



SNS COLLEGE OF TECHNOLOGY
COIMBATORE-35



19FTT304 BAKING AND CONFECTIONERY TECHNOLOGY

UNIT –IV

CARMEL AND TOFFEE PROCESS

Introduction

- Caramel & Toffee candies preparation needs different quantities of butter, sugar and cream.
- Toffees basically made from sugar and butter, cooked to high degree of temperature (300 degrees Fahrenheit) to which we then add nuts and chocolate after cooking. To make it crunchy and nutty candy.
- Caramel is generally made from sugar and cream or milk, with butter and cooked to 248 degrees Fahrenheit to form it chewy and flavorful. Caramel has no chocolate.
- Toffee and caramel are similar in color and flavor, but are different in two main ways—butter content and final cooking temperature.

❖ Structure of caramels

It is complex structure of highly concentrated sugar and emulsified fat. Also it contains milk protein. The caramel texture depends on the moisture content (6-20%), which may vary from semi-hard to hard. Milk ingredient has the major influence on the texture (1-4%). As the coagulated milk protein gives texture on cooking and it gives stand-up properties i.e. prevent cold flow. But at low end of moisture content range, protein is less important than total solids

❖ Structure of toffee

It is an amorphous glass like state of hard candy, which is basically made from fat emulsified into syrup. The higher fat content gives it a friable, crunchy texture. Toffees very often have nut or other inclusions added e.g. the almonds in English Toffee.

Major Raw Materials:

1) Sugar

Sucrose is the mainly used as sweetener and texture former. In fudge, sugar content must be high enough to allow crystallization. Some time it is partially replace with brown sugar or other sugar to added flavor in candies.

2) Invert sugar

It is hydrolyzed sucrose, which help in forming the tender texture and humectancy (5%). Invert sugar helps in controlling the crystal size in candies.

3) Corn syrup

Corn syrup, provides bulk, body texture to candies. It prevents crystallization in case of caramel and control the crystallization in case of fudge. Generally 42DE (Dextrose equivalent) high fructose corn sugar is most often used in confectionery. The lower dextrose equivalent sugar used then it make the product tough, chewy texture and high dextrose equivalent sugar used then it makes sticky and lack of textured product. High Fructose corn syrup (42%) is very similar to invert sugar in composition, can be used as a 1:1 replacement.

4) Milk

It is the major ingredient of caramel production, as milk protein reacts with reducing sugar in maillard reaction a major factor in developing a typical caramel flavour and colour. The milk generally used for flavour and texture improvement. The caramel generally contain 1-4% of milk protein. Milk protein is generally composed of casein (80%) and remaining (20%) whey protein.

5) Milk products

- Fresh milk: it contains 13% solid and rarely used due to high moisture content.
- Sweetened condensed whole milk: It is mostly used and consist of 27% water, 44.3% added sugar, 8.1% protein, 8.7% milk fat, 11.4% lactose.
- Sweetened condensed skim milk: It contains 28% water, 42% added sugar, 10% protein, 0.3% milkfat, 16.3% lactose.
- Condensed milk, evaporated milk: it is concentrated solid product contains 33% solid. It is generally consisting of 9% protein, 9% fat, and 1.4%

lactose. Also it is available in fat free form. Condensed milk generally sold in truckloads for large scale operation and evaporated milk sold in can. Evaporated milk is a favorite in retail candy kitchens, gives a rich creamy flavor, must be added slowly to boiling batch to avoid curdling.

- Milk powder: It is dried milk powder (skim milk or whole milk), generally used in caramel and fudge. Reconstitution of milk powder needs careful attention. It requires 24 holding period after premixing to ensure maximum hydration. Milk powder use may form the rough texture and inferior flavor. Milk powder can be prepared by using spray drying, roller drier.
- Whey powder and protein concentrate: It contains protein 12.9% Lactose 73.5% Ash 8.0%. it is used as partial replacement of milk in caramel and fudge. But it can produce the inferior quality of product due to poor flavor, lack of body as protein contain no casein. The higher lactose content leads to excessive color development and also form rough texture if crystallization in finished product. Milk protein concentrate contains lower lactose level.

6) Fat

It provides a “creamy” mouth feel, influences the firmness, and provide lubricity to prevent sticking to equipment during production and teeth during consumption. In fudge, caramel, and toffee, it mainly contributed to flavor and texture. It is generally added as part of milk ingredients as dairy butter or as anhydrous milk fat. Other fats are also used in the formulation of candies such as soybeans, palm kernel, palm, coconut and cottonseed. Vegetable fat do not contribute to the flavour of the product. The fat should have melting point in between the range 32-42 °C to be used in the product to avoid a waxy mouthfeel on consumption. hard fat contributes to the texture of caramel.

7) Emulsifier

The substance when added to enhance the emulsification. Milk contains a natural emulsifier. Soya lecithin (0.25%) is the most commonly used emulsifier in food. Mono-glycerides and/or Di-glycerides (1-2%) are sometimes used as emulsifiers, they also help to improve lubricity and are useful in low-fat content formula.

8) Starch protein gum gelling agent

It is generally added to provide body to low protein food. In caramel, egg whites, soy proteins, wheat flour, gelatin and alginates are some time used.

9) Salt

It enhances flavor to other raw materials. It is used at 0.25-1%. For pH adjusting, in caramel or fudge as pre-mix should have neutral pH. The low pH cause curdling of milk and granular texture. Sodium bicarbonate is generally used ~0.3% per batch.

10) Flavour

Vanilla extracts, Vanillin or other synthetic flavors are generally added to caramel and fudge recipes. Other some natural and artificial flavor are added such as Licorice, Peppermint, Raspberry.

❖ Caramel and Toffee Processing

It is done by using a simple technique, by using an open kettle which is heated by steam and gas. The kettle should be made from copper or stainless steel and fitted with scrapers to prevent scorching caused by milk protein burning on the sides of the kettle. Copper metal provides the best heat transfer and stainless steel provides better sanitation. But the major disadvantage of use of copper is, causes the oxidation of less stable fat and reduces shelf life.

The five basic unit operation is done during the caramel/ Toffee processing

1) Pre-Mixing

The sugar, corn syrups, condensed milk, fats, emulsifiers and salt are required in caramel preparation. But sometime water may be added depends on the requirement. all the ingredients are blended and heated enough to melt sugar and fat. The heating temperature should be near to melting point of fat/ emulsifier + 10°F. the premixing is generally done at 70-72 °C.

2) Emulsification

It is an important step in caramel preparation, to prevent phase separation as well as flavors development. It is done by using high shear homogenization, ultrasonication. The emulsification process is generally done between the pre-mixing and cooking process (160-180°F /10-20 min).

3) Cooking / Caramelization

Caramelization is an important process to develop the colour and flavour during cooking at 248°F (120°C). It is generally based on cooking time and temperature. Cooking process is done after emulsification with constant scraping to final temperature required to give the final moisture content 6-7%. This processing generally takes 20 min to complete the cooking. While toffee is cooked to 300°F (150°C), to make it crunchy.

4) Cooling

In case of batch processing, it is generally poured out onto a water-cooled table and tempered with occasional folding to the desired plasticity. While in case of continuous process, is usually passed over a water-cooled wheel for lowering the temperature.

5) Forming

The forming is depending on the product being made. It can be done by various machineries such as batch roller / cut & wrap, extruder, depositor (not pre-cooled), bar former.

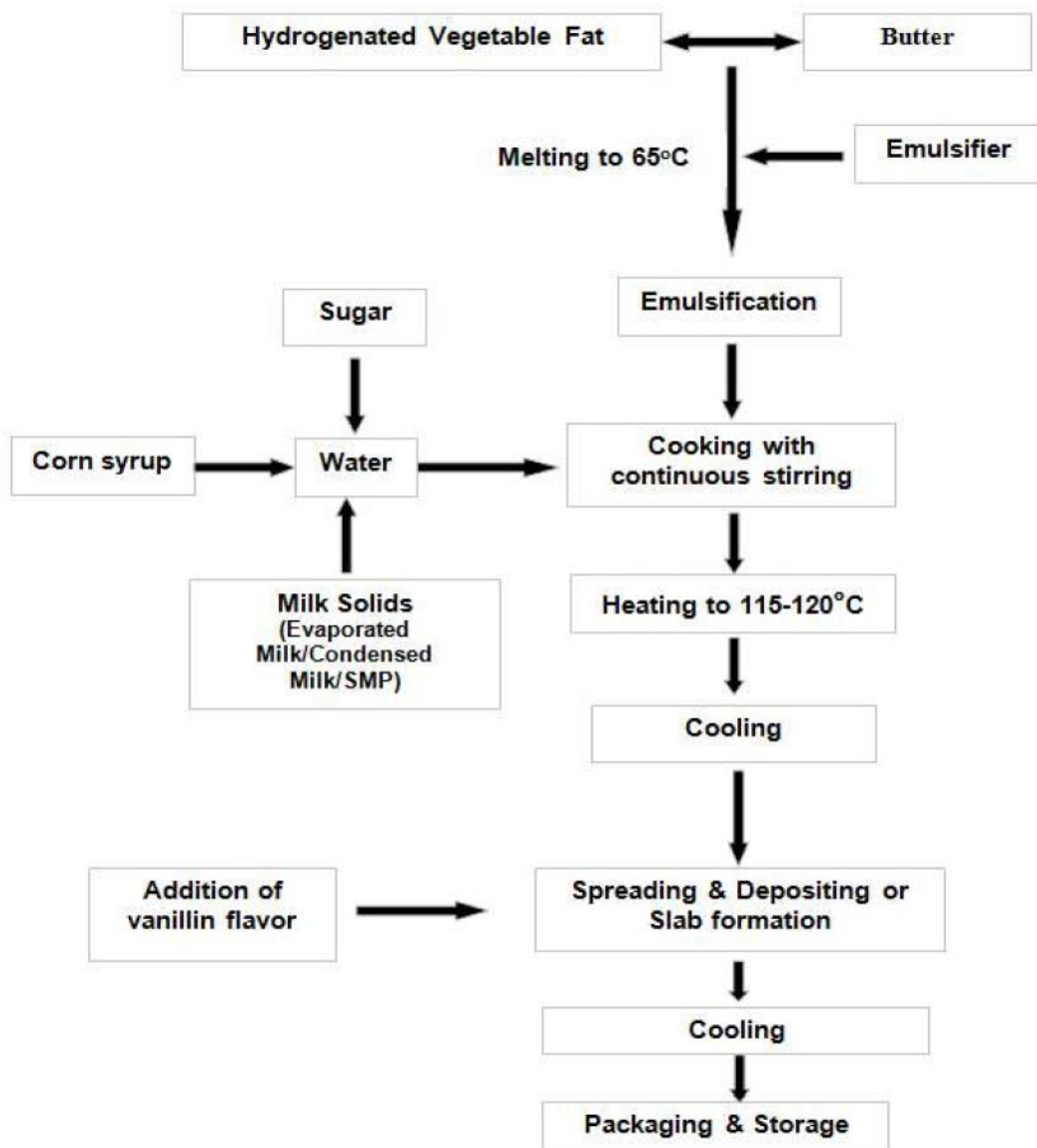


Figure. Caramel processing

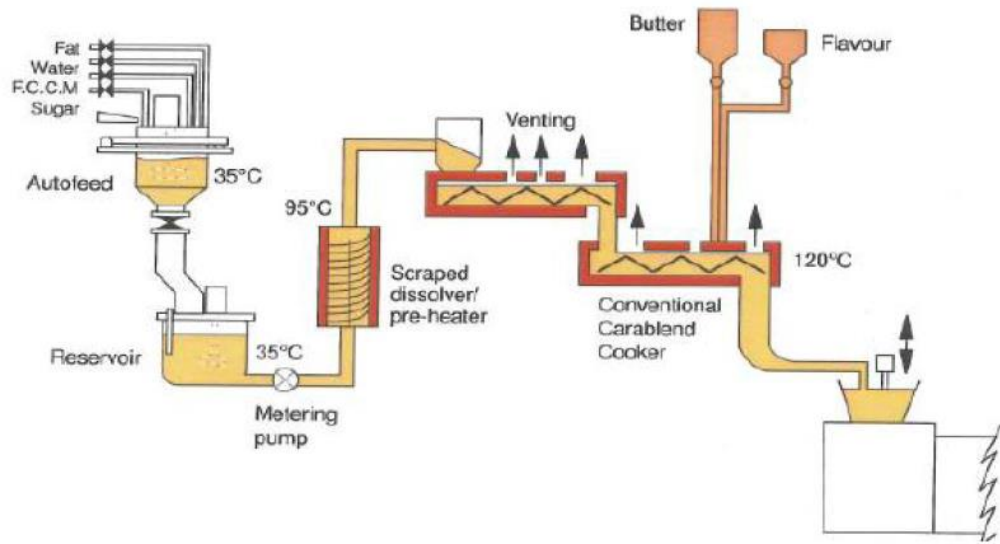


Figure. Caramel processing

Fig. Toffee processing