



# Processed cheese, cheese spread and processed cheese foods



- 1. Processed cheese** is a product made by blending natural cheese of different ages in required proportion with emulsifying salts followed by heating and continuous mixing to form homogenous mass.
- 2. Increased shelf-life.**
- 3. Sub-graded cheeses like gassy, highly acidic etc. to be utilized, instead of getting wasted.**

**Product obtained by grinding, mixing, melting and emulsifying one or more varieties of cheeses with aid of heat and emulsifying agents.**



# Characteristics of Processed Cheese

May contain cream, butter, butter oil and other milk products subject to maximum 5% lactose content in final product and edible common salt, vinegar/acetic acid, spices, vegetable seasoning and foods other than sugars properly cooked or prepared for flavoring of product (additions do not exceed one sixth of weight of total solids of final product on dry matter basis and cultures of harmless bacteria and enzymes).

Shall have pleasant taste and smell free from off flavor and rancidity.

May contain food additives permitted in the regulation and conform to the microbiological requirements prescribed in regulation.

Shall have moisture not >47% and milk fat not <40% on dry matter basis.

## Processed Cheese Spread

**Product obtained by grinding, mixing, melting and emulsifying one or more varieties of cheese with emulsifying agents with the aid of heat.**



# Characteristics of Processed Cheese Spread

May contain cream, butter oil and other dairy products, subject to maximum limit of 5.0 % lactose in the final product, salt, vinegar, spices, condiments and seasonings, natural carbohydrate sweetening agents (sucrose, dextrose, corn syrup, corn syrup solids, honey, maltose, malt syrup and hydrolysed lactose) and food properly cooked or otherwise prepared for flavoring and characterization of product (additions do not exceed one sixth of the weight of total solids of final product on dry weight basis and cultures of harmless bacteria and enzymes).

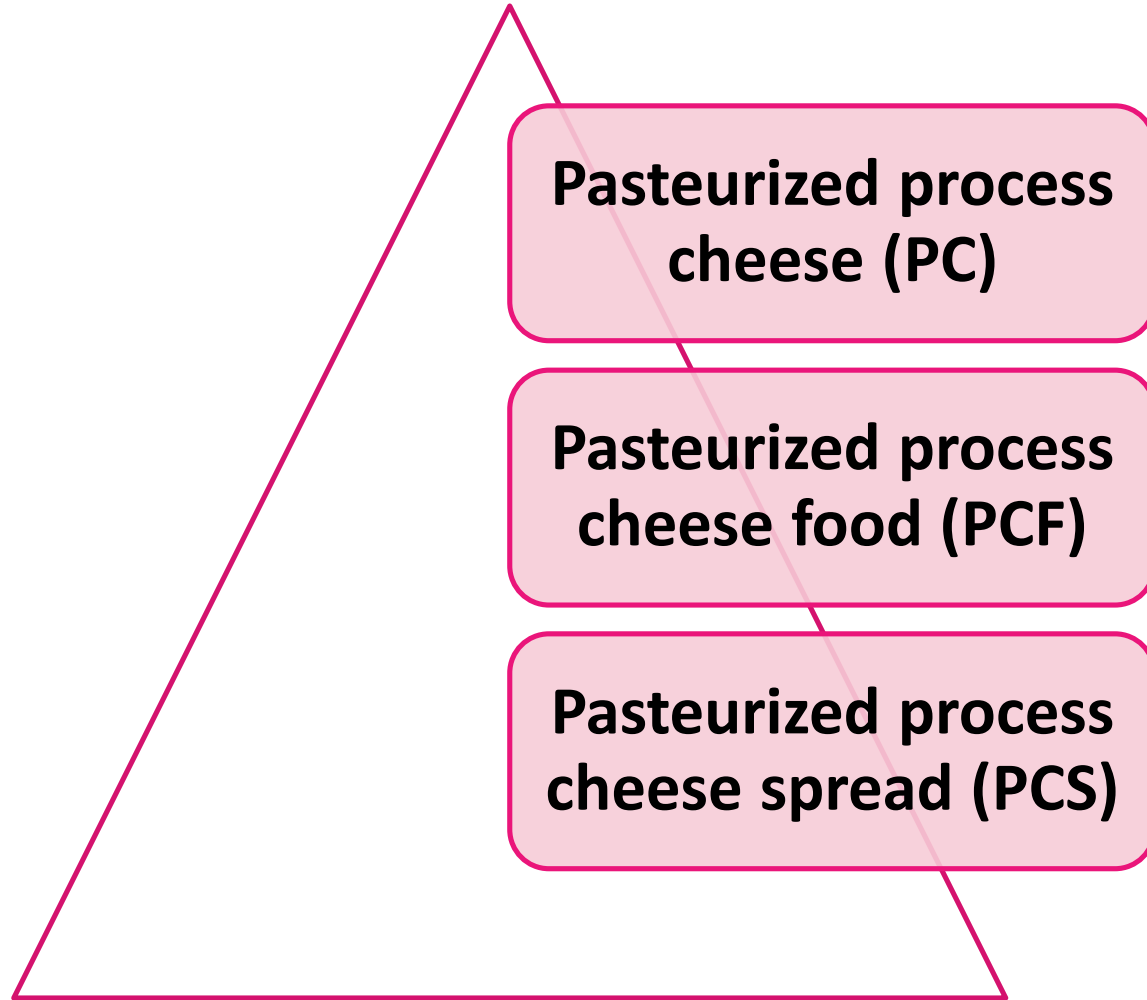
Shall have pleasant taste and flavor free from off flavor and rancidity.

May contain permitted food additives and shall conform to microbiological requirements as prescribed in the regulation.

Shall have moisture not > 60% and milk fat not <40% on dry matter basis.

# Classification of Processed Cheese Products

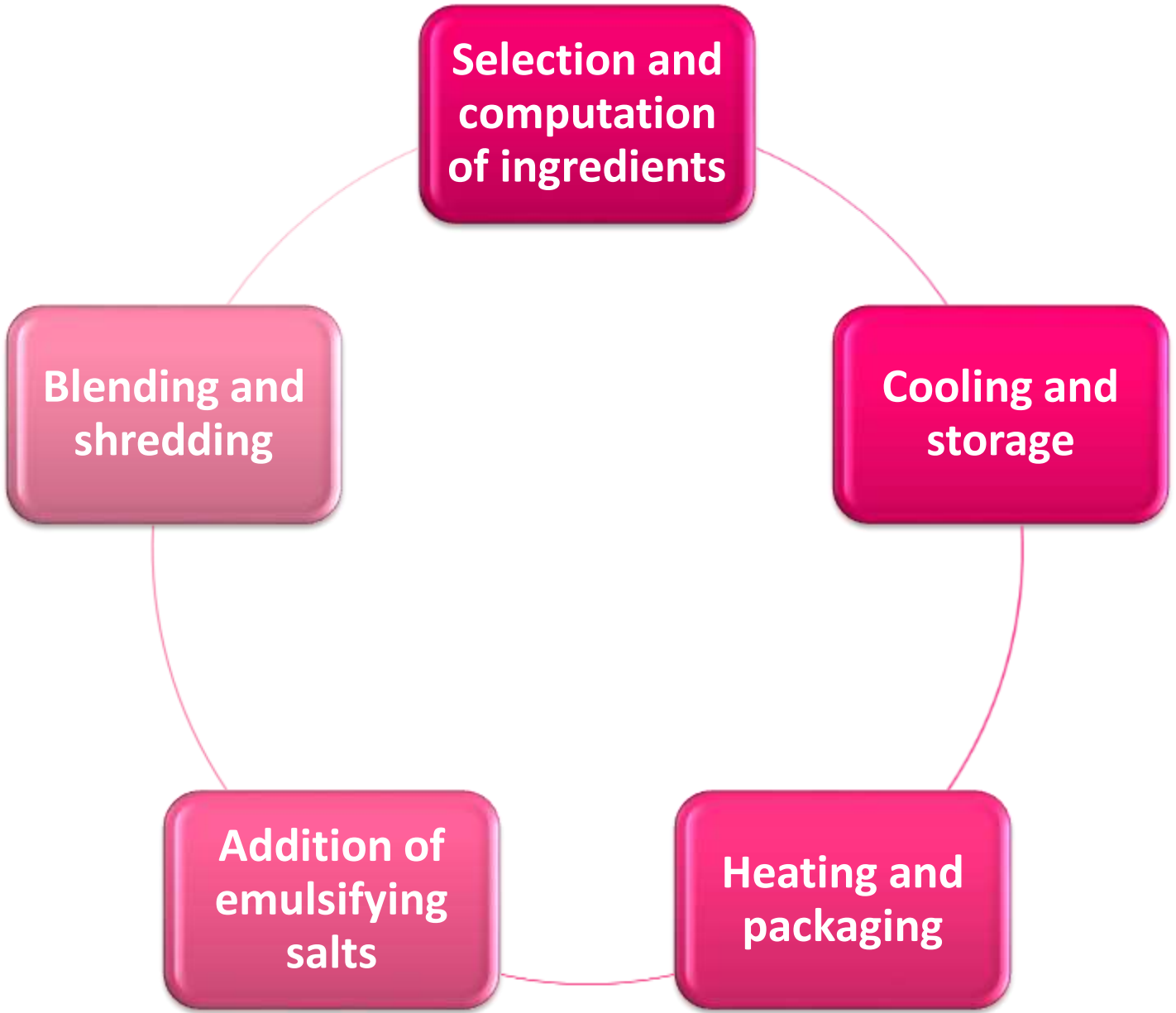
As per Code of Federal Regulations (CFR), USA



## Categories of cheese and their specifications

Type of Cheese	Ingredients	Moisture (%)		Fat (%)	
		CFR	FSSR	CFR (% w/w)	FSSR (% FDM)
Process Cheese	Cheese, Emulsifying agents, Acidifying agents, Cream, Anhydrous milk fat, dehydrated cream Water, salt, color, spices or flavorings, Enzymatically modified cheese	≤ 40	≤ 47	≥ 30	≥ 40
Process Cheese Food	Cheese and other ingredients allowed in process cheese in addition to milk, skim milk, buttermilk and cheese whey	≤ 44	---	≥ 23	--
Process cheese spread	All the ingredients allowed in process cheese food in addition to food grade hydrocolloids, sweetening agents and nisin	44-60	≤ 60	≥ 20	≥ 40

# Preparation of Process Cheese:





# **1. Selection and computation of ingredients:**

- i) Involves selection of type of cheese and various ages of cheese, emulsifying salts and water to give process cheese the desired composition, textural and functional properties.**
- ii) Major constituent is cheese. Types of cheese, degree of maturity and blend selected for processed cheese have major influence on textural attributes of final product. Can be made from only one or several types of cheeses.**
- iii) Blend of cheese having varying degree of maturity is selected on basis of required flavor and texture in finished product. General formulation of processed cheese is 70-75% mild cheese and 25-30% medium aged or mature cheese. For producing processed cheese in slices, Kosikowski had suggested a blend composition of 55% young, 35% medium aged and 10% aged cheese in order to obtain optimum firmness and slicing qualities.**

- iv. Use of higher proportion of young cheese results in lesser raw material cost, formation of stable emulsion with high water binding properties, firm body and good slicing properties. Sometimes it may also result in product having mild taste, excessive swelling and tendency to harden during storage.**
- v. High content of mature cheese have advantages of full flavor development and flow properties. Disadvantages may be harsh flavor, low emulsion stability and soft consistency.**
- vi. After selecting all ingredients, quantity of ingredients is calculated on basis of fat and dry matter content of natural cheese components.**

## **2. Shredding and mixing**

- i) After calculating quantities of all the ingredients, all types of cheese are shredded and either pre-mixed with other ingredients or mixed in process cheese cooker before processing.**
- ii) Pre mixing of cheese with other ingredients offers some advantages like physico-chemical changes at lower temperature prior to cooking which results in more uniform quality in the end product.**
- iii) Since cheese of different ages is used in manufacturing process cheese, there may be batch to batch variation in the hydration time of cheese and free fat emulsification.**
- iv) Pre -mixing evens out the effects of differences in processability of cheese of varying age on consistency of the final product.**

### **3. Processing the blend**

- i) Following pre-mixing, blend is discharged into cooker, where it is processed.**
- ii) When pre mixing is not practiced, ingredients are added directly to cooker. Ingredients are added in order of ground cheese, a dry blend of emulsifier and other dry optional ingredients, water and flavors.**
- iii) Emulsifying salt may also be added with portion of water at start of cooking process.**
- iv) Remaining water may be added later in the processing stage. This is practiced especially where cooking time is relatively short.**
- v) Flavors may be added later to minimize loss of volatile flavor compounds.**

- vi. Processing refers to heat treatment of blend by direct or indirect steam with constant agitation.**
- vii. Main functions of processing are killing of pathogenic and spoilage microorganisms to extend shelf-life of product and induce physicochemical and microstructural changes which transform blend to an end product with desired characteristics and physico-chemical stability.**
- viii. Processing may be carried out in batch or continuous cookers. Time-temperature combination of processing varies depending on formulation, extent of agitation and desired characteristics in finished product.**

**Batch Processing- 70-95 C for 4 -15 min**

**Continuous Method-140 C for 5-20 s**

- ix. In continuous method, after giving required heat treatment, it is essential to hold product at around 70-90 C for 4-15 mins for interaction of different ingredients and for desired physico-chemical changes to occur.**
- x. Processing may also be performed continuously using extrusion cookers at temperature (70-90 C).**
- xi. Extrusion cooking gives high degree of protein hydration and rapid emulsification.**

#### **4. Homogenization**

- i) Processed hot mass may be homogenized in two stage homogenizer at pressures of 15 and 5 MPa, respectively.**
- ii) It improves the stability of fat emulsion, consistency, structure, appearance and flavor of processed cheese.**

#### **5. Hot packing and cooling**

- i. Hot processed cheese blend can be transported to packaging machines directly from cooker or a buffer tank can also be installed in between.**
- ii. Processed cheese is usually packed and wrapped in lacquered foil, tubes, cups, cans and cardboard cartons.**

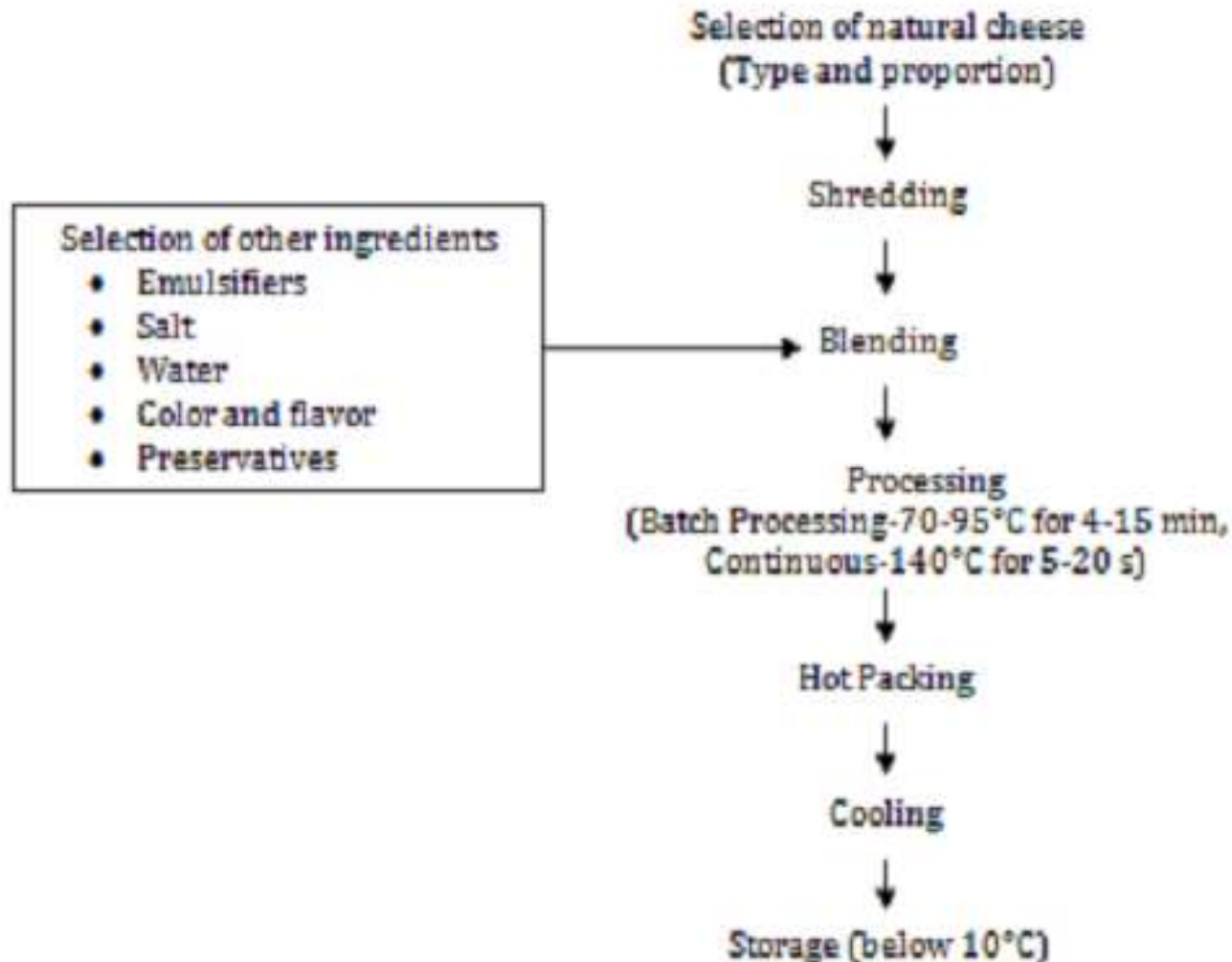
- iii. May also be packed in form of slices wherein, the hot molten cheese is pumped continuously into an endless 'tube' of plastic film, e.g. saran-coated polyester, which is automatically flattened and crimped into chain of individual wrapped slices using crimping conveyors and rotating crimping heads.**
- iv. Chain of slices is then passed through water-cooling tank and cooled to  $<10^{\circ}\text{C}$ , dried by removing water using fans and/or scrapers and finally cut into individual slices which are stacked and packed.**



- v. Body of finished product may vary from firm and sliceable to semi-soft and spreadable, depending on blend formulation, processing conditions and cooling rate.**
- vi. Product that is cooled slowly develops firmer body as compared to product that is cooled faster. Thus, process cheese should be cooled as slow as possible and in process cheese spread; fast cooling is required.**

## 6. Storage

- i) Finished product is stored at less than 10 C.
- ii) Should not be stored under frozen conditions as low temperature may induce crystal formation.



# **Cheese Powder**

- i) Cheese is dried to prolong keeping quality and reduce weight and bulk.**
- ii) Cheese powders are used as functional and natural flavor ingredients in wide range of food/culinary applications including biscuits, savory, snacks, soups, bakery, sauces, dressings, ready meals and processed cheese.**
- iii) Hard cheeses (Parmesan and Cheddar) can be transformed into powder.**
- iv) Methods of dehydrating cheese (direct tray drying, roller/spray drying, extrusion drying and freeze drying).**

## v. Technological process of dried cheese production

- ✓ Cheese is first ground, and stirred with intensive agitation while adding water at 27-32°C to achieve dry matter concentration optimal for spray drying (35 -45%).
- ✓ At this stage, melting salts, comprising sodium citrate, disodium phosphates or polyphosphates are added to prevent milk fat separation.
- ✓ Well-mixed mass is pasteurized, heated to 60°C and homogenized.
- ✓ It is spray dried at 175°C inlet air temperature and immediately cooled to 29-32°C, then sifted and packed in bags.
- ✓ Packaging in atmosphere of inert gas and addition of antioxidants can extend the shelf life of dry cheese.

