAY IN THE MAILLARD REACTION

Amino Acids

Free amino acids

Proteins (molecules formed of a chain of amino acids)

Reducing Sugars

Glucose (fruit,honey)

Fructose (fruits, honey)

Lactose (milk)

Maltose (potatoes)

Outcomes

Smells

Flavour

Colours (melanoidins)

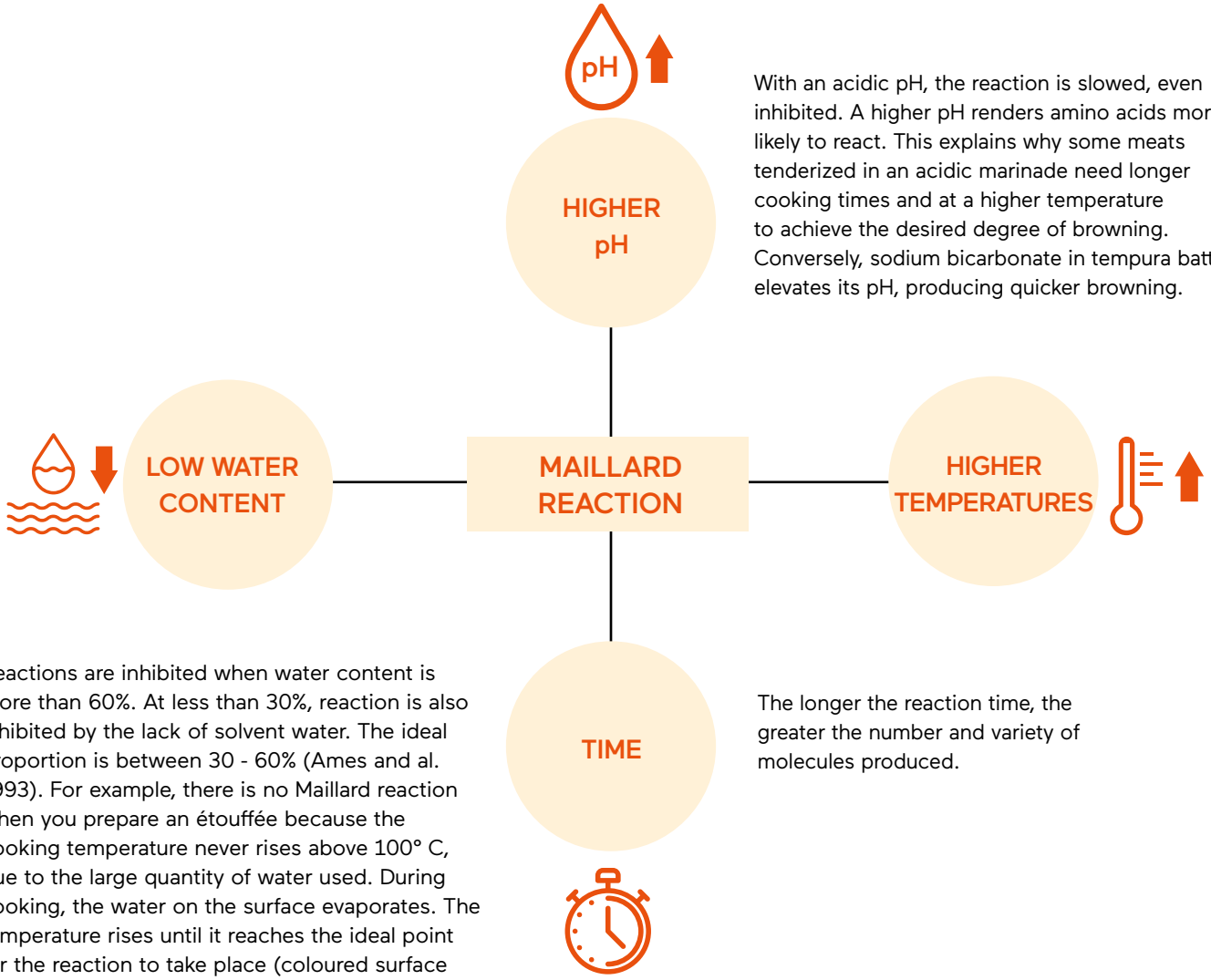
Antioxidants

Nutrients

Acrylamide (harmful)

The Maillard reaction is, in fact, a combination of reactions. The molecules created, even in their minute quantities, are sufficient to produce, for example, the succulent flavour of grilled meat. It has been calculated that dissolving 2 grams of this type of substance in a lake 2 metres deep and 8 kilometres in diameter, the water would taste like grilled steak! (Myhrvold, 2011)

Conditions That May Stimulate the Maillard Reaction



With an acidic pH, the reaction is slowed, even inhibited. A higher pH renders amino acids more likely to react. This explains why some meats tenderized in an acidic marinade need longer cooking times and at a higher temperature to achieve the desired degree of browning. Conversely, sodium bicarbonate in tempura batter elevates its pH, producing quicker browning.

Reactions are inhibited when water content is more than 60%. At less than 30%, reaction is also inhibited by the lack of solvent water. The ideal proportion is between 30 - 60% (Ames and al. 1993). For example, there is no Maillard reaction when you prepare an étouffée because the cooking temperature never rises above 100° C, due to the large quantity of water used. During cooking, the water on the surface evaporates. The temperature rises until it reaches the ideal point for the reaction to take place (coloured surface of grilled or fried meat, the crust on baked or toasted bread).

The longer the reaction time, the greater the number and variety of molecules produced.

The reaction that takes just a few minutes at 150° C would take hours at 120° C, and weeks at 60° C.

Temperature	Reaction Speed
180° C	Reaction ceases; pyrolysis (Food burns, carbonizes)
130-140° C	Significant acceleration
100-115° C	Speeds up
< 90° C	Slows down

02

The Properties of Sugar

Chapter

02

SOME OF SUGAR'S CULINARY PROPERTIES

White sugar, made of sucrose, is the most common cooking sugar. That's what most recipes mean when they generically call for "sugar". Its properties, well known and documented, include:

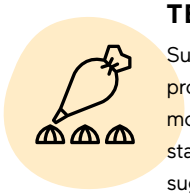
COLOUR

Sugars, whether naturally occurring or added to foods, can be transformed by heat through caramelization and the Maillard reaction. **This produces a host of molecules that will turn it the characteristic brown colour and release pleasant aromas of baked goods and seared meat, as the case may be.** Honey and fructose brown more easily than white sugar. Maple sugar and brown sugars are naturally pigmented and flavoured, requiring caution when used in preparations that involve heat.

SHELF LIFE

Sugar attracts and retains water, a property called hygroscopicity. This slows down the loss of moisture and growth of micro-organisms **and extends the shelf lives of baked goods and pastries, as well as jams, jellies, and candied fruits**.

TEXTURE



Sugar has two main functional properties that provide texture to foods: its ability to bind to water molecules and remain in an amorphous or crystalline state in solution. Added in sufficient quantity, sugar will elevate viscosity, raise the boiling point, and lower the freezing point of water, ultimately modifying the behaviour of proteins, starches, and hydrocolloids in food systems (breads, jams, meringues, and so on).

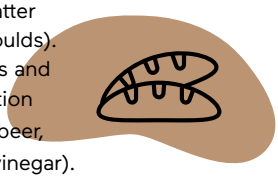
PLEASURE

One of sugar's main functions is to make food taste sweet. **This property is pleasing to humans, as it stimulates pleasure centres in the brain to the point of addiction.** The perception of sweetness varies by type of sugar, its concentration, pH, viscosity, and the temperature of the solution. Synergistic effects can even be observed in mixtures of certain sugars.

FLAVOUR

Sugar, applied in very small amounts, can balance and enhance the taste of vegetables, meats, and foods that are not especially sweet. **It is known to round out or mellow the flavour of foods by masking or suppressing perceptions of bitterness, acidity, and saltiness.** Coffee is less bitter and tomatoes less acidic with a little sugar.

FERMENTATION

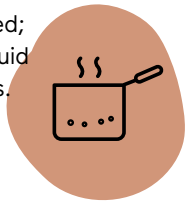


Fermentation is the conversion of organic matter by micro-organisms (bacteria, yeasts, and moulds). Foods are modified, depending on conditions and type of micro-organism, as in lactic fermentation (yogourt, cheese, cold cuts), alcohol (bread, beer, wine), propionic (aged cheese), and acetic (vinegar). In most cases, the micro-organisms use sugar as their nutrient.

Yeast uses the sugar in its medium to produce carbon dioxide and alcohol, critical in making bread, beer, and wine. Carbon dioxide makes the dough rise, lending the bread texture and shape.

SUGAR AND TEXTURE... SOME EXAMPLES

DENSITY



In making sweets, a sugar solution is heated; the water progressively evaporates; the liquid changes in density, and the sugar converts. In successive stages, from colourless and tasteless (syrups, sorbets, poached fruits at 102° C) to colourful and richly flavoured caramels (160 - 180° C), we manage the water to its boiling point and achieve the desired sugar concentration.

AERATION

The preparation of some cake and cookie doughs calls for creaming butter well with granulated sugar. Beating allows air bubbles to be incorporated, along with the sugar, into the butter, resulting in a light and airy crumb after baking.

For meringues, adding sugar to the egg whites being beaten stabilizes the peaks and makes it easier to incorporate air.

CRYSTALS

Sugar can lower the freezing point of water. This will prevent the formation of large ice crystals in ice cream, conferring a smooth texture.

SOFTENING

Sugar inhibits the development of gluten, a highly elastic structure formed by the mix of flour and water. More sugar is used in cake mixes because it slows gluten development and produces a softer, chewy crumb. The opposite is desired in bread, where a right proportion of sugar is prescribed to obtain elasticity through an adequate amount of gluten.

INTERCHANGEABILITY OF SUGARS

In the kitchen, sugars are not all equal. Some are sweeter than others; some have a stronger taste; others have their own distinct consistency. With different properties come **different results in texture, structure, and flavour, so when a substitution is made for the type of sugar called for, the recipe must be adapted**.

This is where food science comes to the service of the culinary arts. **The chef must know the composition and properties of the sugars being used** and understand their functions in food, not only to adapt recipes, but to create new ones.

We know that maple products can be used effectively in most recipes, **but it depends on factors like the moisture content, colour and flavour intensity, and heat reactivity of the maple product**. For example, maple syrup has known colour and flavour characteristics. Under the influence of heat, it becomes darker and the flavour changes: at 132° C, it will blacken; over 150° C, it carbonizes.

While it's generally straightforward to replace white sugar with maple syrup in vinaigrettes, sauces, toppings, and meat preparations, **the chef must, for example, adjust the amount of water added in baking and pastries to avoid a dense, heavy result**.

Having said this, without knowing the culinary properties of maple products perfectly, **it is still sometimes necessary to apply trial and error to the modification of certain recipes**.

A cookie made with white sugar will come out dry and crunchy. Made with brown sugar, its texture will be moist and soft. Why? **Substituting the sugar called for in a recipe can be done, but not unconditionally.**

SUBSTITUTING WITH MAPLE SYRUP

	REPLACE WITH
LIQUID SWEETENER	
Honey	Same quantity of maple syrup
Agave Syrup	
GRANULATED SUGAR	
White Sugar	Same quantity of maple syrup and reduce the quantity of liquid called for in recipe (water, milk, juice, etc.)
Brown Sugar	

SUBSTITUTING WITH MAPLE SUGAR

	REMPLACER PAR
White Sugar	Same quantity of maple sugar
Brown Sugar	

Good to know

Maple sugar is essentially dehydrated maple syrup, processed into crystals of various sizes. Its composition is therefore quite similar to the maple syrup from which it is produced, rich with a multitude of highly varied components. This also means that maple sugar, in its production, contains sugars already transformed by heat. Furthermore, it means that the behaviour of maple sugar, especially that made from darker syrup, will be different from the behaviour of more refined sugars (such as table sugar) when heated.

Caramelization and the Maillard reaction will occur and compete, depending on the conditions of preparation. This should be taken into consideration when cooking time is prolonged or done at high temperature. One example is crème brûlée: maple sugar does not melt easily, even under intense heat. It may burn and carbonize if the finishing procedure is not adapted to the product.

Some vegetables, such as carrots and onions, are high in glucose, fructose, and reducing sugars, making them good candidates for caramelization. Others, like broccoli and cauliflower, benefit from the flavour boost of a little sugar. How about maple syrup instead? And a pinch of baking soda to accelerate browning, either by caramelization or the Maillard reaction, raising the pH. More flavour is a good thing, right?

03

Exploratory Approaches to Cooking

Chapter

03

MAPLE ADDS FLAVOUR

As explained in Maple 101, there are four colour classes of maple syrup, each with distinct flavours. You choose which one serves your specific purpose. Maple water also works in several applications: flavouring, blending with other flavours, simmering, poaching, soaking, and so on.

We now turn to exploration of these products and their various uses.

These are the test recipes prepared by our chefs, featuring maple products:

Recipes	Explorations
PAN-JUICE GLAZE	The 4 classes of maple syrup
SWEET-AND-SOUR GLAZE	The 4 classes of maple syrup
BISON HANGER STEAK GRAVLAX	Dark maple syrup vs. maple sugar
SALMON GRAVLAX	Maple sugar
VERJUICE-MARINATED SALMON	Maple water and raw maple sugar
MARINATED COD, SEARED OR SOUS-VIDE	Dark maple syrup vs. maple sugar
MASHED POTATOES	Maple water vs. filtered water, sweetened
SOUS VIDE VEGETABLES (Nantaise carrots and leeks)	Maple water vs. water
BLANQUETTE DE VEAU (slow-cooked, lid on)	Maple water vs. water
POT AU FEU	Maple water vs. water
FOIE GRAS	Maple water

PAN-JUICE GLAZE
SWEET-AND-SOUR GLAZE

Experimenting with maple syrup's 4 colour classifications

Objective	Compare flavours of glazes made from each of the 4 colours of maple syrup (golden, amber, dark, and very dark).
Method	All glazes started with a maple syrup reduction, deglazed with pan juices or vinegar. We preferred a neutral cider vinegar to counterbalance the glaze's sweetness.
Conclusion	All glazes were weighed after reduction to ensure accuracy of comparison. The darker the syrup, the thicker the consistency of the same reduction. Maple flavour in the golden glaze was deemed present but relatively mild. This would be ideal for fish, poultry, and sweeter vegetables. The amber and dark syrups were considered similar. The very dark syrup was found to be stronger and less balanced; it was thought appropriate for game meats, for example. The glazes made with darker syrup were more flavourful and therefore recommended for red meat and game.

BISON HANGER STEAK GRAVLAX

Experimenting with maple sugar and or dark maple syrup (standard and sous vide curing)

Objective	Compare gravlax prepared with maple sugar vs. gravlax prepared with dark maple syrup.
Method	Meat cured (standard method and sous vide) with 2/3 coarse salt and 1/3 of maple products (maple sugar or maple syrup).
Conclusion	The gravlax cured with maple sugar had a very nice salty/sweet balance, but the maple flavour was quite subtle, unlike those done with maple syrup. The maple flavour permeated much better with the sous vide method, so this technique is recommended for a red-meat gravlax.

SALMON GRAVLAX

Experimenting with maple sugar

Objective	Applying the maple effect to salmon in a marinade with salt.
Method	Gravlax technique using maple sugar.
Conclusion	We used maple sugar and achieved an impressive result: it imparted a creaminess to the salmon and brought the flavours of the spices, maple, and salt together. The finished product was tested in-store and customer feedback was extremely positive.

VERJUICE-MARINATED SALMON

Experimenting with maple water and raw maple sugar

Objective	Contrast the sour, salty, and sweet. Use osmosis and a mixture of ingredients, sealed for two days, to perfect a blend of spices, lemon, maple water, and salt.
Method	Put all ingredients into sous vide for 2 days (salmon, grapes, maple water, lemon, spices, and fennel). Remove salmon and sprinkle with maple sugar, sear with a torch, and apply a touch of fleur de sel.
Conclusion	The raw maple sugar added at the end and caramelized, created the Maillard reaction, heightening the flavours of the salmon and maple. The result was remarkable.

MARINATED COD, SEARED OR SOUS VIDE

Experimenting with dark maple syrup vs. maple sugar

Objective	Compare marinades, one made with maple syrup, the other with maple sugar, for cod, which is then pan-seared or prepared sous vide.
Method	We marinated the cod for 24 hours in a mixture of salt and maple sugar and in another of salt and maple syrup, then seared or cooked sous vide. We used a proportion of 2/3 salt and 1/3 sugar, up to 20 g per kilo. You could use a 50/50 proportion to obtain a sweeter dish with more maple flavour.
Conclusion	In all cases, the fish was very nice and moist. The syrup-marinated cod, cooked sous vide, had a very interesting flavour similar to soy sauce. The flesh of white fish gives full scope to the taste of maple. In the pan method, the maple syrup brought a subtle flavour but balanced the saltiness very well. The maple flavour of the sugar was quite weak so, in this case, maple sugar is not recommended.

MASHED POTATOES

Experimenting with maple water vs. water

Objective	Compare mashed potatoes made with maple water vs. sweetened, filtered water.
Method	Basic technique.
Conclusion	The mashed potatoes made with maple water had a subtle maple flavour with umami. The purée had more flavour and balance. Maple water was therefore found to be of value for cooking porous vegetables like potatoes. If aromatics are added to the cooking water, their flavours are more present.

SOUS VIDE VEGETABLES (NANTAISE CARROTS AND LEEKS)

Experimenting with maple water vs. water

Objective	Compare flavour of leeks and Nantaise carrots cooked in maple water vs. filtered water.
Method	Seasoning of 1 g salt per 100 ml maple water. Vegetables cooked sous vide at 83 degrees for about 50 minutes.
Conclusion	The vegetables cooked in maple water had a milder, slightly sweeter taste, but too subtle a difference to be very interesting. However, glazing them with their own cooking water succeeded in achieving a more pronounced maple flavour and caramelization. We also blanched the vegetables in maple water, with inconclusive results. Experimentation may reveal maple water as an excellent solution for preparing more bitter vegetables.

BLANQUETTE DE VEAU

Experimenting with lid-on slow cooking in maple water vs. water

Objective	Demonstrate the added value of maple water over water in a slow-cooked preparation.
Method	Basic technique.
Conclusion	The *blanquette* prepared with maple water was milder in flavour and slightly sweet. The texture of the meat was more tender. The cooking broth was much more flavourful with a better distribution of aromatics such as clove.

POT AU FEU

Experimenting with maple water vs. sweetened, filtered water

Objective	Demonstrate the added value of maple water vs. water.
Method	Basic technique.
Conclusion	Cooking in maple water seemed to make the meat more tender, as if it had been salted. The aromatics infused the broth to a greater degree. In the mouth, broth, vegetables, and meat are all very pleasantly mellow and round. Tip: As the broth cooks and reduces, it is recommended to add water (preferably spring water) to keep it from getting too sweet by the time it's done.

FOIE GRAS

Experimenting with maple water and long pepper

Objective	Demonstrate the potential of combining maple water and long pepper in a slow-cooked foie gras. We thought it important to see whether the light sweetness of maple water would improve the taste and texture of foie gras.
Method	Duck foie gras cooked at length and low temperature with maple water and long pepper. Seasoned with fleur de sel and dune pepper, and a touch of golden maple syrup, marinated for 24 hours.
Conclusion	After chilling for 48 hours, the results were outstanding: the foie gras had remarkable mouth feel and delicacy to a level we had never experienced before.

Good to know

For all glazes, very dark maple syrup is recommended. However, care must be taken not to overcook, as bitterness may result. If lighter syrup is used, a reduction will be required.

Both red and white meats benefit from cooking in maple water.

Maple water has been shown effective in the cooking of porous vegetables such as potatoes. It is also an excellent solution for cooking vegetables that are more bitter.

04

Exploratory Approaches to Baking/Pastries

Chapter

04

MAPLE IS VERSATILE

Baking and pastry-making are culinary specialties with very precise rules and specificities. In this chapter, we will explore the possibilities for maple water, maple syrup, and maple sugar in these disciplines, experiment, analyze the results of testing, and make comparisons.

These are the test recipes prepared by our chefs, featuring maple products:

Recipes	Explorations
SOUS VIDE MAPLE-BLUEBERRY JAM	The 4 classes of maple syrup
SOUS VIDE CRÈME ANGLAISE	The 4 classes of maple syrup
CARAMELIZED NUTS	The 4 classes of maple syrup and maple sugar
POUND CAKE	Maple syrup and maple sugar
SOUS VIDE GLAZED APPLES	Maple syrup
MAPLE-MUSHROOM BISCUITS (DRY BISCUITS)	Maple water
PAIN "AU LAIT"	Maple water vs. milk and maple sugar
CHOUX & CRAQUELIN DOUGHS	Maple water vs. water and maple sugar
BRIOCHE	Maple sugar and maple syrup vs. white sugar
CHOCOLATE MOUSSE/DESSERT	Maple sugar

SOUS VIDE MAPLE-BLUEBERRY JAM

Experimenting with the 4 classes of maple syrup

Objective	Compare jams made with the four colours of maple syrup.
Method	Basic technique.
Conclusion	Texture and colour are similar in all four. However, the darker the syrup, the stronger the maple flavour, along with the potential for bitterness.

SOUS VIDE CRÈME ANGLAISE

Experimenting with the 4 classes of maple syrup

Objective	Compare crème anglaise made with the four colours of maple syrup.
Method	Basic technique.
Conclusion	The darker the syrup, the stronger the maple flavour.

CARAMELIZED NUTS

Experimenting with the 4 classes of maple syrup and maple sugar

Objective	Compare the results of using the 4 colours of maple syrup.
Method	Basic technique.
Conclusion	All experiments returned a more-or-less bitter result. However, the lighter the syrup, the less likely to produce bitterness and a strong maple flavour. Bitterness also increased with length of cooking. Maple sugar brought results similar to dark syrup in terms of flavour and texture.

POUND CAKE

Experimenting with golden and dark maple syrup and maple sugar (twice-sifted and #14 granularity)

Objective	Use two different types of syrup and two different types of sugar and compare.
Method	Basic technique.
Conclusion	Maple syrup made a cake that was more compact and less appealing. Maple sugar produced a moister texture, as has been observed with most cake recipes. The cake rises more effectively with a finer maple sugar. A coarser sugar produces an extra crunchy texture in pound cake.

SOUS VIDE GLAZED APPLES

Experimenting with sous vide and maple syrup

Objective	Demonstrate a sous vide preparation of fruit (apples) with a mixture of cream cheese, maple sugar, and rosemary.
Method	Sous-vide cored apples with a mixture of cream cheese, egg white, maple sugar, and rosemary. Drizzle with golden maple syrup and return to sous vide.
Conclusion	The albumin of the egg white produces a more compact result. The advantage of vacuum cooking with sous vide is control of a low-temperature process. After obtaining sufficient moisture, the preparation is dried, then bathed in cooking juice (golden maple syrup with a delicate flavour) to promote caramelization and stimulate the Maillard reaction. Golden maple syrup is recommended, as dark syrup will burn.

MAPLE-MUSHROOM BISCUITS (DRY BISCUITS)

Experimenting with mushrooms cooked in maple water

Objective	Demonstrate the flavour and texture value of using different ingredients to create umami. The goal is to maximize maple flavour.
Method	Paris mushrooms were cooked with pepper in maple water over very low heat until complete reduction. The mushrooms were allowed to cool, then chopped, combined with maple sugar, and placed in the oven. They were then added to the biscuit mixture.
Conclusion	Mushrooms accentuate the flavour of maple by delicately blending with its various sugars. This recipe can be made with varieties more flavourful than these cultivated mushrooms, such as morels or shiitakes. These shortbread biscuits keep extremely well and can be dusted with icing sugar (ultra-fine maple sugar) to further enhance enjoyment of them.

PAIN "AU LAIT"

Experimenting with maple water vs. milk

Objective	Compare a pain "au lait" (a "milk" bread) made with maple water and one made of milk.
Method	Basic technique.
Conclusion	Very nice texture and flavour in both cases. The dough made with maple water was slightly softer.

CHOUX AU CRAQUELIN

Experimenting with maple water and maple sugar vs. water and white or brown sugar

Objective	Compare making this cream puff with maple water instead of milk.
Method	Classic choux dough made with maple water and the craquelin with maple sugar.
Conclusion	Maple water adds nothing special to the choux dough. The maple sugar in the craquelin brings a very pleasant and bright texture to the cream puff, and a much less sandy mouth-feel, compared to brown sugar.

BRIOCHE

Experimenting with maple sugar and maple syrup

Objective	Switch out white sugar for maple sugar and maple syrup to flavour brioche dough from the inside.
Method	Basic brioche technique.
Conclusion	We felt it important to top our brioche with chunks of maple sugar to obtain a pleasing crunch and visual appeal. Maple chunks will melt gently inside a brioche, imparting full maple flavour. To avoid an over-mixing of flavours, we used golden maple syrup with its delicate flavour. This improved the texture and enhanced the effect of the sugar chunks.

CHOCOLATE MOUSSE/DESSERT

Experimenting with various grain textures of maple sugar

Objective	Compare different types of maple sugar with white sugar.
Method	Basic technique for chocolate mousse with whipped egg whites.
Conclusion	Maple sugar provides a highly appealing crunch; the fact that it's less soluble makes it useful for textural purposes in addition to its gift of delicate taste. It comes in many grain sizes, lending versatility in the type of texture you wish to achieve.

Good to know

For making jams, golden or amber maple syrup should be chosen so that the taste of the fruit is not compromised. Dark and very dark syrup develop a bitterness that is detrimental to fruit flavours.

Maple water produces excellent results in a crème anglaise, pastry, or whipped dessert, with cocoa butter replacing the milk fat. Adding maple as the sweetening agent lends subtle flavour. Note that vanilla should not be used in the same recipe as maple, as it overpowers that subtle touch.

Extra-fine maple sugar is a sure replacement for icing sugar. Maple chunks make brioche and fermented doughs much more interesting because their slow melting action coats and flavours wonderfully. And, in addition to its lovely taste, maple sugar provides visual appeal.

GLUTEN-FREE/LACTOSE-FREE

According to Health Canada, one in 133 people, or 1% of the country's population has celiac disease. This condition means the absorption surface of the small intestine has been damaged by gluten.

In association with Québec Maple Syrup Producers, we have developed recipes using gluten-free and maple products to offer delicious foods to people with celiac disease.

We also wanted to bring attention to maple water, the sap from the tree, and a product still little-known. Maple sap carries 46 nutritional compounds essential to the life, growth, and protection of the tree. The best part is that contains only 9 g of carbohydrates and 35 calories per 375 ml!

Now a product found on store shelves, its fresh, authentic taste can be applied to recipes for both gluten- intolerant and lactose-intolerant people. We have been able to substitute milk with maple water without sacrificing texture or taste.

Maple products bring delicate taste and culinary versatility to the latest food trends.

MAPLE BREAD WITH MAPLE WATER?

Maple water is a suitable replacement for skim milk in bread making.

Milk solids slightly weaken the gluten bonds in bread dough, resulting in a softer crumb and milder taste. Given its composition, maple water is a good substitute for skim milk in bread making because its sugars are better utilized than lactose by yeast. As is the case when milk is replaced by plain water in a dough recipe, the baker should bear in mind that bread made with maple water will colour more quickly in the oven.

These are the test recipes prepared by our chefs, featuring maple products:

Gluten-Free/Lactose-Free	
LACTOSE-FREE MAPLE CRÈME ANGLAISE	Maple water vs. milk
LACTOSE-FREE CRÊPES	Maple water vs. milk
LACTOSE-FREE FRENCH TOAST	Maple water vs. milk
LACTOSE-FREE POUDING CHÔMEUR	Maple water vs. milk and maple sugar
GLUTEN-FREE BISCUITS/CRACKERS	Gluten-free flour, maple water and maple sugar
GLUTEN-FREE MAPLE BLINIS	Gluten-free flour, maple water and maple sugar
GLUTEN-FREE BREAD (MADE WITH MAPLE WATER)	Gluten-free flour and maple water

LACTOSE-FREE MAPLE CRÈME ANGLAISE

Experimenting with maple water and maple syrup

Objective	Develop a recipe for consumers who may have intolerances to milk products.
Method	The fat content of milk or cream must be replaced by a vegetable fat such as Mycryo (cocoa butter). Potato starch will act as the stabilizer for this recipe, but modified or unmodified corn starch may Method also be used. We used fresh egg yolks (medium) but frozen or powdered will also work.
Conclusion	Maple water and amber maple syrup are suitable replacements for milk and sugar. The shelf life of the finished product is similar to that of a milk-based product, even better if it is pasteurized. To make a lactose-free custard, we decided to replace the animal fat (milk, cream, or butter) with cocoa butter. For the sugar, we had to adjust the maple water with golden maple syrup to maintain yellow colouring. We deliberately used fresh egg yolks but, for future marketing purposes, we also tested with powdered yolks and obtained a similar result: outstanding.

LACTOSE-FREE CRÊPES

Experimenting with maple water vs. milk

Objective	Compare crêpes made with maple water with those made with milk.
Method	Basic technique.
Conclusion	The crêpes made with maple water had a much more elastic texture. The taste and texture of the flour was much less present. Maple water makes a good lactose-free alternative.

LACTOSE-FREE FRENCH TOAST

Experimenting with maple water vs. milk

Objective	Compare French toast made with maple water instead of milk.
Method	Basic technique.
Conclusion	Maple water returned a less-salty taste. A nice lactose-free French toast.

LACTOSE-FREE *POUDING CHÔMEUR*

Experimenting with maple water vs. milk

Objective	Compare *pouding chômeur* made with maple water instead of milk.
Method	Basic technique.
Conclusion	The pudding made with maple water is much spongier than that made with milk, even when cold. And it keeps its texture longer. We observed that replacing milk with maple water in pastry/baking applications adds very interesting value not only in texture, but also in flavour distribution.

GLUTEN-FREE BISCUITS/CRACKERS

Experimenting with maple water and fine maple sugar

Objective	Develop the use of maple water and fine maple sugar in gluten-free pastry-making. We decided on the combination of maple water, maple sugar, and gluten-free flour with manual kneading. First, we switched out the milk for maple water which, due to its natural properties, allowed us to reduce sugar content. Replacing regular sugar with maple sugar gave texture, a golden colour, and a light maple flavour.
Method	A gluten-free blend of chickpea flour, potato starch, tapioca flour, rice flour, fine maple sugar, and maple water.
Conclusion	Using a slow baking process, we obtained incomparable crunch and a subtle maple flavour. This experiment brought a successful result.

GLUTEN-FREE MAPLE BLINIS

Experimenting with maple water and ultra-fine maple sugar

Objective	Address the increasing number of people with gluten intolerances by developing simple baked goods, using gluten-free flour with exceptional maple products such as maple water and ultra-fine maple sugar. We used maple water instead of milk and ultra-fine maple sugar in place of regular sugar.
Method	A gluten-free blend of chickpea flour, potato starch, tapioca flour, rice flour, fine maple sugar, and maple water.
Conclusion	The result was a very pleasant mouth-feel and a delicate maple flavour. Successful experiment.

GLUTEN-FREE BREAD (MADE WITH MAPLE WATER)

Experimenting with maple water

Objective	Evaluate the potential of maple water in gluten-free baking products. We tested a bread of yeast and gluten-free flour with maple water instead of plain water. Manual kneading. We added salt to the dough and let it rest for at least 3 hours.
Method	A gluten-free blend of chickpea flour, potato starch, tapioca flour, rice flour, fine maple sugar, and maple water.
Conclusion	Test result is inconclusive. Dough heavy before baking. After baking, heavy and disagreeable in the mouth, unsatisfying result. The conclusion is that the maple water is already sweet and partially reduces fermentation; more yeast needed, and possibly plain water. Unsuccessful experiment.

Good to know

Maple water produces a moister texture than milk in baking and cookie-making.

If whole milk is used, its fats weaken the gluten. The dough's volume and lightness increases, and the staling process slows down.

The sugars in maple water are more fermentable, i.e. in a form that is easier than lactose for yeast to assimilate. The presence of other compounds such as amino acids and minerals can also aid fermentation.

05

Exploratory Approaches to Confectionery

Chapter

05

MAPLE, A NATURAL, GOURMET SWEETENER

In his explorations, Jean-Marc Guillot emphasized the use of maple water concentrate, all four colours of maple syrup and, of course, maple sugar. The chocolate world has real interest in maple water concentrate due to its concentration of sugars. It creates space for a new vision (particularly for infusions) as maple water is known for elevating flavour.

However, the use of maple water concentrate demands technical ability because recipes must be reworked, accounting for Brix. The goal is to achieve a new, slightly woody flavour.

In the ganache recipe, for example, the chef had to add a little dark chocolate, so its bitter touch could balance the sugar of the maple water concentrate. The result was very, very good.

The confectionery section of our experimentations saw testing of all syrups. The chefs preferred golden and amber because they brought maple flavour without being overly present, even in higher proportions. The key to success lies in their subtlety. The dark and very dark syrups were found to perform very well in pastries where, even after baking, their flavours remain quite present.

Jean-Marc particularly enjoyed playing with the superb palette of aromas that emanates from maple water concentrate, the syrups and the sugar.

There is less interest in basic unconcentrated maple water in recipe development because of its neutral flavour. This means that it need not replace the usual mineral water.

That said, maple water concentrate is a veritable revelation in flavour enhancement, as it increased, even magnified taste in our test recipes.

These are the test recipes prepared by our chefs, featuring maple products:

Recipes	Explorations
MAPLE CANDIED ORANGE	Maple sugar and maple water
VERBENA PÂTE DE FRUIT	Maple water and maple sugar
MAPLE MARSHMALLOW	Maple water
HONEY-MAPLE JELLY	Golden maple syrup and raw maple sugar
RASPBERRY CARAMEL SPREAD	Maple syrup and maple sugar
FLEUR DE SEL-SWEET CLOVER CARAMEL SPREAD	Maple syrup and maple sugar
MAPLE ICE CREAM	Maple syrup and maple sugar
CHOCOLATE ICE CREAM	Maple water concentrate
COFFEE GANACHE	Maple water concentrate
SEA BUCKTHORN & WILD CARAWAY SORBET	Raw maple sugar and amber maple syrup
CRANBERRY & WILD ROSE SORBET	Raw maple sugar
BLACKCURRANT & POPLAR FRUIT SORBET	Maple water concentrate
MAPLE & COCOA-LIME SORBET	Maple water concentrate
BAKED APPLE WITH BALSAM FIR INFUSION SORBET	Maple water concentrate

MAPLE CANDIED ORANGE

Experimenting with maple sugar and maple water

Objective	Testing maple products as a replacement for white sugar in candying fruit. We also tested maple water as a replacement for water.
Method	Basic technique for candying fruit.
Conclusion	Dark syrup produces a bitter reduction, so a lighter syrup is recommended. Maple water as a replacement for water brings no results.

VERBENA *PÂTE DE FRUIT*

Experimenting with maple water and maple sugar

Objective	Substitute water with maple water.
Method	Prepare an infusion of fresh verbena, cook the pulp of green apples for 4 minutes. Add sugars at boiling point. Add sugar/pectin and cook to 75° B. Add acid and chopped candied lemon.
Conclusion	The maple water and maple sugar add a significant level of woody flavour, lending a new qualitative approach to the *pâte de fruit*.

MAPLE MARSHMALLOW

Experimenting with maple water

Objective	Evaluate the differences between the use of maple sugar only and a mixture of maple sugar and sucrose, both cooked in maple water.
Method	Basic technique.
Conclusion	The maple sugar-sucrose blend produced a sweet flavour and very soft texture. Caution: there is slight colouration at the end of cooking.

HONEY-MAPLE JELLY

Experimenting with golden maple syrup and raw maple sugar

Objective	Test maple products as replacements for white sugar. We also tried maple water as a substitute for water.
Method	Basic technique.
Conclusion	Very pleasant taste. The maple water adds sweetness and a slight woody touch. Very nice.

RASPBERRY CARAMEL SPREAD

Experimenting with maple syrup and maple sugar

Objective	Evaluate the differences between a caramel made with amber maple syrup or a combination of amber maple syrup and maple sugar vs. sucrose.
Method	Cook the maple syrup with the cream and butter until it comes to a boil. Add the raspberry pulp and reheat to 104° C. Cool to 60° C, mix well, and pour into jar.
Conclusion	Maple adds incredible sweetness and texture to this recipe. The maple flavour is delicate, even subtle.

FLEUR DE SEL - SWEET CLOVER CARAMEL SPREAD

Experimenting with amber maple syrup and amber maple syrup with maple sugar

Objective	Evaluate the differences between a caramel made with amber maple syrup or a combination of amber maple syrup and maple sugar vs. sucrose.
Method	Caramelize the sucrose, maple syrup, and glucose. Thin with cream, the sweet clover, and fleur de sel. Add the butter and mix well, then pour into jar.
Conclusion	Maple adds incredible sweetness and texture to this recipe. The maple flavour is delicate, even subtle.

MAPLE ICE CREAM

Experimenting with maple syrup and maple sugar

Objective	Evaluate the differences between an ice cream made with maple syrup and maple sugar vs. sucrose.
Method	Basic ice cream technique but switching out sucrose for maple syrup and maple sugar.
Conclusion	After several attempts, we found the best equilibrium between sweet and woody in this superb ice cream. The combinaison of maple syrup and maple sugar brings an incomparable delicacy.

CHOCOLATE ICE CREAM

Experimenting with maple water concentrate

Objective	Evaluate the differences between an ice cream made with maple water concentrate, maple syrup, and maple sugar and the classic method using sucrose.
Method	Basic ice cream technique but reconstituting milk with maple water and milk powder. Combine the cream, sugars, cornstarch, and egg yolks. Bring to 85° C, add the chocolate, and mix well. Allow to mature for 12 hours, then process.
Conclusion	Maple's woody touch elevates the strong taste of dark chocolate.

COFFEE GANACHE

Experimenting with maple water concentrate

Objective	Compare the classic ganache made from water and sucrose to one made from maple water, maple syrup, and a blend of white and dark chocolate.
Method	Basic ganache technique but infuse the maple water concentrate with the coffee for 8 minutes and lightly caramelize the maple syrup.
Conclusion	To keep the ganache from getting too sweet, dark chocolate is added to offset the high sugar content in the maple water concentrate. The balance became perfect and the ganache tasted wonderful. The maple water reveals flavours of coffee, caramel, and maple.

SEA BUCKTHORN & WILD CARAWAY SORBET

Experimenting with maple water concentrate

Objective	Compare a sorbet made with maple water concentrate, maple syrup, and maple sugar to the classic sorbet made with water and sucrose.
Method	Infuse the caraway in maple water for 8 minutes. Make a syrup with the sugars and the starch. Macerate 12 hours. Add the pulp, mix, and process.
Conclusion	The maple syrup brings creamy smoothness to the sorbet. The maple water and sugars really mellow the sea buckthorn's tartness. The caraway adds a very pleasant twist to the flavour. This recipe is a revelation, with the subtle and refreshing marriage of the maple and berries.

CRANBERRY & WILD ROSE SORBET

Experimenting with maple water concentrate

Objective	Compare a sorbet made with maple water concentrate, maple syrup, and maple sugar to the classic sorbet made with water and sucrose.
Method	Basic sorbet technique but with an infusion of wild rose in maple water concentrate.
Conclusion	The maple water concentrate permits the reduction of sugar called for in the classic recipe. Incorporating all three maple products brings taste and texture, but it most importantly elevates the incredible flavour of the cranberry. The wild rose adds such a lovely floral touch.

BLACKCURRANT & POPLAR FRUIT SORBET

Experimenting with maple water concentrate

Objective	Compare a sorbet made with maple water concentrate, maple syrup, and maple sugar to the classic sorbet made with water and sucrose.
Method	Basic sorbet technique but with an infusion of poplar fruit in maple water concentrate.
Conclusion	Poplar fruit makes a superb combination with the strong taste of blackcurrant. The maple water concentrate adds intensity to the rich, woody attitude of this sorbet.

MAPLE & COCOA-LIME SOR

Experimenting with maple water concentrate

Objective	Compare a sorbet made with maple water concentrate, maple syrup, and maple sugar to the classic sorbet made with water and sucrose.
Method	Basic sorbet technique but with an infusion of lime zest in maple water concentrate.
Conclusion	The maple recipe is an incredible exercise in style, as the maple water concentrate reveals the full intensity of the chocolate and cocoa. The lime zest reveals a world of fresh taste and accentuates the maple products. As was the case with many of the test recipes, maple water concentrate elevates the flavour, but one must be careful with the woodiness of maple, which is quite present. This highlights the importance of balancing the sugars.

BAKED APPLE WITH BALSAM FIR INFUSION SORBET

Experimenting with maple water concentrate

Objective	Compare a sorbet made with maple water concentrate, maple syrup, and maple sugar to the classic sorbet made with water and sucrose.
Method	Infuse the balsam fir in the maple water concentrate for 8 minutes. Make a syrup with the infusion, the sugars, and the starch. Macerate 12 hours. Add the apple pulp, mix, and process.
Conclusion	The maple recipe delivers the full aromatic powers of apple and fir. Maple takes a back seat—we love this rivalry of flavours. The maple water and sugar again provide woodiness to this autumn sorbet. Maple water concentrate is a great discovery. It reveals and enhances the different flavour combinations. Be careful with balance, deciding whether or not to add maple sugar.

Good to know

When candying fruit, dark syrup may add bitterness to the reduction. A lighter syrup is recommended.

Making a sorbet or an infusion for chocolate? Maple water concentrate adds a beautiful intensity to your flavours and an exciting new approach.

Making ice cream? Maple syrup and maple sugar is a winning combination.

06

Exploratory Approaches – Others

Chapter

06

ALCHEMY WITH THE SPICES OF THE WORLD

The sugar maple, native to the boreal forest of eastern Canada, finds kinship with spices from around the world, such as peppers, nutmeg, and cinnamon.

First, let us clarify that we are speaking of spices, as they are sometimes confused with aromatic herbs.

The wide variety of peppers used in cooking, by decoction, infusion, or maceration, combine with maple to reach new heights of flavour.

Maple water and syrup contribute a subtlety to flavour blends that approaches the wonder of umami.

Peppers, be they long, green, tailed, or Sichuan, have unique botanical characteristics, as do dune peppers and spices like nutmeg and clove. Ah, the marvellous fragrance of clove, best released by crushing or pounding.

Macerating or infusing long peppers in maple syrup produces a delicate, refined flavour. With peppers like the Sichuan, the capsaicin is tempered by the combination of maple syrup and a fat such as cocoa butter or olive oil.

When herbs infuse with maple, such as a herbal tea in maple water concentrate, their flavours achieve a higher intensity. Labrador tea and cloudberry leaves succeed very well in this application.

Some (not all) mushrooms marry well with maple. The best results have been observed when dried mushrooms are hydrated in maple water concentrate. The same can be said for morels, shiitakes, even boletus mushrooms. Then add them to a sauce or any savoury or sweet preparation. We think you'll find the results convincing.

Dried or pickled products (such as mushrooms) are finding new life when combined with maple.

Maple gives plenty of reasons and opportunity for the exercise of culinary curiosity. In one of our experiments, we worked with chaga, a fungus that grows on birch trees in cold climates. This ongoing exploration has brought very interesting results, leaving us more confident than ever in the culinary future of maple syrup.

BEVERAGES

Teas, herbal teas, decoctions, and infusions are now recognized in gastronomy. They, as long known, stimulate digestion but also flavour coulis, sauces, and marinades. Combining them with maple water or maple concentrate contributes significantly to the mellowing of bitterness in an infusion or decoction, as in the case of the chaga fungus.

These are the test recipes prepared by our chefs, featuring maple products:

Recipes	Explorations
INFUSIONS (TEAS)	Maple water vs. sweetened, filtered water
MAPLE-ORANGE	Amber maple syrup and maple water

INFUSIONS (TEAS)

Experimenting with maple water vs. sweetened, filtered water

OBJECTIVE	Demonstrate the added value of maple water vs. water.
METHOD	We made tea in three liquids: water, filtered water sweetened at 20 g per litre, and maple water.
Conclusion	The maple water infusions were quite distinctive. The flavours were much more pronounced with a roundness in the mouth and umami quality. The sugar content of maple water is very light, but it balances the bitterness of some teas.

MAPLE-ORANGE

Experimenting with amber maple syrup and maple water

Objective	Demonstrate the utility of maple syrup and maple water vs. a sugar syrup at 30 degrees.
Method	Oranges and orange zests (blanched) were cooked in maple syrup with a pinch of Sichuan pepper. Maple water was added the next day, and again brought to a boil. The process was repeated for three more days.
Conclusion	The Sichuan pepper brings out the subtleties of the amber maple syrup while retaining the original maple flavour. If done with a light, delicate syrup, the cooking time would require adjustment to prevent bitterness. The maple water serves to add smoothness to the finished product.

Good to know

Maple water or maple syrup enhances the flavours of spices in an infusion.

Maple water delivers superior taste and texture in a tea infusion, with an umami quality that filtered water does not have. Its light sweetness moderates the bitterness of some teas.

Cook rice in maple water with saffron for superb results.

A spice like saffron gains flavour when infused (at a gentle simmer of at least 10 minutes) in maple water or maple syrup.

CONCLUSION

These culinary experiments and test recipes have proven to us the extent to which maple and its products are integral to not only the development of Québec and Canadian food culture, but to that of the world.

Chefs everywhere search for new products to inspire their creativity through new recipes. Just as vanilla, exceptional olive oils, morels, and truffles found their places in modern cuisine, maple products are doing the same. Québec's liquid gold knows no borders as it contributes to the joys of food wherever it goes.

REFERENCES (ACKNOWLEDGEMENTS)

Various tests and trials were conducted to validate our recipes. We were inspired by the methods of Chef Josh Niland and his work with fish, particularly his Nordic marinades.

We would also like to acknowledge the kind assistance of renowned culinary researcher and chemist Hervé This, who made it possible for us to better understand the physics of food and the reactions of concentrations.

Suggested Reference Text:

- *L'essentiel de Chartier : l'ABC des harmonies aromatiques à table et en cuisine, by* François Chartier (Éditions La Presse).

Thank you for bringing to maple all your talent, love, and inspiration.

You are now a part of our story. We hope you will write your own chapter.

From the kitchen to the table, wherever you go, keep maple in your mind and heart!

Luc Goulet
Président des Producteurs et productrices acéricoles du Québec

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