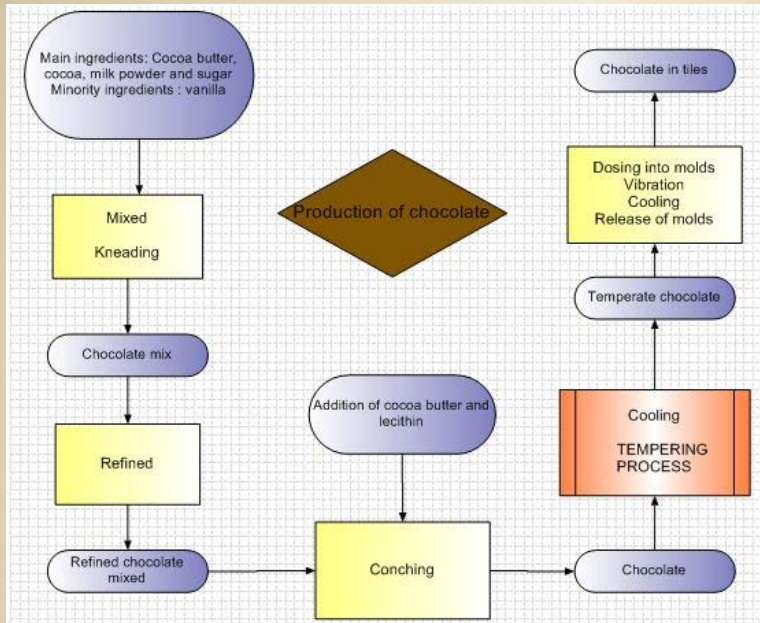


The chocolate tempering process

http://ca.wikipedia.org/wiki/Temperament_de_la_xocolata

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Tempering is a fundamental step in chocolate production

The target of tempering process is to obtain the expected features of a good chocolate. It must have a fine structure and a certain hardness to break properly (best snap), must be glossy and melt near body temperature

It controls cocoa butter crystallization

Cocoa butter can crystallize in six different forms: only polymorph V is desirable

Polymorph	Melting point
I (γ)	16-18°C
II (α)	22-24°C
III (β')	24-26°C
IV (β')	26-28°C
V (β)	32-34°C
VI (β)	34-36°C

Fat bloom:

main defect in chocolate confections, identified by a beige coating, due to the uncontrolled crystallization of cocoa butter

Steps in tempering process

- Temperature increase to ~44-45°C → melts cocoa butter completely
- Rapid cooling to ~27°C → onset of crystallization of different types of crystals
- Slight warming to ~32°C → removes crystals that are not type V

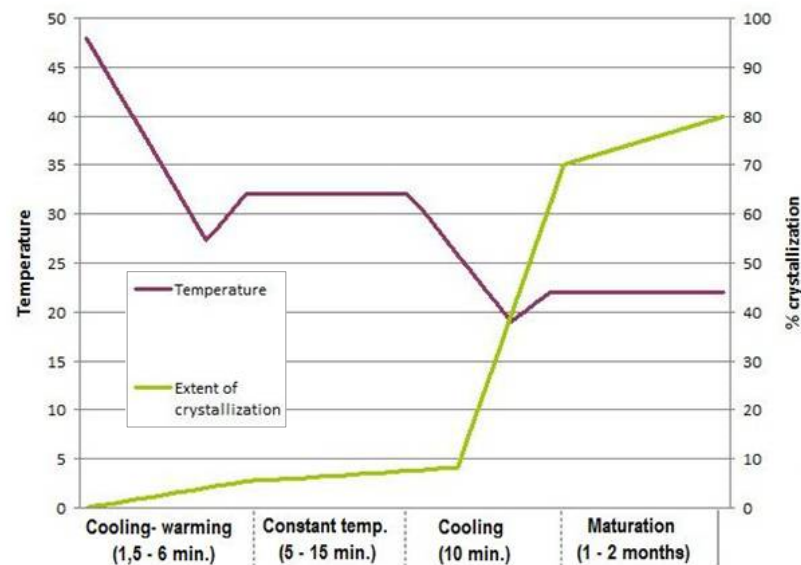
Continuous agitation is necessary in all steps

Industrial tempering → different types of tempering machines, companies keep industrial processes secret

Craft tempering → same heating-cooling steps than in industrial tempering

Tempering by seeding → increases speed

Evolution of the formation of crystals during the tempering of chocolate



New methods to temper chocolate

- Ultrasounds
- Pressure

Measurement of tempering

- X-ray diffraction
- Differential scanning calorimetry
- Temper meter: more simple and cheap, used in industry → measures the temperature profile of chocolate crystallization

Chocolate storage

Chocolate must be stored at room temperature, without fluctuations and, when possible, with controlled relative humidity.