

A close-up photograph of a dark chocolate tempering stone. A thick, glossy splash of melted chocolate is spread across the surface, with some drips extending towards the bottom left. A metal scraper tool with a black handle is positioned diagonally on the right side of the stone. The background is a dark, textured surface. The entire image is framed by a white circular border.

Useful Information

Everything you need to know about
tempering, cooling and storing chocolate



CHOCOLATE ACADEMY

In this brochure, we would like to provide answers to the following questions:

- How to store chocolate and why?
- How to melt chocolate?
- How to temper chocolate? What is tempering for?
- What is the ideal temperature for workshops, moulds and fillings?
- How to cool chocolate?
- How to store finished products?



we temper

How to store chocolate and why?

Chocolate is sensitive to humidity, odours and if in contact with air and light, oxidation. Chocolate should be protected against light and air and stored in a cool dry place, at a constant temperature between 12 and 20°C. Always ensure that the packaging used to store chocolate is properly closed.

How to melt chocolate?

- Chocolate should preferably be melted within a range of 40 to 45°C.
- Chocolate should not be placed in contact with a direct heat source.
- Chocolate should preferably be melted in a dry bain marie, a microwave or a heating cabinet in order to reach a temperature between 40 and 45°C. This is the ideal temperature for tempering (pre-crystallisation) to begin.

How to temper chocolate? What is tempering for?

The purpose of tempering chocolate is to pre-crystallise the cocoa butter in the chocolate, which is related to the working temperature of the chocolate. During tempering, with contraction, the cocoa butter in the chocolate changes into a stable crystalline form. It ensures the hardness, shrinking force and gloss of the finished product after it has cooled. If the chocolate is melted in the normal way (between 40 and 45°C) then left to cool to working temperature, the finished product will not be glossy.

There are three factors that are important during tempering. They are time, temperature and movement.

Each chocolate has a different ideal working temperature :

31°C approximately for dark chocolate	30°C for milk and ruby chocolate	29°C for white chocolate
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So how can you ensure perfect results?

By tempering the chocolate by one of the following methods detailed in this brochure.

Visit our brand websites:

www.cacao-barry.com
www.callebaut.com
www.carma.ch

There you will find further information about working with chocolate.

Tempering on a cool (marble or granite) work surface



step #1

Melt the chocolate to a temperature between 40 and 45°C in a bain-marie or melting pan.



step #2

Pour 2/3 of the melted chocolate onto the cool marble or granite surface.



step #3

Keep the chocolate moving by stirring continually with a palette and a chocolate scraper.



step #4

Continue to do so until the chocolate starts to thicken (when the temperature is 4 to 5 degrees lower than its working temperature): crystallisation takes place. You will see that 'peaks' are formed when the chocolate is falling from the palette knife.



step #5

Pour the pre-crystallised chocolate back into the one third left of chocolate in the melting tank.



step #6

Stir together to even the temperature.



step #7

Always test the chocolate by taking a sample, on a scraper or palette knife for example.
 If the chocolate is correctly tempered, it will harden evenly within 3 minutes at an ambient temperature of +/- 20°C.
 If the chocolate is too thick, reheat it until it becomes liquid again, but is still pre-crystallised. Your chocolate is now ready to work with.

“ There are three factors that are important during tempering. They are time, temperature and movement. ”



If the whole of the chocolate is poured onto the marble surface, it only needs to thicken slightly until its temperature is 1 to 2 degrees lower than its working temperature.

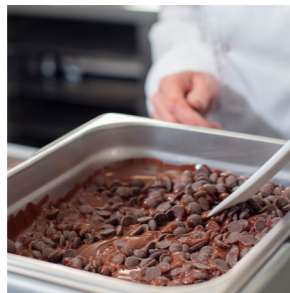
“ Pre-crystallisation is very easy if you add chocolate which has already been tempered to the melted chocolate. ”

Pre-crystallisation with Callets™



step #1

Melt the chocolate in a bain marie / chocolate melter set at 45°C.



step #2

Lower the thermostat (+/- 32°C for dark chocolate, +/- 30°C for white chocolate and milk chocolate) and immediately add 15 to 20% Callets™ at ambient temperature.



step #3

Stir the chocolate well to ensure the dispersion of the stable crystals within the Callets™.

Are the Callets™ melting too quickly? That is because the chocolate is still too hot.

Add more Callets™ and continue stirring.



step #4

In this way, you will obtain a slightly thickened chocolate, which is ready to work with.

Wheel-type tempering machine



step #1 and step #2

Melt the chocolate in the wheel tempering machine (setting the thermostat to 45°C) then lower the thermostat (+/- 32°C for dark chocolate, +/- 30°C for white and milk chocolate). Immediately add 15 to 20% Callets™ at ambient temperature.



step #3

The machine mixes the Callets™ into the melted chocolate, dispersing the stable crystals throughout the already melted chocolate.

Are the Callets™ melting too quickly?

That is because the chocolate is still too hot. Add more and continue stirring.



step #4

That's it!

The chocolate has thickened, but has remained even. When the chocolate reaches 33°C you still need some Callets™ dispersed in the chocolate because as this melts, they will crystallise your chocolate with the Beta 5 crystals. Your chocolate is ready to use.

Continuous tempering machine



step #1

Fill the machine with chocolate

step #2

Press Temper

step #3

Wait and then your chocolate is ready to use

If you need to temper quickly large quantities of chocolate, we recommend to use a continuous tempering machine. Those are usually stand alone machines or you can add an enrobing belt. The pump allowing a continuous chocolate flow also allows you to fill moulds very easily.



For more details we recommend to contact your machine supplier.

Callebaut® Callets™



The unique size makes them perfect for tempering, as they have already been tempered during manufacturing. The required quantity of Callets™ depends upon the temperature of the melted chocolate and the Callets™. When the melted chocolate reaches a temperature of approximately 40°C, you can add 15 to 20% Callets™ at ambient temperature (between 15 and 20°C).

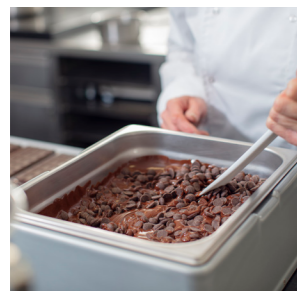
100%
natural ingredient

we temper

Mycryo®: Perfect for Pre-Crystallising Chocolate

Pre-crystallising or tempering chocolate is quick and easy with **Callebaut® Mycryo®**. It even allows you to use the pre-crystallised chocolate for longer because it slows down the overcrystallisation process.

Mycryo™ is a 100% natural ingredient made of pure cocoa butter in powder form. It presents a true revolution for tempering. Adding just about 1% **Mycryo™** to melted chocolate seeds the necessary stable crystals to create perfectly pre-crystallised chocolate conveniently. On top, the addition of the cocoa butter will give your chocolate more gloss and a harder crack.



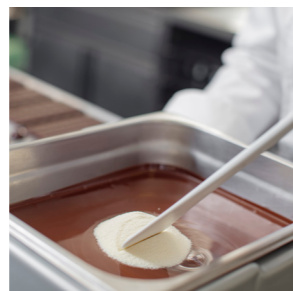
step #1

Melt the chocolate to 40-45°C (in the microwave or bain-marie).



step #2

Allow the chocolate to cool at room temperature to 34 - 35°C dark, 33 - 34°C for milk, white, ruby or coloured chocolate.



step #3

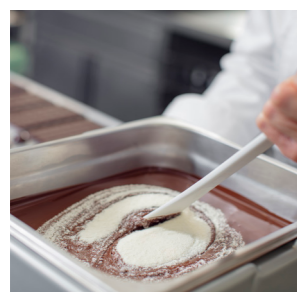
Add 1% of **cocoa butter Mycryo®**, or 10 g for 1 kg of chocolate.

Pre-crystallising or tempering chocolate is quick and easy

Cocoa butter will give your chocolate more gloss



Mycryo™
is a **100%**
natural ingredient



step #4

Mix well and cool each chocolate to their working temperature. 32°C dark, 30°C milk and ruby and 28°C white.



step #5

When the chocolate is perfectly precrystallised, it is ready to use.

Pre-Crystallisation in the microwave



step #1

Pour some **Callets™** into a plastic bowl.



step #2

Place the bowl into the microwave and melt the **Callets™** at 800-1000 W for 30 seconds.



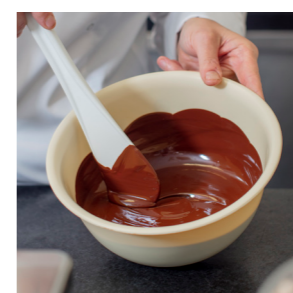
step #3

Take the **Callets™** out of the microwave every 15 to 20 seconds and stir well to ensure that the temperature of the **Callets™** is evenly distributed and that they do not burn.



step #4 and #5

Repeat this procedure until the chocolate has almost all melted. Some small pieces of **Callets™** should still be visible in the bowl.



step #6

Remove from the microwave and stir the chocolate well, until all the pieces of **Callets™** have melted and a slightly thickened chocolate has been obtained. This method is very quick and it is ideal when only a small amount of chocolate is required.

How to check pre-crystallisation?

To check pre-crystallisation, spread a tiny amount of chocolate on the tip of a palette knife or on a piece of paper. If the chocolate is properly tempered, it should harden evenly within 3 minutes at an ambient temperature of 18 to 20°C, and it should have a good shine. If it does not, restart the whole process. It is also wise to stir the chocolate regularly because crystallisation mostly takes place on the surface of the setting chocolate.



What to do if the chocolate becomes too thick?

After a certain amount of time, the tempered chocolate may start to thicken rapidly. This is called over-crystallisation which is caused by the multiplication of cocoa butter crystals. Overcrystallised means less shine on the finished product and does not shrink enough at the edges, making it difficult to remove from the mould. It also becomes more difficult to remove air bubbles. What can be done about this? One simple step: raise the temperature of the melted chocolate by adding more melted chocolate or reheat the chocolate slightly in the microwave. It's advisable to reheat the chocolate with small bursts of heat so that you can control the temperature and that the crystallized chocolate remains. It is also wise to stir the chocolate regularly because crystallisation mostly takes place on the surface of the setting chocolate.



Did you know?
The **ideal temperature** for storing chocolate is between **12 and 20°C**.

What is the ideal temperature for workshops, moulds and fillings?

Workshop Ideal temperature: +/- 20°C.

Fillings The temperature of the filling must be as near as possible to the temperature of the chocolate (where the type of filling permits). If the difference between the temperature of the filling and the temperature of the chocolate is too great, it will have a negative effect on the crystallisation of the cocoa butter and the finished product will have less gloss and will be less heat-resistant. The best result will be achieved with a filling of which the temperature is about 5°C lower than the temperature of the chocolate.

Mould The temperature must be as near as possible to the ambient temperature of the workshop (+/-20°C). Slight pre-heating of the mould is recommended. Ensure above all that the temperature of the mould does not exceed the temperature of the tempered chocolate. These precautions will help to give the finished product a perfect glossy appearance.

The following factors should of course be considered:

Storage time The following rule applies to chocolate products: short storage times ensure better quality products. Normal storage times for chocolate:

24 months dark chocolate	18 months milk chocolate	12 months white chocolate
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The FIFO (first in/first out) system of stock control is recommended. With this system, the products which have been in storage the longest are delivered first. In this way, no product remains in storage for too long, and optimum freshness is guaranteed.

Temperature The ideal temperature for storing chocolate is between 12 and 20°C. At higher temperatures, the chocolate becomes softer and its gloss is diminished. Lower storage temperatures are less hazardous. When the products are brought back to ambient temperature, condensation must be avoided, because humidity causes sugar bloom. Temperature variations are also not recommended, because they may accelerate the appearance of fat bloom.

How to cool chocolate?

The ideal temperature for cooling chocolate used for moulding work is between 10 and 12°C. Chocolate for coating work should preferably be cooled between 15 and 18°C. Temperature variations of more than 10°C should be avoided at all costs. During the cooling of moulding work, there should be plenty of cold air circulation due to a large quantity of heat that will need to be evacuated during the process of solidification of the chocolate. Coating work should preferably be cooled without ventilation. When the moulds are ready to be cooled, for good results, place them in a well ventilated area with temperature control, which is 10°C lower than the workshop. As a result, the solidification of the chocolate takes place. Then the moulds are placed in a refrigerator.



The chocolate will thicken and over crystallize whilst it is being worked with. This is caused by rapid multiplication of the cocoa butter crystals. It is possible to solve this problem by adding a little heated chocolate or by slightly increasing the temperature of the chocolate.

Sugar bloom

By comparison with fat bloom, sugar bloom consists of a rough and irregular layer on the surface of the chocolate. Sugar bloom is caused by condensation, e.g. when chocolate is taken out of the refrigerator and moisture forms upon it. The water from this condensation dissolves the sugar on the surface of the chocolate. Then when the water evaporates, the sugar remains on the surface of the chocolate in the form of large, irregular crystals. This gives the chocolate an unpleasant appearance. Sugar bloom can be prevented, if temperature variations when moving the chocolate from a cold place into a warm place are avoided (thus preventing condensation). Chocolate products leaving a cold room should be stored in a warmer room for a certain amount of time before opening the packaging. In this way, direct condensation can be avoided. It is therefore vitally important for chocolate products to be stored under ideal conditions so that they remain in their original condition for as long as possible, without developing any defects or decay.



How to store finished products?

Like chocolate that is used as a raw material, finished chocolate products are also sensitive to temperature, unpleasant odours and tastes, light and air, humidity and storage time. Typical problems which may occur during storage are as follows:

Fat bloom

This problem is caused by a thin layer of fat crystals on the surface of the chocolate. The chocolate loses its gloss and a soft white layer appears. This layer gives the chocolate an unpleasant appearance. This problem should not be mistaken for the formation of mould. The cause of fat bloom is the re-crystallisation of fat and/or the migration of fatty fillings into the layer of chocolate. Storage at a constant temperature delays the appearance of fat bloom.





The maximum relative humidity in the warehouse should be

70%

Storage area

Chocolate is very receptive to the absorption of unfamiliar odours. Consequently chocolate must be stored in an area which does not smell musty or unusual. Good ventilation of the warehouse is indispensable. Chocolate should never be stored between or near strongly smelling products (e.g. cheese, fish, meat, lemons, etc.). The packaging of chocolate products must be neutral, which means that it must not give off unfamiliar odours. Smoking should not be allowed near chocolate products.

Humidity

Chocolate must be protected against humidity. As a general principle, the maximum relative humidity in the warehouse should be 70%. Storage of chocolate products on floors or against walls should be strictly prohibited because this increases the risk of absorption of humidity.

Air and light

Air and light cause the fat in chocolate to disintegrate. This leads to a significant change in taste, appearance and unpleasant smell. This is caused by oxidation. It is therefore very important to protect chocolate as much as possible against air and light (including artificial light). Store chocolate in a closed packaging. Dark and milk chocolate naturally contain a number of anti-oxidants (substances which delay the oxidation process), but white chocolate does not contain such substances, and will therefore be more sensitive to oxidation. White chocolate therefore needs increased protection.

Vermin

Unfortunately, chocolate is not only a stimulant for humans. The smell of chocolate can attract all sorts of vermin. It is therefore vitally important to protect chocolate products against vermin (e.g. by setting mousetraps, destroying insects, etc.).

Possible problems and remedies

Problem	Example	Cause	Solution
Difficult to remove from mould		Poorly tempered couverture Cooling temperature too high Layer of couverture too thin, consistency too thin to remove from mould	See tempering See cooling Use less liquid couverture
White or grey coloration of the chocolate		Cooling of couverture too slow Poorly tempered couverture "Over-crystallised" chocolate	See cooling See tempering See tempering
The chocolate has many clearer spots on the surface		Contact with water	Ensuring the chocolate does not touch water and is stored in a dry place
Dull stains on moulded product		"Over-crystallised" chocolate Refrigerator too cold Moulds too cold Moulds not cleaned sufficiently	See thickening of the chocolate See temperature of refrigerator See temperature of moulds See cleaning of moulds
Holes in the moulded product		Excessive crystallisation of couverture Thickening of couverture whilst working	Increase the temperature Gradually add some couverture which is warmer. Do not add cocoa butter.
Couverture not glossy		Filling too cold Workshop or refrigerator too cold Couverture not at right temperature	See temperature of filling See temperature of workshop See tempering
Fingerprints on finished product		Product touched with wet or warm fingers	Do not touch the product with wet or warm fingers. If necessary, gloves should be worn.
Dirty moulds		Poorly tempered chocolate used Moulds not pre-heated	How to clean moulds? With warm water and a very mild detergent. Use a very soft cloth, a sponge or brush in order to avoid scratching the inside of the moulds. Rinse with warm water and remove remaining water with a dry cloth. See tempering See temperature of moulds