

Intermediate gelato course

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Weekly Calendar



- **DAY 1**
 - Analysis of raw materials and their functionality – ingredient substitution – Inverse balancing
- **DAY 2**
 - Sugar classification – AFP - SP and their calculation – Characterization of the white base (transformation into a finished gelato) - Analytic compensation
- **DAY 3**
 - Fruit sorbets with stabilizer (neutral) – Fruit sorbets with 70% sugar syrup – Fruit sorbets with stabilized sugar syrup
- **DAY 4**
 - Yogurt – Yogurt Gelato – Frozen Yogurt– Poached fruit - Hot Infusions and extractions – Location, target customers and the importance of the Branding
- **DAY 5**
 - Cold Infusions and extractions - Analysis and calculation of recipes for International Flavors – Recap - Final exam

- Solid ingredients of a gelato recipe and their %
- Raw materials: composition in %.
- Inverse balancing: explanation
- Inverse balancing: recipe calculation
- Replacement of ingredients

Gelato ingredients

TOTAL SOLIDS

SUGARS

(Sucrose, dextrose, SC, glucose, etc.)

Sweetening power – Anti-freeze power

FATS

(Milk, Cream, etc..)

Creaminess, taste, viscosity and texture

MILK SOLIDS NON-FAT

(Milk powder, condensed milk, etc.)

Body, structure, viscosity, overrun

OTHER SOLIDS

(Stabilizers, fiber, etc.)

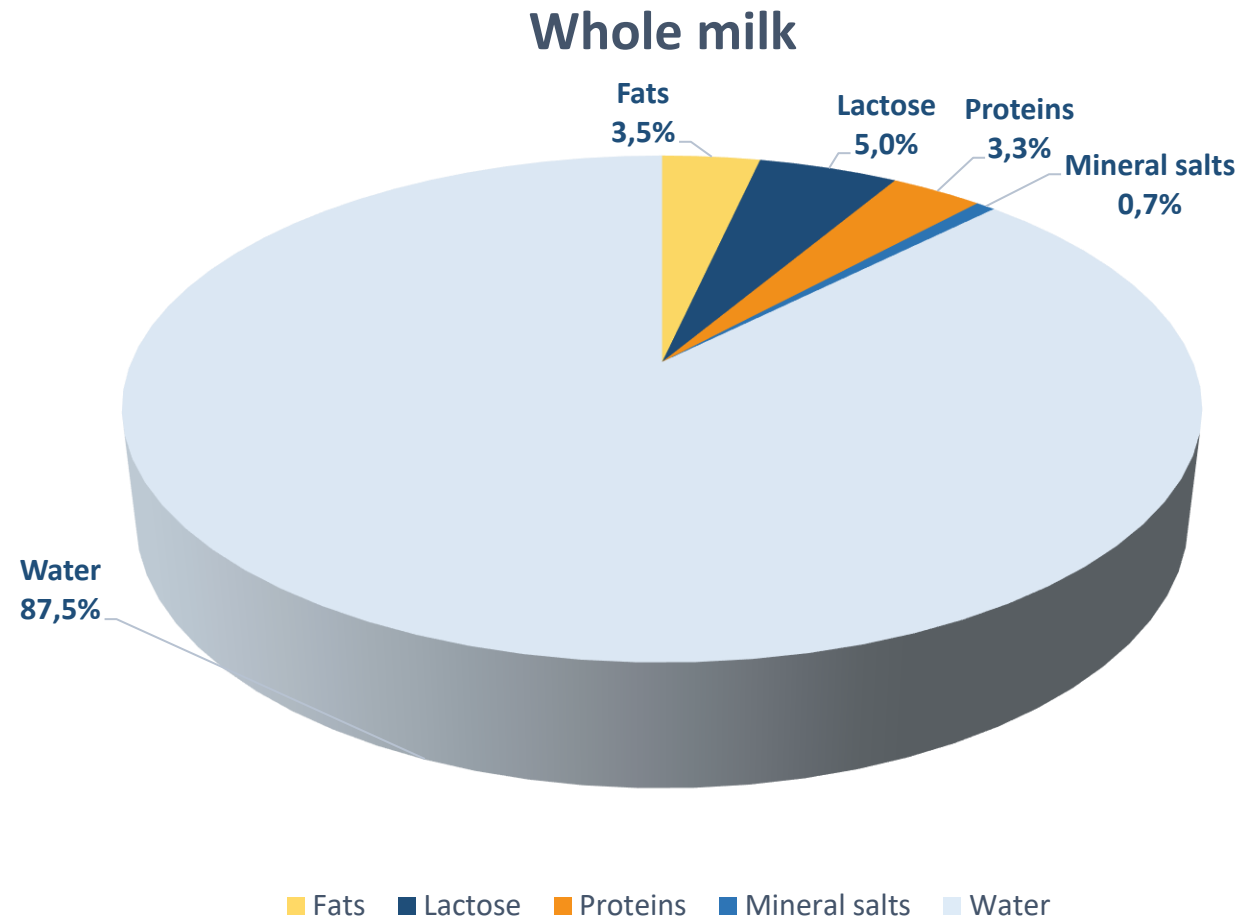
Stabilization, viscosity, nutritional information

Ingredients composition

• Whole milk

- Fats
- Lactose
- Proteins
- Water
- Mineral salts

Approximate composition

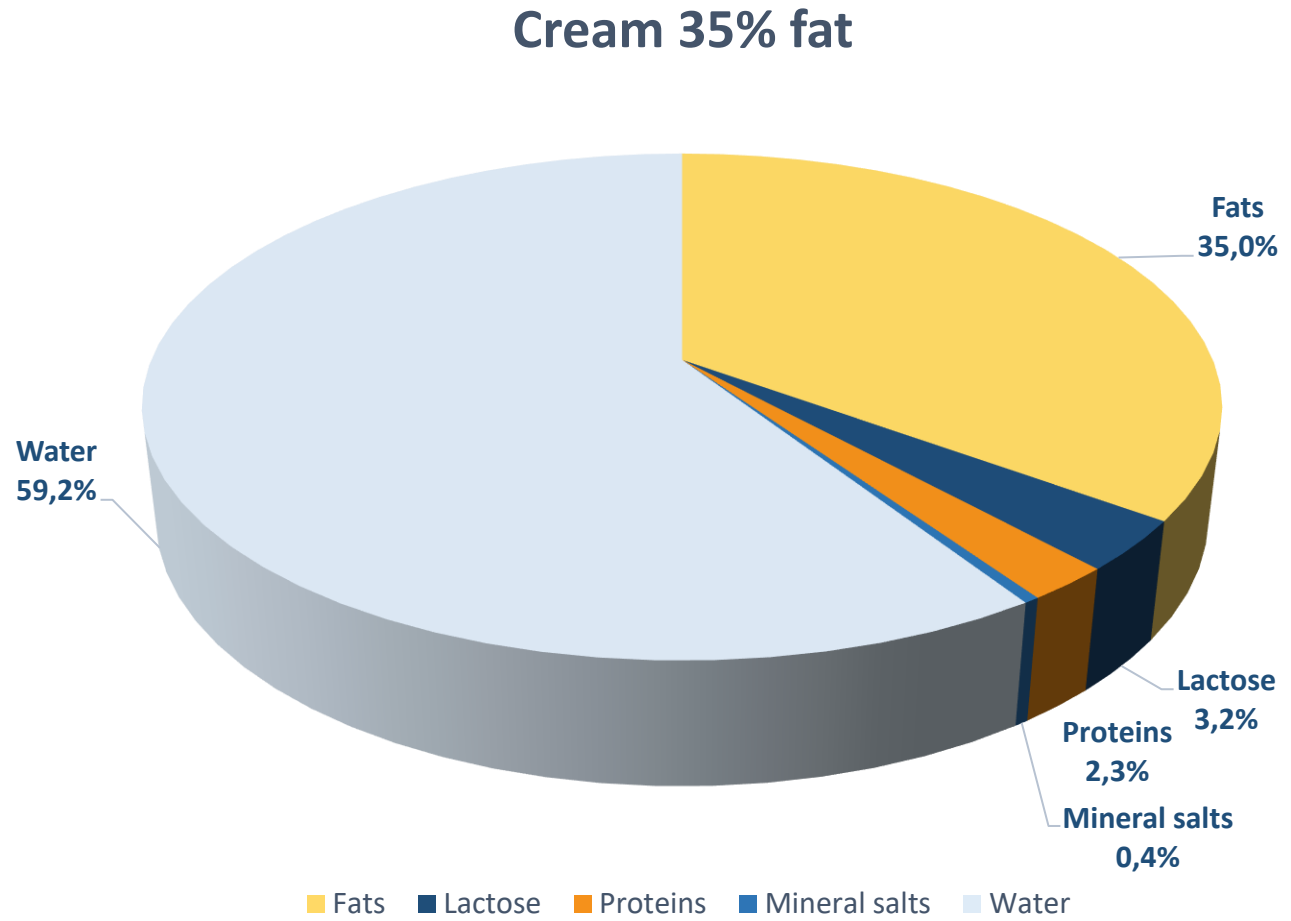


Ingredients composition

• Cream (35% fat)

- Fats
- Lactose
- Proteins
- Water
- Mineral salts

Approximate composition



Breakdown of ingredients



WHOLE MILK 3.5% fat

Ingredients	Qty	S	F	MSNF	OS	TS
Whole milk	1000.0g	/ //	3.5% 35.0 g	9.0% 90.0 g	/ //	125.0 g
TOTAL	1,000 g	0.0g	35.0g	90.0g	0.0g	125.0 g
	%	0.0%	3.5%	9.0%	0.0%	12.5%

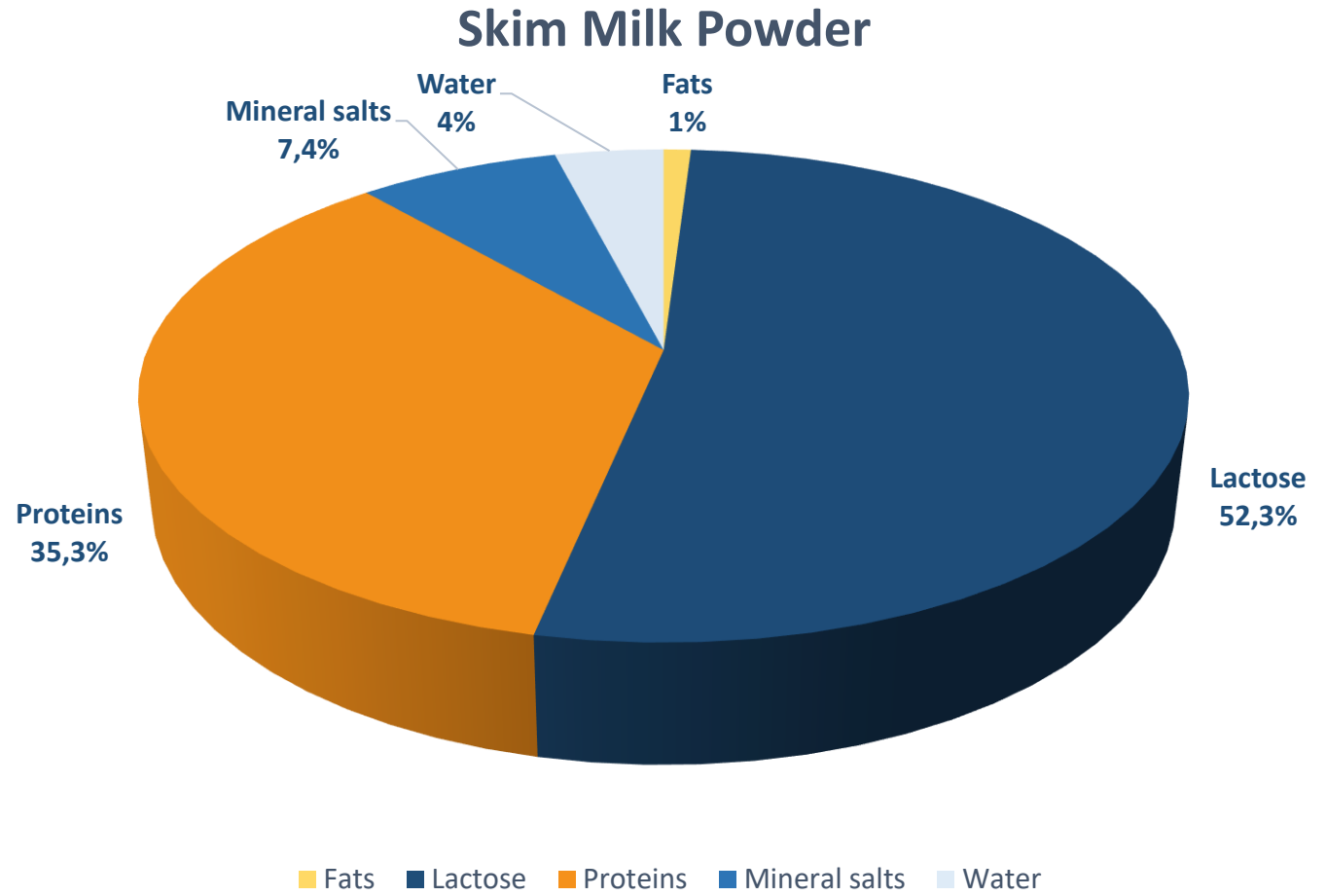
CREAM 35% fat

Ingredients	Qty	S	F	MSNF	OS	TS
Cream 35%	1000.0g	/ //	35.0% 350.0 g	5.8% 58.0 g	/ //	408.0g
TOTAL	1,000 g	0.0g	350.0 g	58.0g	0.0g	408.0g
	%	0.0%	35.0%	5.8%	0.0%	40.8%

• Skim milk powder

- Fats
- Lactose
- Proteins
- Water
- Mineral salts

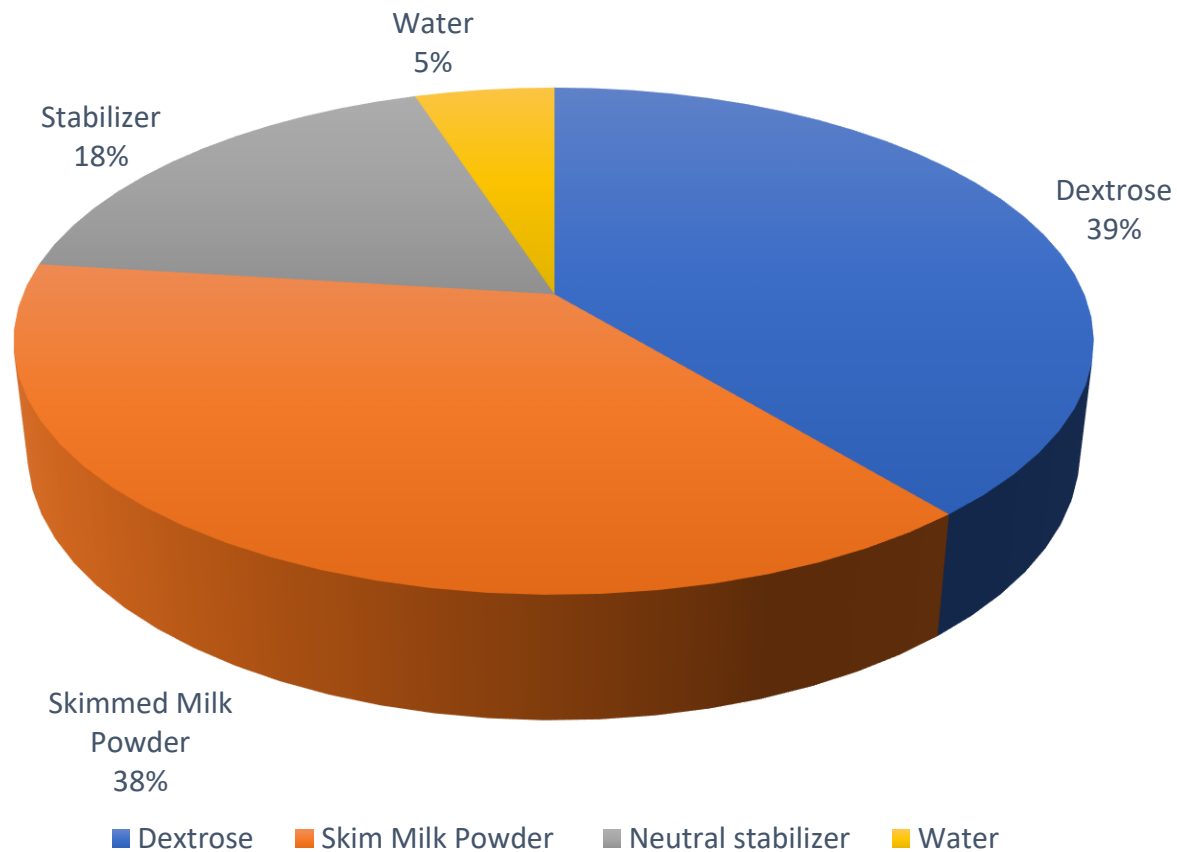
Approximate composition



Creating the Base 50



Base 50 CC



50 g of Base 50 contains:

Sugar	19.5g
MSNF	19.0g
Other Solids*	9.0 g
Water	2.5g

**Other solids = this value refers to the stabilizer*

Breakdown of ingredients



Base 50

Ingredients	Qty	S	F	MSNF	OS	TS
Dextrose	21.0g	92.0% 19.5 g	/ //	/ //	/ //	19.5g
S.M.P	20.0g	/ //	/ //	95.0% 19.0 g	/ //	19.0g
Stabilizer	9.0 g	/ //	/ //	/ //	100.0% 9.0 g	9.0 g
TOTAL	50.0 g	19.5g	0.0g	19.0g	9.0 g	50.0 g
	%	39.0%	0.0%	38.0%	18.0%	95.0%

Balancing percentages



	WHITE BASE	FINISHED GELATO	FRUIT GELATO
Sugar	16 - 19%	18 - 22%	22 - 24%
Fats	3 - 7%	7 - 16%	3 - 10%
MSNF	9 - 12%	7 - 12%	3 - 7%
Other solids*	0.3 - 0.6*%	(0.2 - 0.5*) - 10%	(0.2 - 0.5 *) - 7%
Total Solids	32 - 37%	37 - 46%	32 - 42%

** Value referred to the pure stabilizer only*

Inverse balancing

BALANCING RULES:

1

Define the % of Sugars and Fats and calculate them against the total

3

Define the % of the Stabilizer according to the following diagram and calculate it against the total

5

Define the sugar spectrum, apply it to the total sugars and calculate the sugar quantities

2

Define the % of Milk Solids Non-Fat (MSNF) according to the diagram below and calculate them against the total

4

Define the % of the characterizing ingredient (if envisaged) and calculate it against the total

6

Calculate the fats and MNSF according to the dairy products to be added:
1) Quantity of milk or
2) System

Milk Solids Non-Fat and Stabilizer



INGREDIENTS	MSNF %	STABILIZER %
Dark chocolate Cocoa mass Cocoa powder	7 - 9%	0.3 - 0.5%
Eggs Nuts	8 - 10%	0.4 - 0.5%
None of the above	9 - 12%	0.5 – 0.6%

Sugar spectrum

SUGARS	%
Disaccharides (e.g.: Sucrose) Taste – creaminess – consistency	50 - 100%
Monosaccharides (e.g. Dextrose) Softness	0 - 25%
Polysaccharides (e.g.: Dry Glucose Syrup) Compactness – viscosity	0 - 35%

Quantity calculation of Milk, Cream and S.M.P.: (System)



Step 1: Define the variables

Ingredients	Q.ty	S	F	MSNF	OS	TS
Whole milk	x	//	3.5 %	9.0 %	//	//
Cream 35%	y	//	35.0 %	5.8 %	//	//
S.M.P.	z	//	1.0 %	95.0 %	//	//
Sucrose	137.0 g	137.0 g	//	//	//	137.0 g
Dextrose	14.0 g	12.9 g	//	//	//	12.9 g
Dry Glucose syrup	31.0 g	29.8 g	//	//	//	29.8 g
Stabilizer ch	6.0 g	//	//	//	6.0 g	6.0 g
TOTAL	1.000 g	179.7 g	60.0 g	105.0 g	6.0 g	350.1 g
	%	18.0%	6.0%	10.5%	0.6%	35.1%

VARIABLES:

MILK = X

CREAM = Y

SMP = Z

Quantity calculation of Milk, Cream and S.M.P.: (System)



Step 2: Develop the system

System with a 3 variables

$$x + y + z = 812.0 \quad (\text{Total Q.ty} - \text{Already calculated ingredients})$$

$$3.5\% x + 35.0\% y + 1.0\% z = 60.0 \quad (\text{Total Fats to reach})$$

$$9.0\% x + 5.8\% y + 95.0\% z = 105.0 \quad (\text{Total MSNF to reach})$$

RESULT :

MILK	(x)	=	667.0 g
CREAM	(y)	=	104.0 g
SMP	(z)	=	41.0 g

Quantity calculation of Milk, Cream and S.M.P. (Guessing the milk)



Step 1: Guess the milk % (30 - 70%) and quantity, and then calculate its components

Ingredients	Q.ty	S	F	MSNF	OS	TS
Whole milk	650.0	//	3.5 % 22.8	9.0 % 58.5	//	//
Cream 35%	?	//	35.0 % //	5.8 % //	//	//
S.M.P.	?	//	1.0 % //	95.0 % //	//	//
Sucrose	137.0 g	137.0 g	//	//	//	137.0 g
Dextrose	14.0 g	12.9 g	//	//	//	12.9 g
Dry Glucose syrup	31.0 g	29.8 g	//	//	//	29.8 g
Stabilizer c.h.	6.0 g	//	//	//	6.0 g	6.0 g
TOTAL	1.000 g	179.7 g	60.0 g	105.0 g	6.0 g	350.1 g
	%	18.0%	6.0%	10.5%	0.6%	35.1%

Whole milk quantity = Total whole milk % (65.0%) x actual total (1000.0 g) = 650.0

Quantity calculation of Milk, Cream and S.M.P. (Guessing the milk)



Step 2: Subtract the total fats from the Whole milk fats, to calculate the cream fat

Ingredients	Q.ty	S	F	MSNF	OS	TS
Whole milk	650.0	//	3.5 % 22.8	9.0 % 58.5	//	//
Cream 35%	?	//	35.0 % 37.2	5.8 % //	//	//
S.M.P.	?	//	1.0 % //	95.0 % //	//	//
Sucrose	137.0 g	137.0 g	//	//	//	137.0 g
Dextrose	14.0 g	12.9 g	//	//	//	12.9 g
Dry Glucose syrup	31.0 g	29.8 g	//	//	//	29.8 g
Stabilizer c.h.	6.0 g	//	//	//	6.0 g	6.0 g
TOTAL	1.000 g	179.7 g	60.0 g	105.0 g	6.0 g	350.1 g
	%	18.0%	6.0%	10.5%	0.6%	35.1%

$$\text{Cream fat} = \text{Total fat (60.0)} - \text{Whole milk fat (22.8)} = 37.2$$

Quantity calculation of Milk, Cream and S.M.P. (Guessing the milk)



Step 3: Divide the cream fat by the cream fat % to calculate the cream quantity and calculate the cream M.S.N.F. quantity (g)

Ingredients	Q.ty	S	F	MSNF	OS	TS
Whole milk	650.0	//	3.5 % 22.8	9.0 % 58.5	//	//
Cream 35%	106.0	//	35.0 % 37.2	5.8 % 6.1	//	//
S.M.P.	?	//	1.0 % //	95.0 % //	//	//
Sucrose	137.0 g	137.0 g	//	//	//	137.0 g
Dextrose	14.0 g	12.9 g	//	//	//	12.9 g
Dry Glucose syrup	31.0 g	29.8 g	//	//	//	29.8 g
Stabilizer c.h.	6.0 g	//	//	//	6.0 g	6.0 g
TOTAL	1.000 g	179.7 g	60.0 g	105.0 g	6.0 g	350.1 g
	%	18.0%	6.0%	10.5%	0.6%	35.1%

Cream quantity = Cream fat quantity (37.2) / cream fat % (35.0%) = 106.0

Cream M.S.N.F. quantity = Cream quantity (106.0) x cream M.S.N.F. % (5.8%) = 6.1

Quantity calculation of Milk, Cream and S.M.P. (Guessing the milk)



Step 4: Subtract the sum of Whole milk M.S.N.F. + Cream M.S.N.F. from the the total M.S.N.F. to calculate the Skim Milk Powder M.S.N.F.

Ingredients	Q.ty	S	F	MSNF	OS	TS
Whole milk	650.0	//	3.5 % 22.8	9.0 % 58.5	//	//
Cream 35%	106.0	//	35.0 % 37.2	5.8 % 6.1	//	//
S.M.P.	?	//	1.0 % //	95.0 % 40.4	//	//
Sucrose	137.0 g	137.0 g	//	//	//	137.0 g
Dextrose	14.0 g	12.9 g	//	//	//	12.9 g
Dry Glucose syrup	31.0 g	29.8 g	//	//	//	29.8 g
Stabilizer c.h.	6.0 g	//	//	//	6.0 g	6.0 g
TOTAL	1.000 g	179.7 g	60.0 g	105.0 g	6.0 g	350.1 g
	%	18.0%	6.0%	10.5%	0.6%	35.1%

$$\text{Skim Milk Powder M.S.N.F.} = \text{Total M.S.N.F. (105.0)} - (\text{Whole milk M.S.N.F. (58.5)} + \text{Cream M.S.N.F. (6.1)}) = 40.4$$

Quantity calculation of Milk, Cream and S.M.P. (Guessing the milk)



Step 5: Divide the Skim Milk Powder M.S.N.F. by the Skim Milk Powder M.S.N.F. % to calculate the Skim Milk Powder quantity (g)

Ingredients	Q.ty	S	F	MSNF	OS	TS
Whole milk	650.0	//	3.5 % 22.8	9.0 % 58.5	//	//
Cream 35%	106.0	//	35.0 % 37.2	5.8 % 6.1	//	//
S.M.P.	43.0	//	1.0 % 0.4	95.0 % 40.4	//	//
Sucrose	137.0 g	137.0 g	//	//	//	137.0 g
Dextrose	14.0 g	12.9 g	//	//	//	12.9 g
Dry Glucose syrup	31.0 g	29.8 g	//	//	//	29.8 g
Stabilizer c.h.	6.0 g	//	//	//	6.0 g	6.0 g
TOTAL	1.000 g	179.7 g	60.0 g	105.0 g	6.0 g	350.1 g
	%	18.0%	6.0%	10.5%	0.6%	35.1%

Skim Milk Powder quantity = Skim Milk Powder M.S.N.F. quantity (40.4) / Skim Milk Powder M.S.N.F. % (95.0%) = 43.0

Quantity calculation of Milk, Cream and S.M.P. (Guessing the milk)



Step 6: Sum up all the quantities and calculate the gap from the actual total (1000.0 g)

Ingredients	Q.ty	S	F	MSNF	OS	TS
Whole milk	650.0 g	//	3.5 % 22.8	9.0 % 58.5	//	//
Cream 35%	106.0 g	//	35.0 % 37.2	5.8 % 6.1	//	//
S.M.P.	43.0 g	//	1.0 % 0.4	95.0 % 40.4	//	//
Sucrose	137.0 g	137.0 g	//	//	//	137.0 g
Dextrose	14.0 g	12.9 g	//	//	//	12.9 g
Dry Glucose syrup	31.0 g	29.8 g	//	//	//	29.8 g
Stabilizer c.h.	6.0 g	//	//	//	6.0 g	6.0 g
TOTAL	1.000 g	179.7 g	60.0 g	105.0 g	6.0 g	350.1 g
	%	18.0%	6.0%	10.5%	0.6%	35.1%

Gap from all the quantities to the total = the sum of all the quantities (987.0 g) - the actual total (1000.0 g) = 13.0

Quantity calculation of Milk, Cream and S.M.P. (Guessing the milk)



Step 7: If the sum of all the quantities is lower or higher than the total, respectively add or subtract the gap to the milk q.ty and restart the calculation from step 1. Repeat it until getting no gap

Ingredients	Q.ty	S	F	MSNF	OS	TS
Whole milk	650.0 g + 13.0 g	//	3.5 % //	9.0 % //	//	//
Cream 35%	?	//	35.0 % //	5.8 % //	//	//
S.M.P.	?	//	1.0 % //	95.0 % //	//	//
Sucrose	137.0 g	137.0 g	//	//	//	137.0 g
Dextrose	14.0 g	12.9 g	//	//	//	12.9 g
Dry Glucose syrup	31.0 g	29.8 g	//	//	//	29.8 g
Stabilizer c.h.	6.0 g	//	//	//	6.0 g	6.0 g
TOTAL	1.000 g	179.7 g	60.0 g	105.0 g	6.0 g	350.1 g
	%	18.0%	6.0%	10.5%	0.6%	35.1%

Since the sum of all the quantities (987.0 g) is lower than the actual total (1000.0 g), add the gap (13.0) to the starting milk quantity (650.0) $650.0 + 13.0 = 663.0$

White Base CGU



Ingredients	Qty	S	F	MSNF	OS	TS
Whole milk	667.0 g	//	23.3 g	60.0 g	//	83.3 g
Cream 35%	104.0 g	//	36.4 g	6.0 g	//	42.4 g
S.M.P.	41.0 g	//	0.4 g	39.0 g	//	39.4 g
Sucrose	137.0 g	137.0 g	//	//	//	137.0 g
Dextrose	14.0 g	12.9 g	//	//	//	12.9 g
Dry gluc. syrup	31.0 g	29.8 g	//	//	//	29.8 g
Stabilizer C.H.	6.0 g	//	//	//	6.0 g	6.0 g
TOTAL	1,000 g	179.7 g	60.1 g	105.0 g	6.0 g	350.1 g
	%	18.0%	6.0%	10.5%	0.6%	35.1%

Yellow Base CGU



Ingredients	Qty	S	F	MSNF	OS	TS
Whole milk	571.0 g	//	20.0 g	51.4 g	//	71.4 g
Cream 35%	85.0 g	//	29.8 g	4.9 g	//	34.7 g
S.M.P.	35.0 g	//	0.4 g	33.3 g	//	33.7 g
Egg yolk	100.0 g	//	30.0 g	//	18.0 g	48.0 g
Sucrose	136.0 g	136.0 g	//	//	//	136.0 g
Dextrose	27.0 g	24.8 g	//	//	//	24.8 g
Dry gluc. syrup	41.0 g	39.4 g	//	//	//	39.4 g
Stabilizer C.H.	5.0 g	//	//	//	5.0 g	5.0 g
TOTAL	1,000 g	200.2 g	80.2 g	89.6 g	23.0 g	393.0 g
	%	20.0%	8.0%	9.0%	2.3%	39.3%

Chocolate Base CGU



Ingredients	Qty	S	F	MSNF	OS	TS
Whole milk	605.0 g	//	21.2 g	54.5 g	//	75.7 g
Cream 35%	70.0 g	//	24.5 g	4.1 g	//	28.6 g
S.M.P.	17.0 g	//	0.2 g	16.2 g	//	16.4 g
Sucrose	125.0 g	125.0 g	//	//	//	125.0 g
Dextrose	36.0 g	33.1g	//	//	//	33.1 g
Dry gluc. Syrup	22.0 g	21.1g	//	//	//	21.1 g
Cocoa 22-24	50.0 g	//	11.5 g	//	36.0 g	47.5 g
Dark Choc.70%	70.0 g	21.0g	28.0 g	//	21.0 g	70.0 g
Stabilizer C.H.	5.0 g	//	//	//	5.0 g	5.0 g
TOTAL	1,000 g	200.2 g	85.4 g	74.8 g	62.0 g	422.4 g
	%	20.0%	8.5%	7.5%	6.2%	42.2%

Exercises



Exercise no.1

Reconstitution of 1 liter of whole milk with:

- Butter
- Skim Milk Powder
- Water

Exercise no. 2

Reconstitution of 1 liter of cream with:

- Powdered milk
- Water
- butter



Ingredients	Qty	S	F	MSNF	OS	TS	A
Whole milk	1030.0g	/	36.0g	92.7g	/	128.7g	901.3g
Cream 35%	1000.0g	/	350.0 g	58.0g	/	408.0g	592.0g

- Knowledge and analysis of sugars used in gelato-making
- Sugars derived from starch and D.E.
- Sweetening power (SP), Antifreeze Power (AFP) and their calculation
- White base characterizations (transformation into finished flavor)
- Analytical compensation

Main sugars in gelato-making



SUCROSE
LACTOSE
TREHALOSE
MAPLE SYRUP
DEXTROSE
FRUCTOSE
INVERTED SUGAR
HONEY
AGAVE SYRUP
LIQUID GLUCOSE SYRUP 60-62 DE
LIQUID GLUCOSE SYRUP 42-44 DE
DESSICATED GLUCOSE SYRUP 38-40 DE
MALTODEXTRIN 15-19 DE



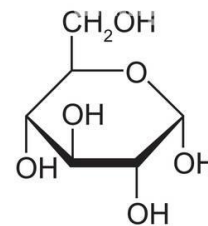
How to differentiate sugars

Differentiation ① (mono • di • oligosaccharides • polysaccharides)

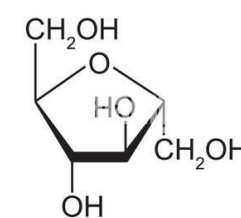
Monosaccharides, also called simple sugars, are the simplest forms of sugar and the most basic units from which all carbohydrates are built

1. **Glucose** (known mainly as **dextrose**)
2. **Fructose**
3. **Galactose**

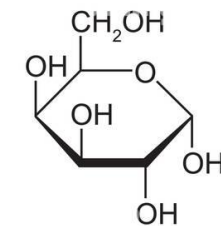
Monosaccharides



Glucose



Fructose



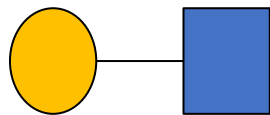
Galactose



How to differentiate sugars

A **disaccharide** is the sugar formed when two monosaccharides are joined by glycosidic linkage. Like monosaccharides, disaccharides are simple sugars soluble in water.

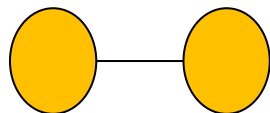
1. **Sucrose** : is a sugar composed of glucose and fructose subunits
2. **Lactose** : is a sugar composed of glucose and galactose subunits
3. **Maltose** : is a sugar composed of glucose and glucose subunits
4. **Trehalose** : is a sugar composed of glucose and glucose subunits



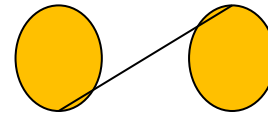
sucrose



lactose



maltose



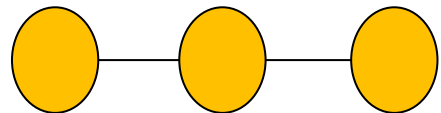
trehalose

How to differentiate sugars

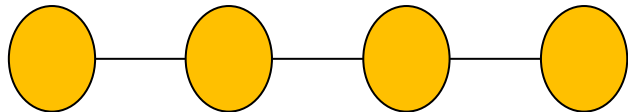
Oligosaccharides are a type of carbohydrate chain made up of three to 10 simple sugars. A carbohydrate chain with 10 or more simple sugars connected is called **polysaccharide**.

- Maltotriose
- Maltotetraose
- Maltopentose and so on...

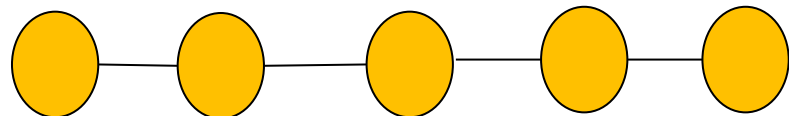
They are present in different percentage in glucose syrups



maltotriose



maltotetraose



maltopentose

More that 10 units



polysaccharide

AFP calculation of a sugar

$$\text{AFP} = \frac{\text{Molecular weight of sugar sucrose (342)}}{\text{Molecular weight of the sugar to be analyzed}}$$

Example:

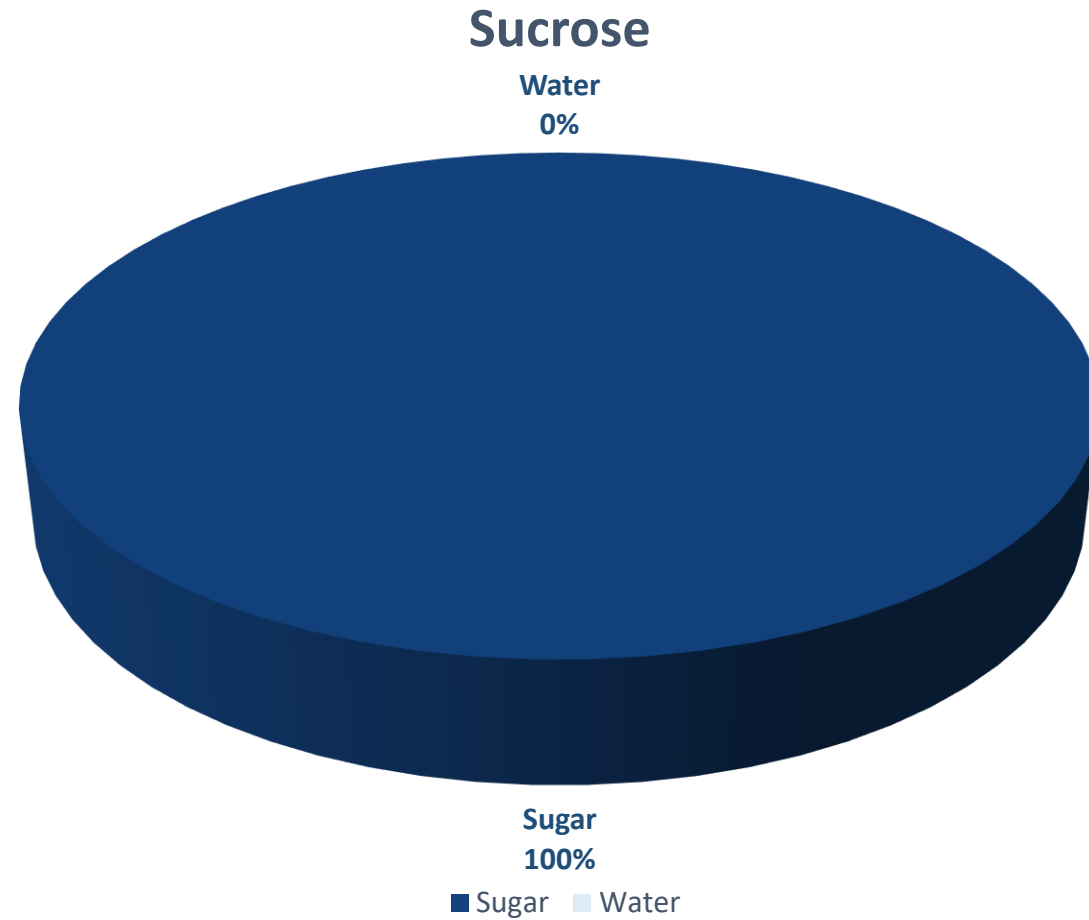
$$\text{AFP of dextrose} = \frac{342}{180} = 1.9$$

(MOLECULAR WEIGHT OF DEXTROSE)

Most common sugars in gelato

• Sucrose

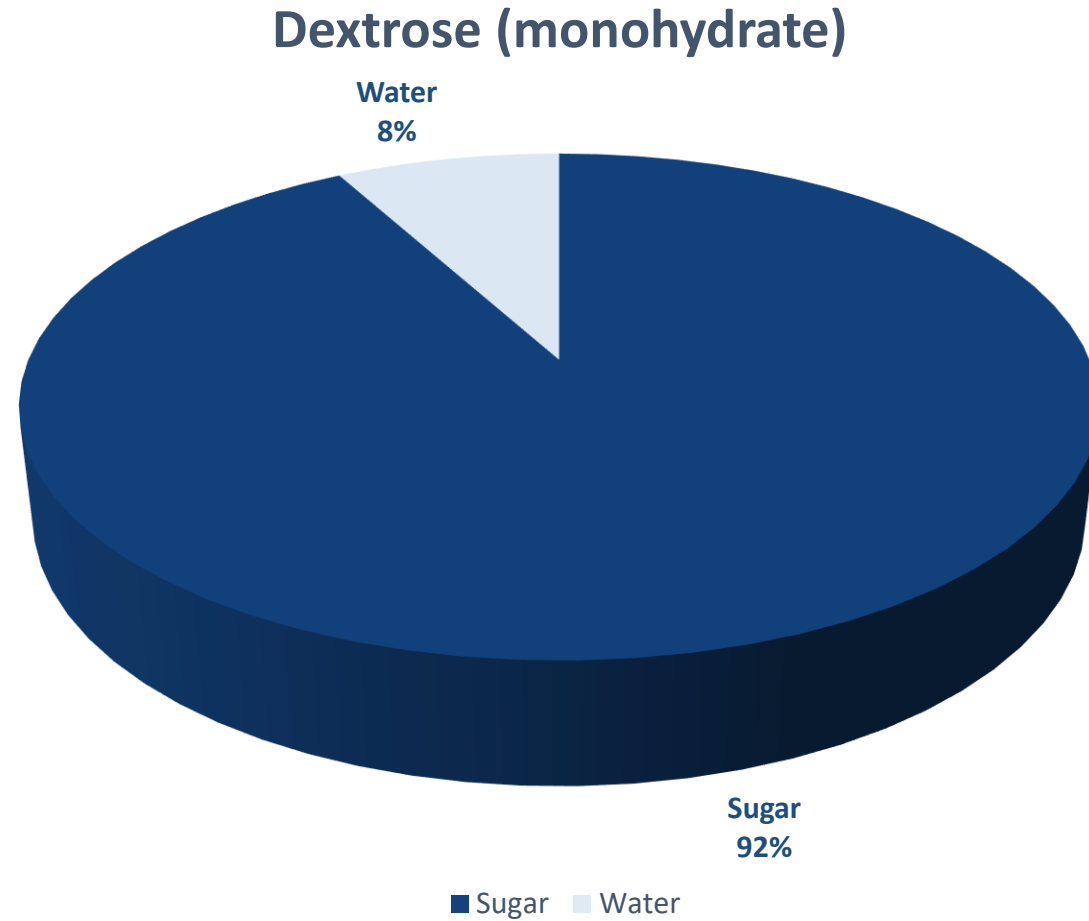
- Sugar
- Water
- AFP on the dry residue 1.00
- SP on the dry residue 1.00
- AFP on the total 1.00
- SP on the total 1.00



Most common sugars in gelato

- Dextrose (monohydrate)

- Sugar
- Water
- AFP on the dry residue 1.90
- SP on the dry residue 0.70
- AFP on the total 1.75
- SP on the total 0.64

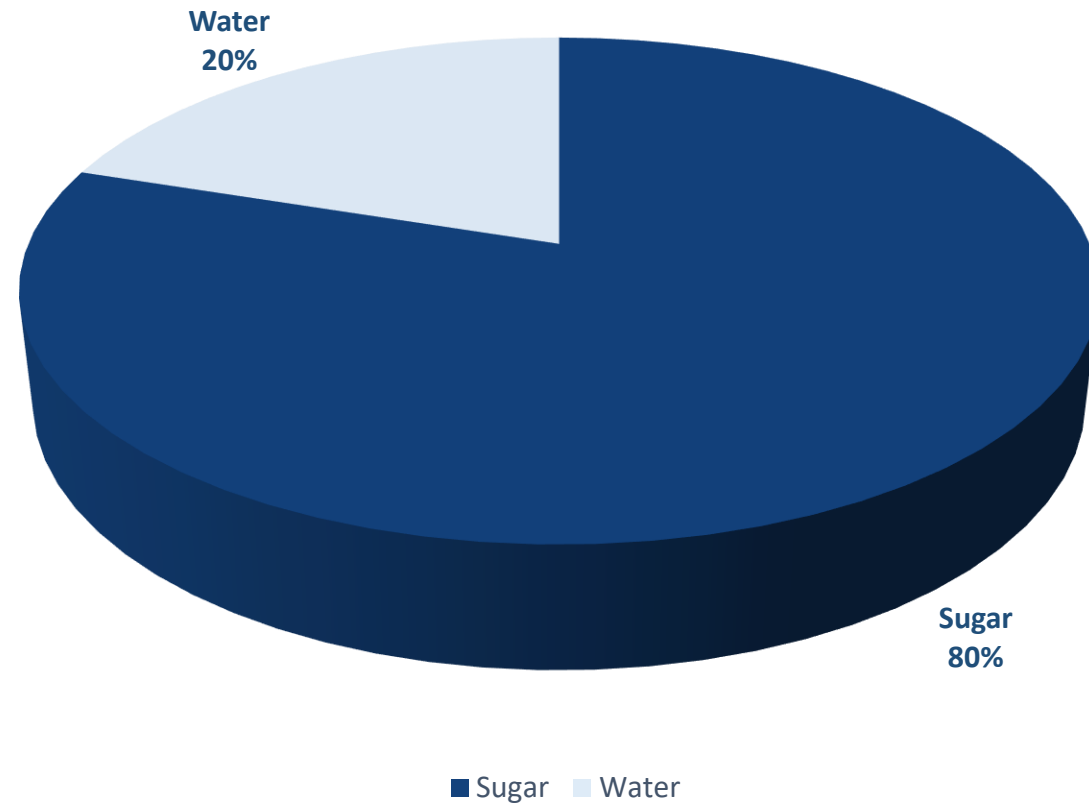


Most common sugars in gelato

- Glucose syrup 42-44 DE

- Sugar
- Water
- AFP on the dry residue 0.92
- SP on the dry residue 0.52
- AFP on the total 0.74
- SP on the total 0.42

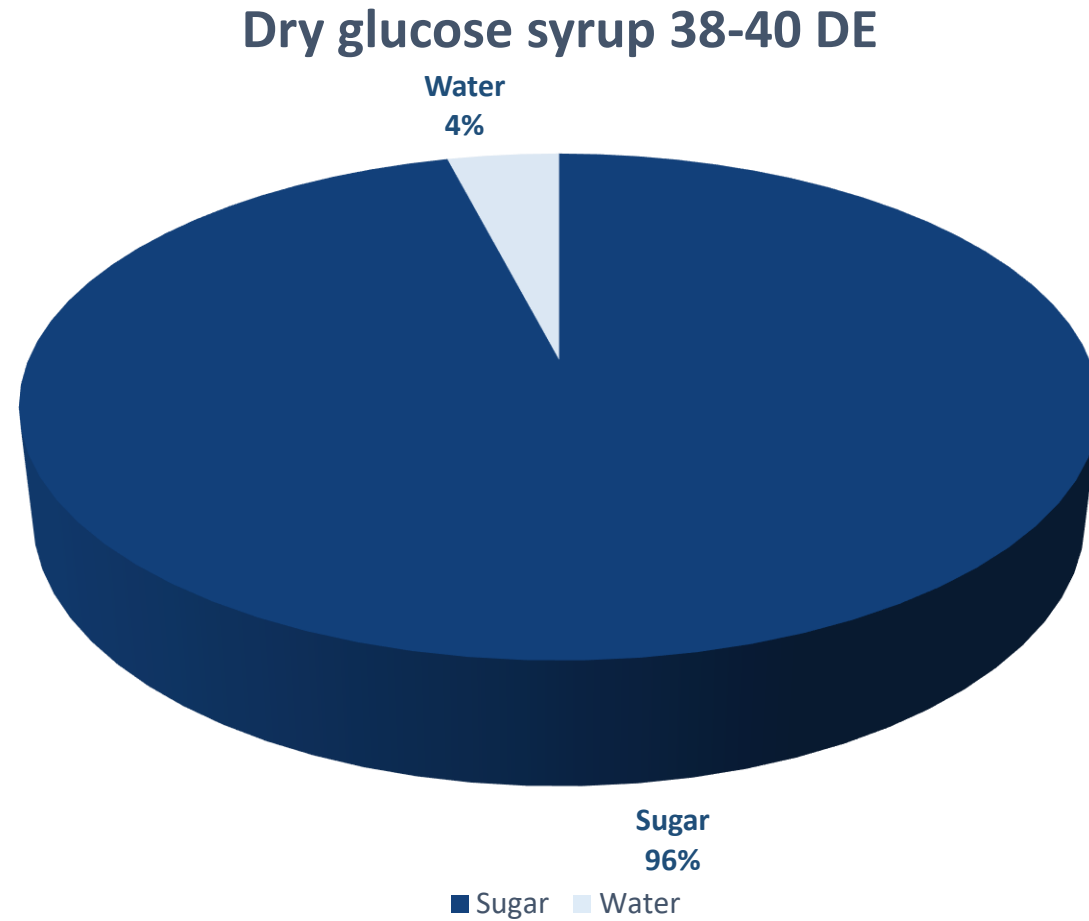
Glucose syrup 42-44 DE



Most common sugars in gelato

- Dry Glucose syrup 38-40 DE

- Sugar
- Water
- AFP on the dry residue 0.45
- SP on the dry residue 0.23
- AFP on the total 0.43
- SP on the total 0.22



SP and AFP of sugars



SUGARS	DRY RESIDUAL	SP	AFP	SP	AFP
	%	ON THE DRY RESIDUE		ON THE TOTAL	
SUCROSE	100.0	1.00	1.00	1.00	1.00
LACTOSE	100.0	0.16	1.00	0.16	1.00
TREHALOSE	91.0	0.45	1.00	0.41	0.91
MAPLE SYRUP	67.0	1.00	1.00	0.67	0.67
DEXTROSE MONOHYDRATE	92.0	0.70	1.90	0.64	1.75
FRUCTOSE	100.0	1.70	1.90	1.70	1.90
INVERTED SUGAR	75.0	1.25	1.90	0.94	1.43
HONEY	80.0	1.30	1.90	1.04	1.52
AGAVE SYRUP	76.0	1.40	1.90	1.06	1.44
LIQUID GLUCOSE SYRUP 60-62 DE	80.0	0.64	1.20	0.51	0.96
LIQUID GLUCOSE SYRUP 42-44 DE	80.0	0.52	0.92	0.42	0.74
DRY GLUCOSE SYRUP 38-40 DE	96.0	0.23	0.45	0.22	0.43
MALTODEXTRIN 15-19 DE	95.0	0.09	0.23	0.09	0.22

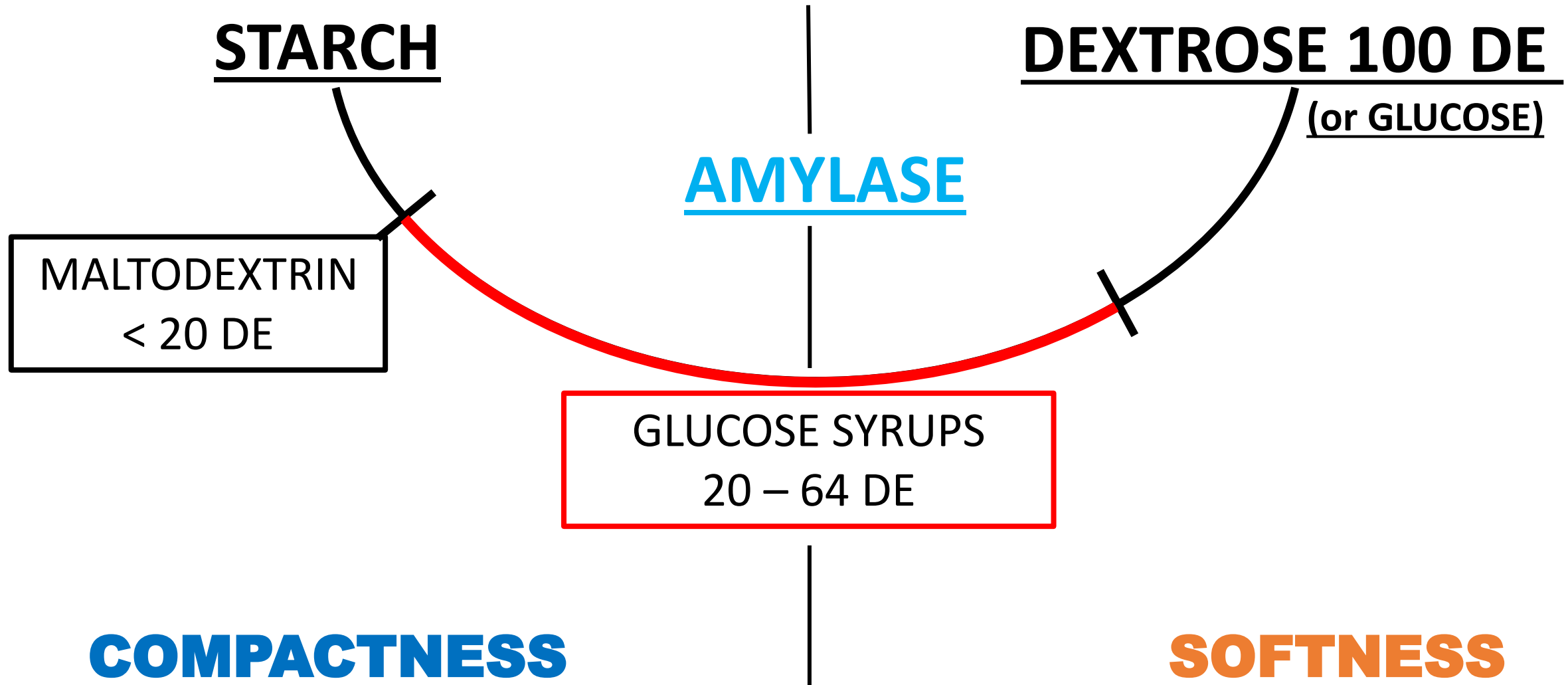
D.E. = Dextrose Equivalence



SUGAR	DERIVATION
DEXTROSE 100 DE	<i>STARCH</i>
LIQUID GLUCOSE SYRUP 60-62 DE	
LIQUID GLUCOSE SYRUP 42-44 DE	
DRY GLUCOSE SYRUP 38-40 DE	
MALTODEXTRIN 15-19 DE	



D.E. = Dextrose Equivalence



D.E. = Dextrose Equivalence

INCREASE OF DE



FUNCTION	EFFECT
SWEETENING POWER	Increases
ANTI-FREEZING POWER	Increases
VISCOSITY	Decreases
ANTI-CRYSTALLIZING POWER	Increases
HYGROSCOPY	Increases
AROMA-ENHANCING EFFECT	Increases
FOAMING	Increases
BROWNING BY HEATING	Increases

SUGARS	AFP
Disaccharides (e.g.: Sucrose) Taste – creaminess – consistency	MEDIUM
Monosaccharides (e.g. Dextrose) Softness	HIGH
Polysaccharides (e.g.: Dry Glucose Syrup) Compactness – viscosity	LOW

LACTOSE IN MILK SOLIDS NON-FAT

54-56%

CALCULATION OF LACTOSE IN WHITE BASE CGU

In 1000 grams of white base CGU, the MSNF is 105.0 g

$$\text{LACTOSE} = 105.0 \times 55\% = 57.8 \text{ g}$$

SP and AFP calculation of the White Base CGU



<u>INGREDIENTS</u>	<u>QTY</u>	<u>S</u>	<u>MSNF</u>	-	-	<u>SP</u>	<u>AFP</u>
MILK	667.0		60.0			↓	↓
SMP	41.0		39.0			↓	↓
CREAM	104.0		6.0			↓	↓
SUCROSE	137.0	137.0	↓			(1) 137.0	(1) 137.0
DRY GLUC. SYRUP	31.0	29.8				(0.23) 6.9	(0.45) 13.4
DEXTROSE	14.0	12.9				(0.7) 9.0	(1.9) 24.5
STABILIZER	6.0				Lactose	↓	↓
				x55%	57.8	(0.16) 9.2	(1) 57.8
TOTAL	1000.0	179.7	105.0				
						162.1	232.7
%	100%	18.0%	10.5%			<u>16.2</u>	<u>23.3</u>

SP and AFP calculation of the Yellow Base CGU



<u>INGREDIENTS</u>	<u>QTY</u>	<u>S</u>	<u>MSNF</u>	-	-	<u>SP</u>	<u>AFP</u>
MILK	571.0		51.4			↓	↓
SMP	35.0		33.3			↓	↓
CREAM	85.0		4.9			↓	↓
SUCROSE	136.0	136.0	↓			(1) 136.0	(1) 136.0
DRY GLUC. SYRUP	41.0	39.4				(0.23) 9.1	(0.45) 17.7
DEXTROSE	27.0	24.8				(0.7) 17.4	(1.9) 47.1
EGG YOLK	100.0					↓	↓
STABILIZER	5.0				Lactose	↓	↓
				x55%	49.3	(0.16) 7.9	(1) 49.3
TOTAL	1000.0	200.2	89.6				
						170.4	250.1
%	100%	20.0%	9.0%			<u>17.0</u>	<u>25.0</u>

SP and AFP calculation of the Choc. Base CGU

<u>INGREDIENTS</u>	<u>QTY</u>	<u>S</u>	<u>MSNF</u>	-	-	<u>SP</u>	<u>AFP</u>
MILK	602.5		54.5			↓	↓
SMP	17.0		16.2			↓	↓
CREAM	70.0		4.1			↓	↓
SUCROSE	125.0	125.0	↓			(1) 125.0	(1) 125.0
DRY GLUC. SYRUP	22.0	21.1				(0.23) 4.9	(0.45) 9.5
DEXTROSE	36.0	33.1				(0.7) 23.2	(1.9) 62.9
DARK CHOCOLATE 70%	70.0	21.0				(1) 21.0	(1) 21.0
COCOA POWDER 22- 24%	50.0					↓	↓
STABILIZER	5.0				Lactose	↓	↓
				x55%	41.1	(0.16) 6.6	(1) 41.1
TOTAL	1000.0	200.2	74.8				
						180.7	259.5
%	100%	20.0%	7.5%			<u>18.1</u>	<u>26.0</u>

SP and AFP parameters



TYPE	SP	AFP (sugars)
MILK BASED GELATO	12 – 22	22 – 28
FRUIT GELATO	18 – 26	25 – 29

Analytical compensation



Flavoring	% characterization in the recipe	% final sugars in the recipe	AFP (sugars) total in the recipe
Nuts	8 – 15%	18 – 20%	22 – 26
Dairy products	5 – 55%	19 – 21%	23 – 27
Sugary pastes	2 – 10%	20 – 22%	24 – 28
Sugary/fatty pastes	5 – 15%	19 – 21%	23 – 27
Fruit	5 – 45%	22 – 24%	25 – 29
Chocolate	5 – 25%	19 – 21%	23 – 27

Nut compensation

HAZELNUT

Ingredients	Qty	S	F	MSNF	OS	TS	AFP
White base	900g	162.0g	54.0g	94.5g	5.4g	315.9g	209.7
Hazelnut paste	100g	4.1g	64.1g	//	30.8g	99.0g	6.2
TOTAL	1000 g	166.1g	118.1g	94.5g	36.2g	414.9g	215.9
	%	16.6%	11.8%	9.5%	3.6%	41.5%	21.6

ADD SUGAR

INCREASE THE AFP

Flavoring	Final sugars in the recipe	AFP in the recipe
Nuts	18 – 20%	22 – 26

Nut compensation



HAZELNUT

Ingredients	Qty	S	F	MSNF	OS	TS	AFP
White base	871g	156.8g	52.3g	91.5g	5.2g	305.8g	202.9
Hazelnut paste	100g	4.1g	64.1g	//	30.8g	99.0g	6.2
Sucrose	29g	29.0g	//	//	//	29.0g	29.0
TOTAL	1000 g	189.9g	116.4g	91.5g	36.0g	433.8g	238.1
	%	19.0%	11.6%	9.2%	3.6%	43.4%	23.8

SUGARS OK

AFP OK

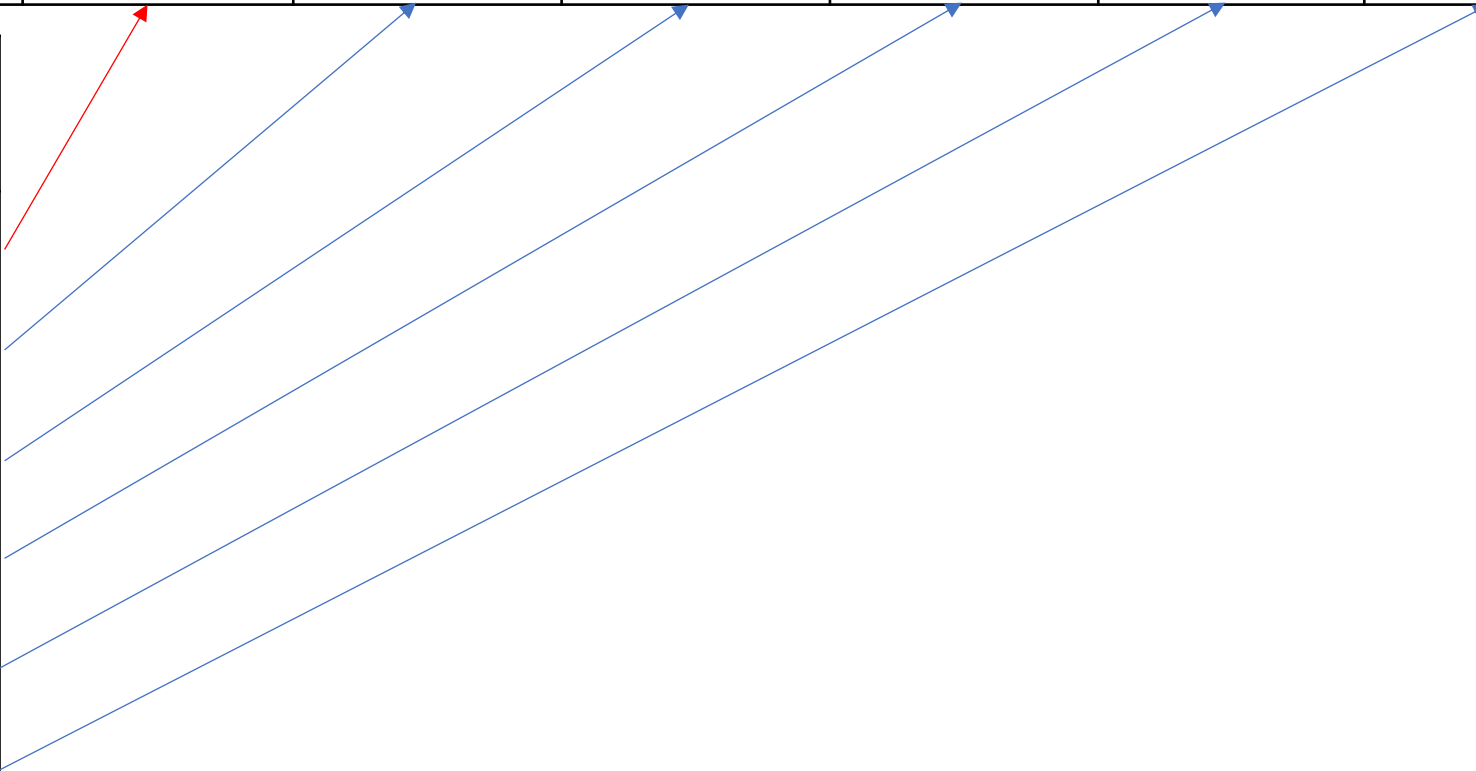
Flavoring	Final sugars in the recipe	AFP in the recipe
Nuts	18 – 20%	22 – 26

Nut compensation

HAZELNUT

Ingredients	S	F	MSNF	OS	TS	AFP
TOTAL %	19.0%	11.6%	9.2%	3.6%	43.4%	23.8

	FINISHED GELATO (with nuts)
Sugar	18 – 20%
Fats	7 – 16%
MSNF	7 – 12%
O.S.	0.2 – 10%
T.S.	37 – 46%
AFP	22 – 26



SUGARS SUBSTITUTION

Ingredients	Qty	S	AFP	SP
Sucrose	29.0	29.0	29.0	29.0

On the D.R.: AFP 1.00 SP 1.00

On the Total: AFP 1.00 SP 1.00

15.3/ 92%

29.0 / 1.9

Ingredients	Qty	S	AFP	SP
Dextrose	17.0	15.3	29.0	10.7

On the D.R.: AFP 1.90 SP 0.70

On the Total: AFP 1.75 SP 0.64

29.0 / 1.75

15.3/ 80%

29.0 / 1.9

Ingredients	Qty	S	AFP	SP
Honey	19.0	15.3	29.0	19.9

On the D.R.: AFP 1.90 SP 1.30

On the Total: AFP 1.52 SP 1.04

29.0 / 1.52

Compensation (Excel)



Sugar paste compensation



MINT

Ingredients	Qty	S	F	MSNF	OS	TS	AFP
White base	930g	167.4g	55.8g	97.7g	5.6g	326.5g	216.7
Mint paste	70g	54.6g	//	//	1.4g	56.0g	49.1
TOTAL	1000 g	222.0g	55.8g	97.7g	7.0g	382.5g	265.8
	%	22.2%	5.6%	9.8%	0.7%	38.3%	26.6

REDUCE THE SUGAR SLIGHTLY

INCREASE THE FATS

Flavoring	Final sugars in the recipe	AFP in the recipe
Sugary paste	20 – 22%	24 – 28

Sugar paste compensation



MINT

Ingredients	Qty	S	G	MSNF	AS	TS	AFP
White base	865g	155.7g	51.9g	90.8g	5.2g	303.6g	201.5
Mint paste	70g	54.6g	//	//	1.4g	56.0g	49.1
Cream 35%	65g	//	22.8g	3.8g	//	26.6g	2.1
TOTAL	1000 g	210.3g	74.7g	94.6g	6.6g	386.2g	252.7
	%	21.0%	7.5%	9.5%	0.7%	38.7%	25.3

SUGARS OK

FATS OK

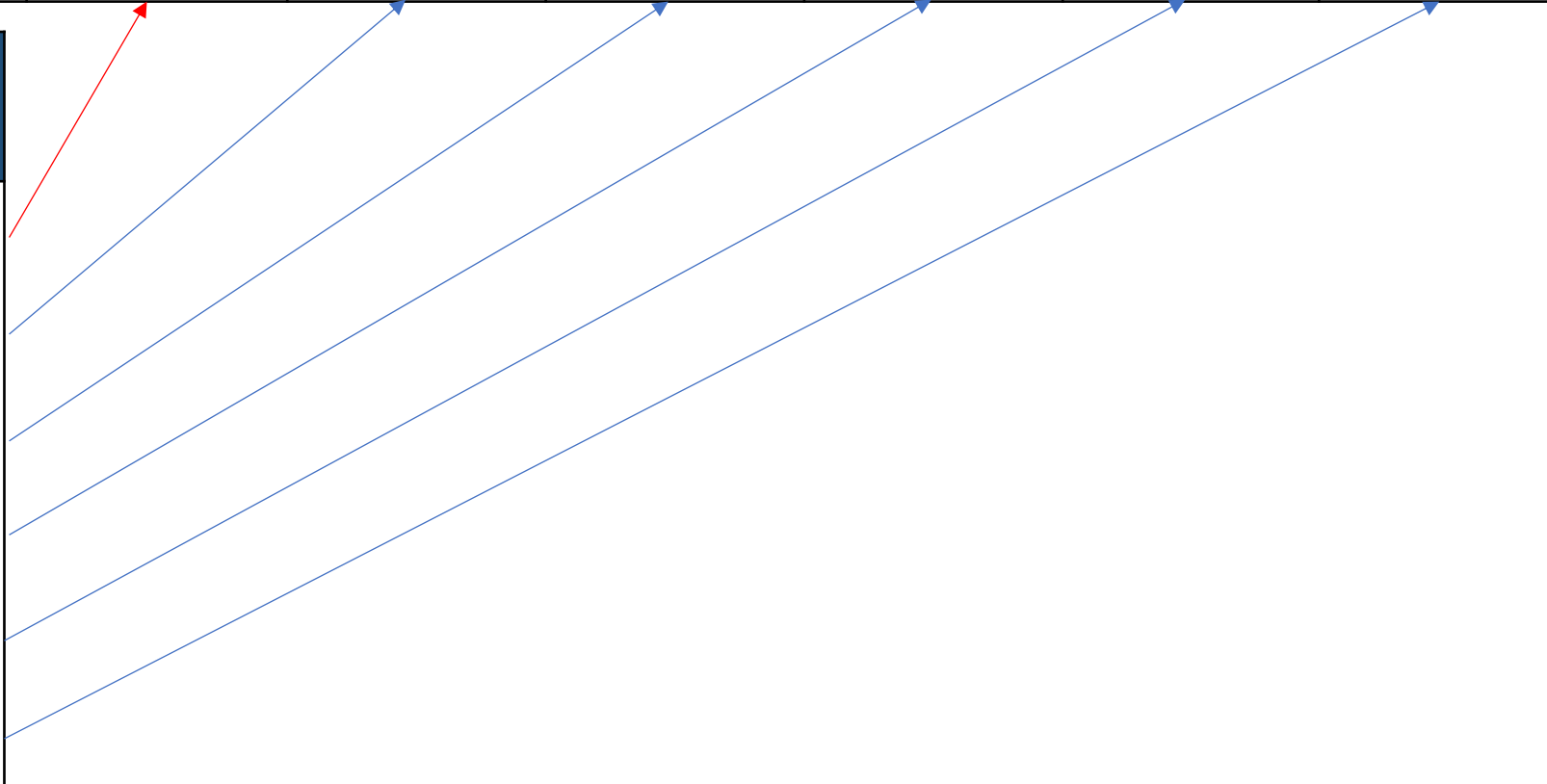
Flavoring	Final sugars in the recipe	AFP in the recipe
Sugary paste	20 – 22%	24 – 28

Sugar paste compensation

MINT

Ingredients	S	F	MSNF	OS	TS	AFP
TOTAL %	21.0%	7.5%	9.5%	0.7%	38.7%	25.3

	FINISHED GELATO (with sugary paste)
Sugar	20 – 22%
Fats	7 – 16%
MSNF	7 – 12%
O.S.	0.2 – 10%
T.S.	37 – 46%
AFP	24 – 28

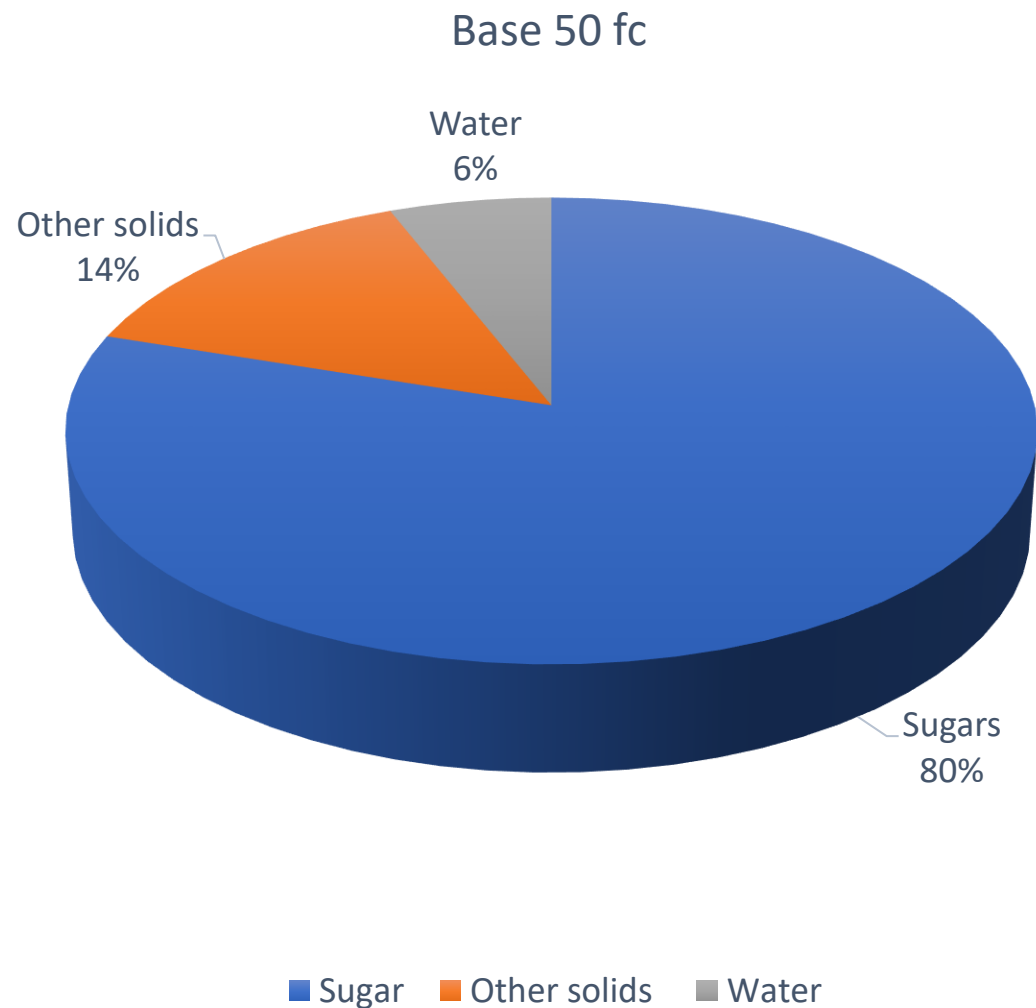


Characterization and simple Compensation

Flavoring	Amount of base	Amount of flavoring	Compensation	Dosage (recommended)
Nuts	1000 g	80 – 150 g	Dextrose	15 – 45 g
Dairy products	1000 g	100 – 400 g	Sucrose	40 – 140 g
Dairy products	1000 g	100 – 400 g	Dextrose	20 – 70 g
Sugary pastes	1000 g	20 – 100 g	Cream	30 – 110 g
Sugary-fatty pastes	1000 g	50 – 100 g	Milk	30 – 100 g
Fruit	1000 g	50 – 600 g	Sucrose	50 – 200 g
Chocolate	1000 g	100 – 300 g	Water/milk	30 – 100 g

- Balancing fruit sorbets with neutral (direct method)
- Sugar spectrum
- Balancing fruit sorbets with neutral (indirect method):
 - 70% sugar syrup
 - Stabilized sugar syrup
- AFP and SP calculation

Creating the Base 50 Fruit



50 g of Base 50 fruit contains:	
Sugar	40.0 g
Other Solids*	7.0g
Water	3.0g

**Other solids = this value refers to the stabilizer*

Fruit sorbets with stabilizer

BALANCING RULES:

1

% SUGAR
26 - 31%

3

% LEMON JUICE
0 - 2%

2

% FRUIT
Strong = 15 – 35%
Medium = 35 - 55%
Weak = 55 - 75%

4

% STABILIZER

Pulp ← ● → **Juice**

0.1% **0.2%** **0.3%** **0.4%**



Sugar spectrum with 2 sugars

SUGARS	%
Disaccharides (e.g.: Sucrose) Taste – creaminess – consistency	85 - 95%
Monosaccharides (e.g. Dextrose) Softness	5 - 15%

Sugar spectrum with 3 sugars

SUGARS	%
Disaccharides (e.g.: Sucrose) Taste – creaminess – consistency	50 - 100%
Monosaccharides (e.g. Dextrose) Softness	0 - 25%
Polysaccharides (e.g.: Dry Glucose Syrup) Compactness – viscosity	0 - 35%

SP and AFP parameters



TYPE	SP	AFP (sugars)
FRUIT SORBETS	20 – 28	28 – 33

Peach sorbet with Fruit Neutral



PEACH SORBET (DIRECT METHOD)

Ingredients	Quantity	Sugar	AFP	SP
Peach	500.0 g	*45.0 g	*67.5	*49.5
Sucrose	211.0 g	211.0 g	211.0	211.0
Dextrose	26.0 g	23.9 g	45.4	16.7
Lemon juice	10.0 g	0.5 g	*0.8	*0.6
Stabilizer F.C.	3.0 g	//	//	//
Water	220.0 g	//	//	//
TOTAL	1,000.0 g	280.4 g	324.7	277.8
	100.0%	28.0%	32.5	27.8

1
%
SUGAR
28.0%

3
%
LEMON
1.0%

2
%
FRUIT
50.0%

4
%
STABILIZER
0.3%

SUGAR SPECTRUM	
Disaccharides (Sucrose)	91.5%
Monosaccharides (Dextrose)	8.5%

*To facilitate the calculations, we consider fruit AFP and SP respectively: AFP = 1.5 SP = 1.1

Sugar Syrups

Stabilized sugar syrup	Non-stabilized 70% sugar syrup
Water	Water
Sugar	Sugar
<u>Fruit</u> stabilizer	

Indirect method (sugar syrup 70%)

SUGAR SYRUP 70%

Ingredients	Quantity	Sugar	AFP	SP
Sucrose	490.0 g	490.0 g	490.0	490.0
Dextrose	76.0 g	70.0 g	133.0	49.0
Dry Glu. Syrup	146.0 g	140.0 g	63.0	32.2
Water	288.0 g	//	//	//
TOTAL	1,000.0 g	700.0 g	686.0	571.2
	100.0%	70.0%	68.6	57.1

Peach sorbet with sugar syrup 70%



PEACH SORBET (70% SYRUP)

Ingredients	Quantity	Sugar	AFP	SP
Peach	500.0 g	45.0 g	*67.5	*49.5
Sugar syrup 70%	335.0 g	234.5 g	229.8	191.3
Lemon juice	10.0 g	0.5 g	*0.8	*0.6
Stabilizer F.C.	3.0 g	//	//	//
Water	152.0 g	//	//	//
TOTAL	1,000.0 g	280.0 g	298.1	241.4
	100.0%	28.0%	29.8	24.8

* To facilitate the calculations we consider fruit AFP and SP respectively: AFP = 1.5 and SP = 1.1

Indirect method (Stabilized sugar syrup)

STABILIZED SUGAR SYRUP (50%)

Ingredients	Quantity	Sugar	AFP	SP
Sucrose	350.0 g	350.0 g	350.0	350.0
Dextrose	54.0 g	50.0 g	95.0	35.0
Dry Glu. Syrup	104.0 g	100.0 g	45.0	23.0
Stabilizer F.C.	6.0 g	//	//	//
Water	486.0 g	//		
TOTAL	1,000.0 g	500.0g	490.0	408.0
	100.0%	50.0%	49.0	40.8

Peach sorbet with stabilized syrup (50%)



PEACH SORBET (STABILIZED SYRUP)

Ingredients	Quantity	Sugar	AFP	SP
Peach	500.0 g	45.0 g	*67.5	*49.5
Stabilized syrup 50%	470.0 g	235.0 g	230.3	191.8
Lemon juice	10.0 g	0.5 g	*0.8	*0.6
Water	20.0 g	//	//	//
TOTAL	1,000.0 g	280.5g	298.6	241.9
	100.0%	28.0%	29.9	24.2

* To facilitate the calculations, we consider fruit AFP and SP respectively: AFP = 1.5 and SP = 1.1

Watermelon sorbet with stabilized syrup (50%)

1

% SUGAR
28.0%

3

% LEMON JUICE
1.0%

2

% FRUIT
65.0%

4

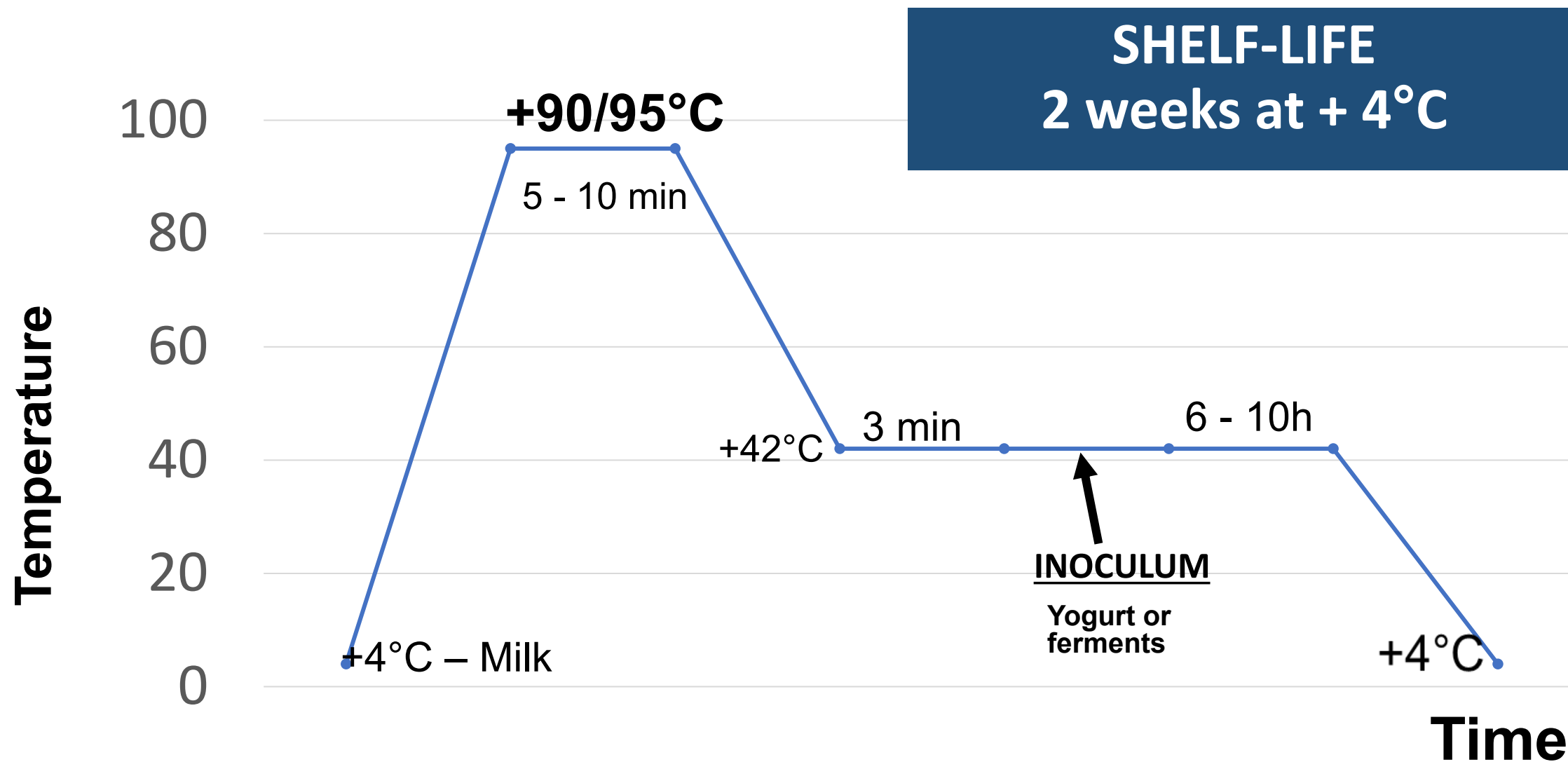
% STABILIZER
Already present in
syrup

This amount of syrup brings the total weight of the recipe higher than the planned value of 1000 grams

Ingredients	QTY	S
Watermelon	650g	*39.0 g
Stab. Sugar syrup 50%	481g	240.5 g
Lemon juice	10g	0.5 g
Water	//	//
TOTAL planned	1000.0g	280.0g
In %	100.0%	29.0%
ACTUAL TOTAL	1141.0g	
In %	100.0%	24.5%

- Yogurt production cycle
- Yogurt Gelato and Frozen Yogurt: analysis of recipes
- Poached fruit: production and use in gelato-making
- Hot infusions and extractions
- Location, target customers and the importance of the Branding

Yogurt



Yogurt Gelato



Yogurt Gelato INGREDIENTS	g	%	Per kg of base
White Base CGU	270.0	27.0	1000.0
Whole Yogurt	540.0	54.0	2000.0
S.M.P.	26.0	2.6	96.0
Sucrose	136.0	13.6	504.0
Dextrose	22.0	2.2	82.0
Citric acid	1.0	0.1	4.0
Stabilizer F.C.	5.0	0.5	19.0
TOTAL	1000.0	100.0	3705.0

Mix all the ingredients, heat to 40 / 45°C and batch freeze



•Sugar	20.5%
•Fats	3.8%
•MSNF	9.9%
•Other solids	0.8%
•Total Solids	35.0%
•AFP	27.4
•SP	20.0

Frozen Yogurt



INGREDIENTS Frozen Yogurt	g	%	Per kg of yogurt
White Yogurt	777.0	77.7	1000.0
Sucrose	183.0	18.3	235.0
Dextrose	35.0	3.5	45.0
Stabilizer F.C.	5.0	0.5	7.0
TOTAL	1000.0	100.0	1287.0



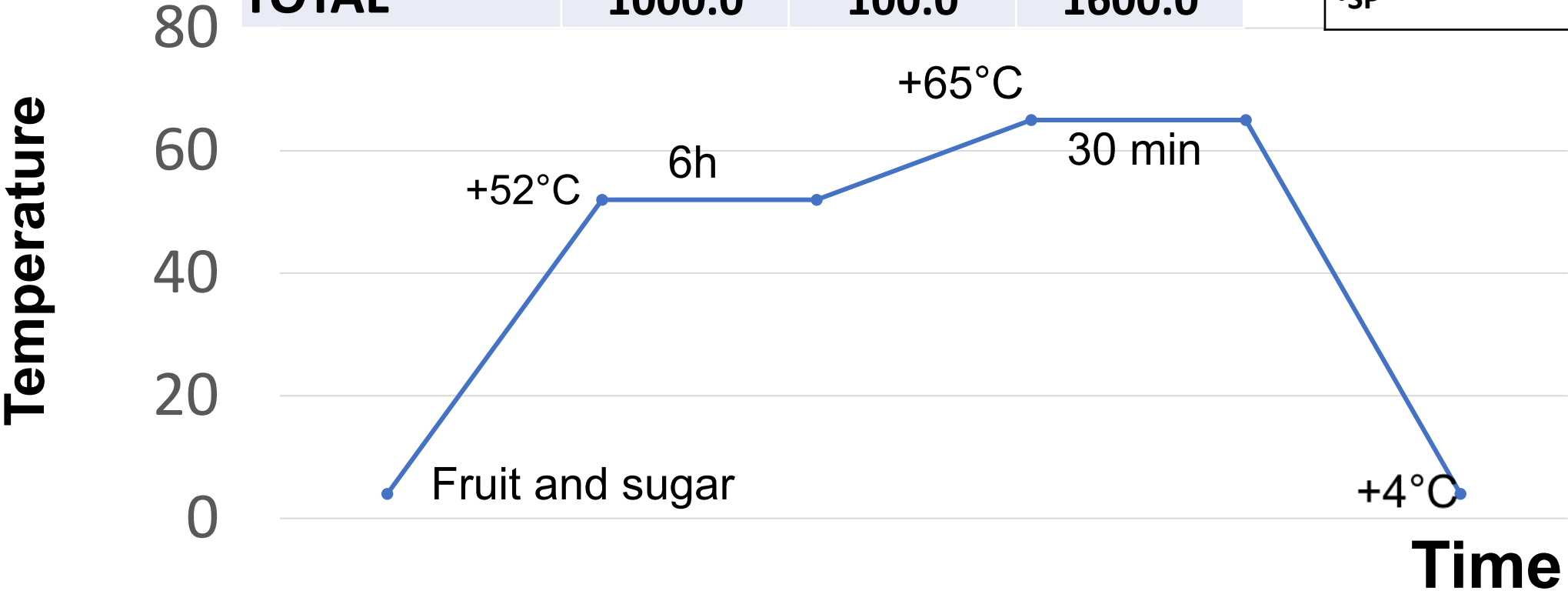
•Sugar	21.5%
•Fats	3.0%
•MSNF	6.7%
•Other solids	0.5%
•Total Solids	31.7%
•AFP	27.8
•SP	21.1

Poached Fruit



INGREDIENTS	Qty	%	Per kg of fruit
Fruit	625.0	62.5	1000.0
Sugar	375.0	37.5	600.0
TOTAL	1000.0	100.0	1600.0

•Sugar	42.5%
•Fats	0%
•MSNF	0%
•Other solids	4.4%
•Total Solids	46.9%
•AFP	46.5
•SP	43.5



IDEAL ENVIRONMENTS FOR INFUSIONS

WATER



SUGARS



FATS



ALCOHOL



GELATO MIX

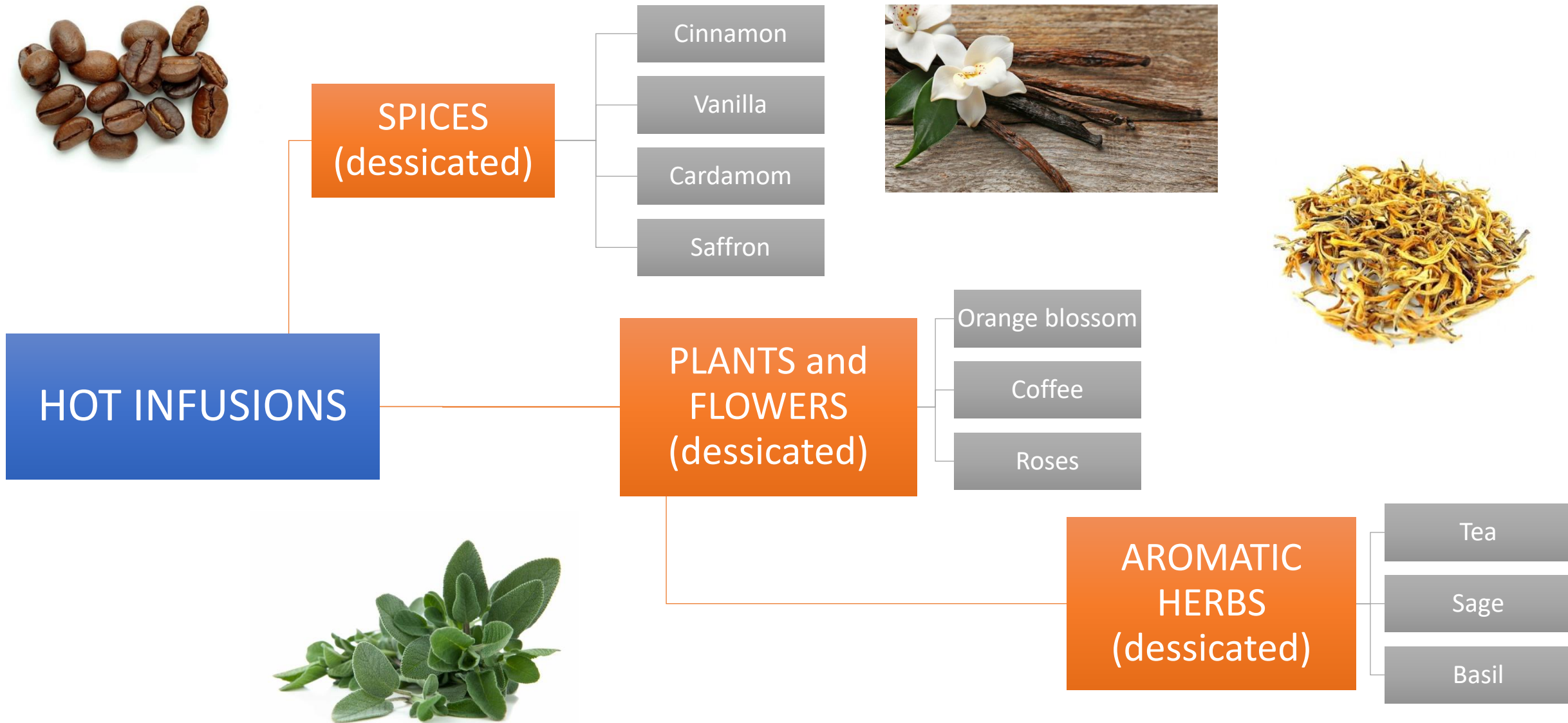
Infusions



INGREDIENTS	Qty per kg
Vanilla	1 – 2 beans
Cinnamon	3 – 6 sticks
Ground cinnamon	10 – 40 g
Cardamom	5 – 15 pieces
Cloves	1 – 4 cloves
Aniseed	3 – 7 g
Star anise	1 – 5 star anises
Nutmeg	1 – 2 g
Tea and herbal teas	15 – 25 g
Fresh aromatic herbs	15 – 30 g
Dried aromatic herbs	5 – 25 g
Ground saffron	0.5 – 1 g
Saffron in pistils	1 – 2 g

INGREDIENTS	Qty per kg
Coffee Beans	30 – 80 g
Ground coffee	5 – 25 g
Liquorice	1 – 2 beans
Ground licorice	5 – 30 g
Fresh chili pepper	1 – 5 pieces
Ground chili pepper	1 – 3 g
Fresh flowers	15 – 30 g
Dried flowers	5 – 20 g
Lemon/Lime zest	2 – 5 g
Orange/mandarin zest	3 – 8 g
Fresh ginger	10 – 30 g
Ground ginger	3 – 7 g
Matcha	5 – 25 g

Hot Infusion



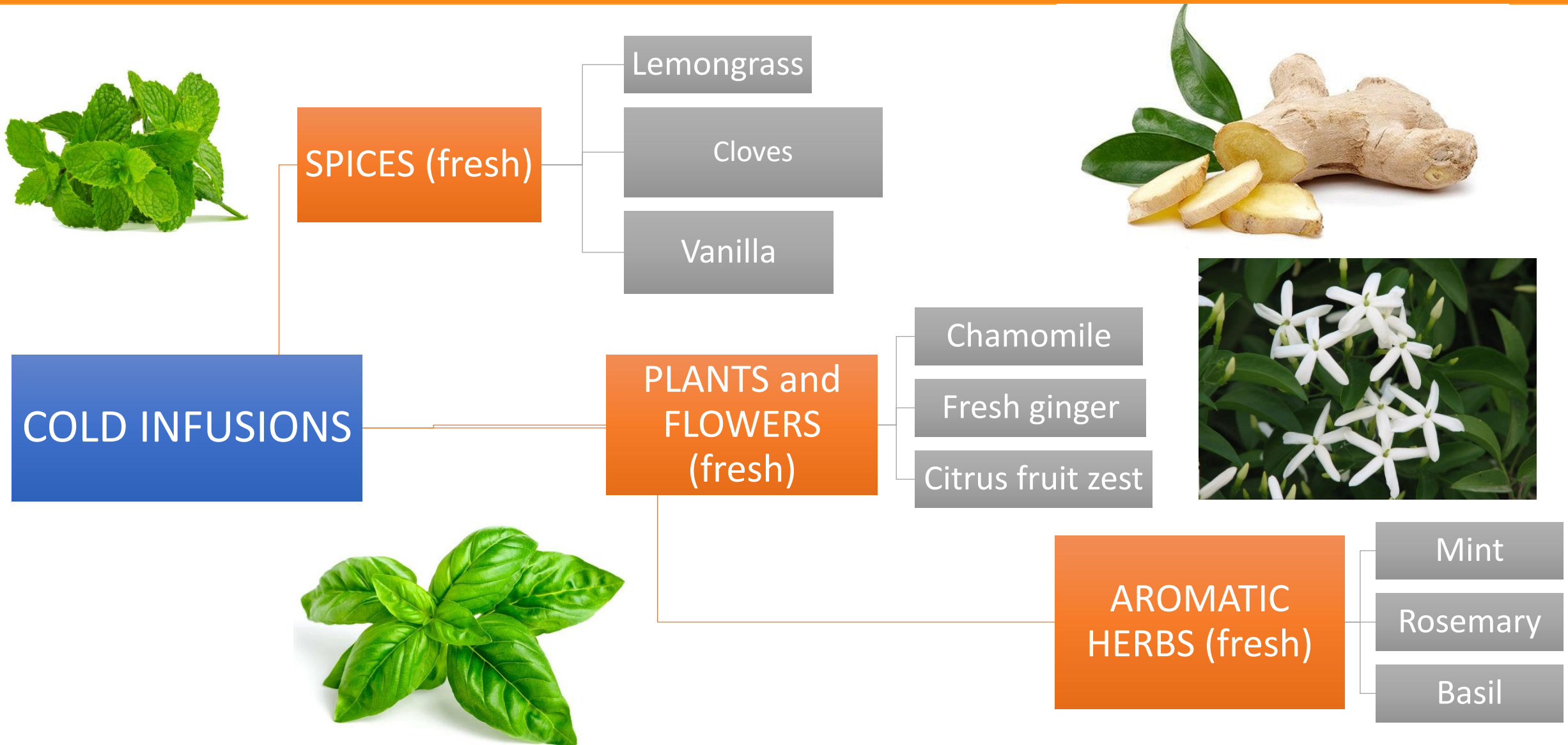
Hot infusions

INFUSION METHOD	TEMPERATURE	INFUSION TIME
INDUCTION / GAS STOVES / MICROWAVES	65° – 95°C	3 – 30 MIN
VACUUM / RONER / OVEN (Water Bath)	45°C (if in oil) or approximately 60°C.	120 – 240 MIN



- Cold infusions and extractions (maceration)
- Calculation and analysis of recipes of international flavors
- Recap
- Final considerations and testing

Cold infusions



Cold infusions

INFUSION METHOD	TEMPERATURE	INFUSION TIME
CLASSIC / VACUUM CONTAINERS	4°C or room temperature (if syrup)	12 – 48 ORE (possibly longer)



International flavors



CHEESECAKE

INGREDIENTS	g	%	Per kg of base
White Base CGU	506.0	50.6	1000.0
Custard sauce CGU	100.0	10.0	198.0
Cream cheese	250.0	25.0	494.0
Whole yogurt	50.0	5.0	99.0
Sucrose	94.0	9.4	186.0
TOTAL	1000.0	100.0	1977.0

•Sugar	21.0%
•Fats	12.2%
•MSNF	8.8%
•O.S.	0.9%
•T.S.	41.4%
•AFP	25.1
•SP	19.7

Vanilla half a pod per kg

SNICKERS

INGREDIENTS	g	%	Per kg of base
White Base CGU	761.0	76.1	1000.0
Chocolate sauce CGU	150.0	15.0	197.0
Peanut paste	80.0	8.0	105.0
Dextrose	9.0	0.9	12.0
TOTAL	1000.0	100.0	1314.0

•Sugar	18.5%
•Fats	10.5%
•MSNF	8.0%
•O.S.	7.0%
•T.S.	44.0%
•AFP	24.5
•SP	16.5

During the extraction, garnish gelato with the salted caramel sauce

CARAMEL SAUCE (WATER)

Ingredients	Qty	%
Sucrose	700g	70.0
Dextrose	60g	6.0
Water	240g	24.0
TOTAL	1000 g	100.0

Before cooking

SUGARS	FATS	MSNF	OTHER SOLIDS	TOTAL SOLIDS	AFP	SP
75.5%	0.0%	0.0%	0.0%	75.5	80.5	73.9

International flavors

CARAMEL SAUCE (WATER)

Ingredients	Qty	%	
Water evaporation	100g	10.0	Product concentration
			1000g – 100g
NEW TOTAL	900g		

Before cooking	SUGARS	FATS	MSNF	OTHER SOLIDS	TOTAL SOLIDS	AFP	SP
	75.5%	0.0%	0.0%	0.0%	75.5	80.5	73.9
After cooking	SUGARS	FATS	MSNF	OTHER SOLIDS	TOTAL SOLIDS	AFP	SP
	83.9%	0.0%	0.0%	0.0%	83.9%	89.4	82.1

CREME CARAMEL

INGREDIENTS	g	%	Per kg of base
White Base CGU	585.0	58.5	1000.0
Cream sauce CGU	200.0	20.0	342.0
Mascarpone cheese	110.0	11.0	188.0
Whole milk	45.0	4.5	77.0
Caramel sauce (water)	60.0	6.0	103.0
TOTAL	1000.0	100.0	1710.0

•Sugar	20.5%
•Fats	11.1%
•MSNF	8.6%
•A.S.	1.6%
•T.S.	41.8%
•AFP	25.1
•SP	18.2

Vanilla half a pod per kg

SALTED CARAMEL SAUCE

Ingredients	Qty	%	
Sucrose	450g	45.0	A
Dextrose	50g	5.0	
Cream	400g	40.0	B
Butter	100g	10.0	
Salt	10g	1.0	
TOTAL	1010g	101.0	

Before cooking

SUGARS	FATS	MSNF	OTHER SOLIDS	TOTAL SOLIDS	AFP	SP
49.1%	22.2%	2.3%	1.0%	74.6%	60.3	48.0

International flavors

SALTED CARAMEL SAUCE

Ingredients	Qty	%	
Water evaporation	50g	5.0	Product concentration
			1010g – 50g
NEW TOTAL	960g		

Before cooking	SUGARS	FATS	MSNF	OTHER SOLIDS	TOTAL SOLIDS	AFP	SP
	49.1%	22.2%	2.3%	1.0%	74.6%	60.3	48.0
After cooking	SUGARS	FATS	MSNF	OTHER SOLIDS	TOTAL SOLIDS	AFP	SP
	51.7%	23.3%	2.4%	1.0%	78.4%	63.5	50.5

WHITE BASE FOR SALTED CARAMEL

INGREDIENTS	g	%	per liter of milk
Whole milk	828.0	82.8	1030.0
Cream 35%	39.0	3.9	49.0
Dry Glucose Syrup 38 DE	67.0	6.7	83.0
Skim milk powder	59.0	5.9	73.0
Stabilizer C.H.	7.0	0.7	9.0
TOTAL	1000.0	100.0	1244.0

•Sugar	6.4%
•Fats	4.3%
•MSNF	13.3%
•A.S.	0.7%
•T.S.	24.7%
•AFP	10.2
•SP	2.7

SALTED CARAMEL GELATO

INGREDIENTS	g	%	Per kg of base
White base for salted caramel	700.0	70.0	1000.0
Salted caramel sauce	300.0	30.0	430.0
TOTAL	1000.0	100.0	1430.0

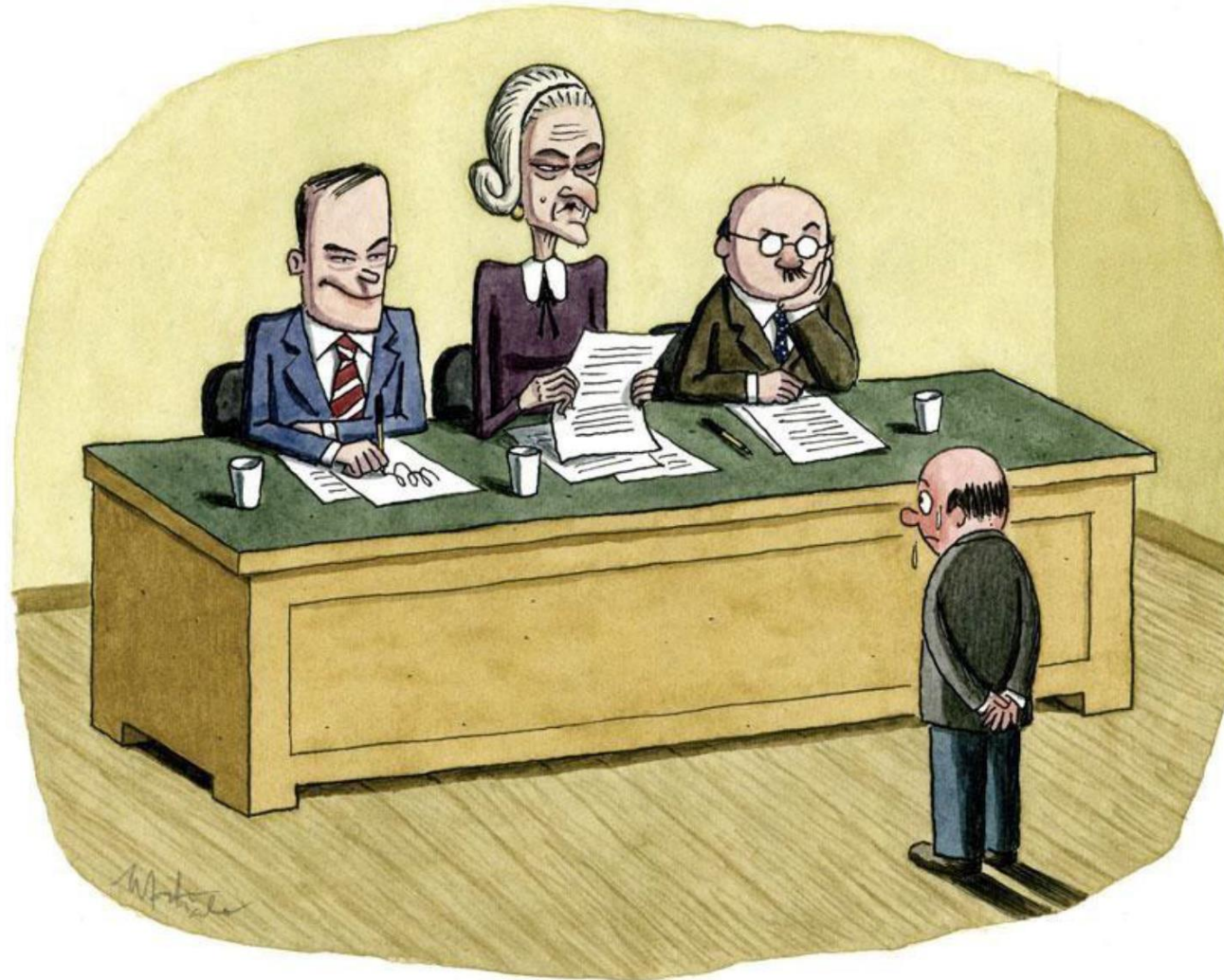
•Sugar	20.0%
•Fats	10.0%
•MSNF	10.0%
•O.S.	0.8%
•T.S.	40.8%
•AFP	26.2
•SP	17.0

Weekly Calendar



- **DAY 1**
 - Analysis of raw materials and their functionality – ingredient substitution – Inverse balancing
- **DAY 2**
 - Sugar classification – AFP - SP and their calculation – Characterization of the white base (transformation into a finished gelato) - Analytic compensation
- **DAY 3**
 - Fruit sorbets with stabilizer (neutral) – Fruit sorbets with 70% sugar syrup – Fruit sorbets with stabilized sugar syrup
- **DAY 4**
 - Yogurt – Yogurt Gelato – Frozen Yogurt– Poached fruit - Hot Infusions and extractions – Location, target customers and the importance of the Branding
- **DAY 5**
 - Cold Infusions and extractions - Analysis and calculation of recipes for International Flavors – Recap - Final exam

Final Exam



Course for becoming an Ice Cream Maker

3. Advanced gelato-making course



You will learn more about balancing and be able to manage gelato flavors which meet every changing market demands, such as dairy-free (D.F.) gelato and gelato with no added sugar (N.A.S.). You will create toppings and sauces, soft or crispy at negative temperatures, to accompany the gelato playing with texture contrasts. You'll learn more about chocolate, from the collection of beans to the making of a chocolate bar or gelato, and finally produce increasingly intriguing and innovative gelato such as gastronomic gelato and alcoholic gelato.



Daily Schedule



Day	
Day 1	– Summary of key balancing concepts and advanced balancing techniques – Gelato with no added sugar (N.A.S.)
Day 2	– Stabilizers and labeling of ingredients – Dairy-free (D.F.) gelato
Day 3	– Enriched gelato: types and applications – Explanation, formulation and production of ripples, sauces and variegations, inclusions and syrups
Day 4	– Chocolate: from the cocoa bean to chocolate gelato
Day 5	– Savory gelato and alcoholic gelato