



PROCESSING OF SOYA MILK



AATMANIRBHAR BHARAT

PM Formalisation of Micro Food Processing Enterprises Scheme (PM FME Scheme)



SOYA MILK

- Most inexpensive source of high-quality nutritive protein.
- Obtained by extraction of ground soybeans and forms a colloidal solution
- Consumption of 25 g soya protein per day- May reduce cardiovascular disease risk.
- Second most important and widely consumed plant-based beverage next to almond milk during 2019



COMPOSITION OF SOYA MILK

Components	Content / 100 g
Water	90-91
Protein	3-3.5
Ash	0.5
Carbohydrates	2.75-3.0
Fat	2-2.25
Calcium (mg)	15-17
Phosphorous (mg)	46-49
Sodium (mg)	1.5-2.5
Iron (mg)	1-2.5
Thiamine (B1) (mg)	0.01-0.03
Riboflavin (B2) (mg)	0.02-0.06
Niacin (mg)	0.4-0.7
Saturated fatty acids (%)	40-48
Unsaturated fatty acids (%)	52-60
Cholesterol (mg)	0



- Possess higher amount of proteins, unsaturated fatty acids, iron and vitamin B1
- Lactose free- Can be consumed by lactose intolerant infants and adults
- A refreshment beverage in addition to its highly nutritive value
- Cholesterol free and rich source of phytochemicals
- Soya milk is also used for the preparation of various other foods including tofu, the most popular soya food



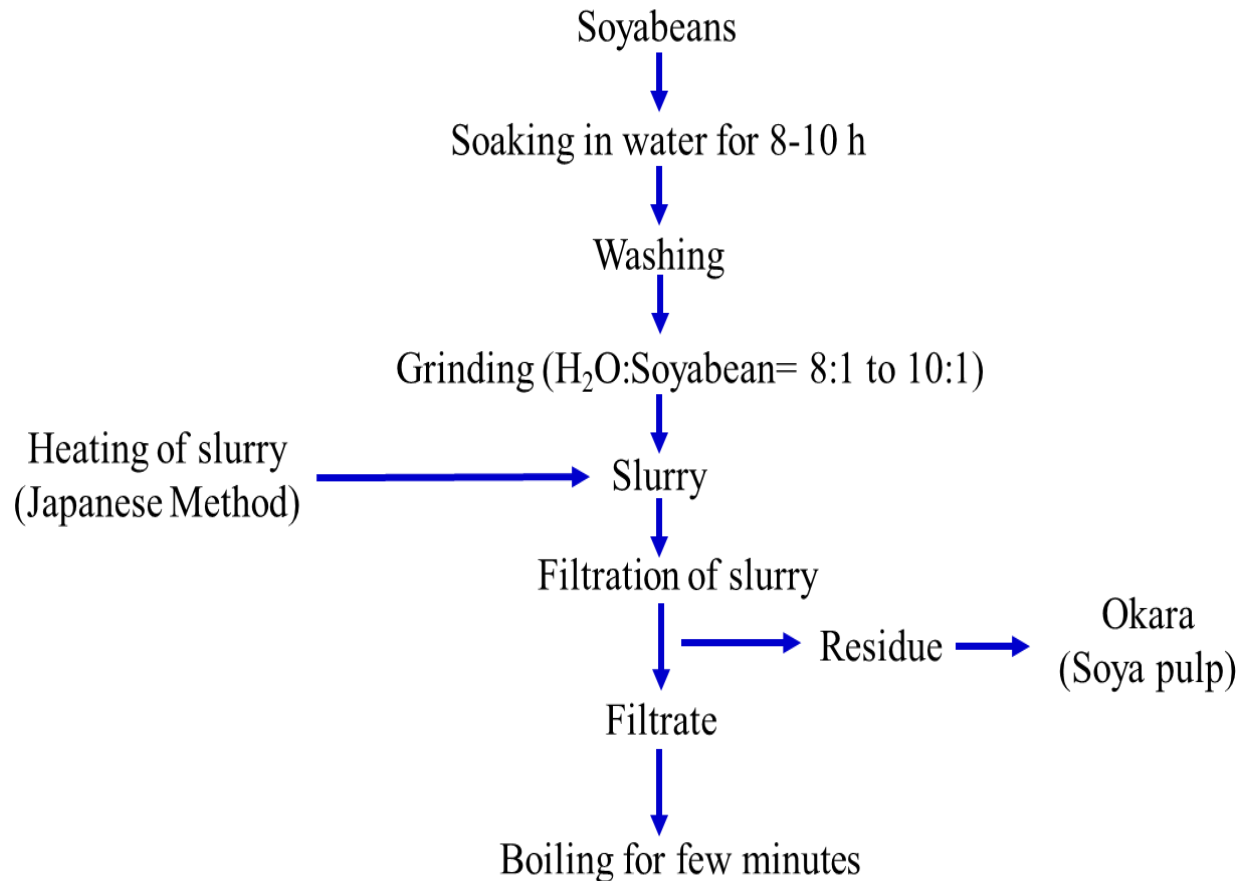
BASIC STEPS AND PRINCIPLES

1. Selection of good quality raw material,
2. Mixing of raw material with water,
3. Grinding of the mix
4. Extraction of soya milk.
5. Heat treatment,
6. Formulation and fortification of soya milk
7. Packaging



TRADITIONAL METHOD

Traditional Method





TRADITIONAL METHOD

Advantages

1. Simple and reproducible method
2. Can be operated at house or small-scale level.
3. Doesn't require any sophisticated or expensive equipment

Disadvantages

1. Cannot be operated at large scale or industrial scale
2. Machine pressing is necessary in case of Japanese method
3. Less energy efficient
4. Low production yields

- These methods are still prevalent and used in many parts of the Eastern world

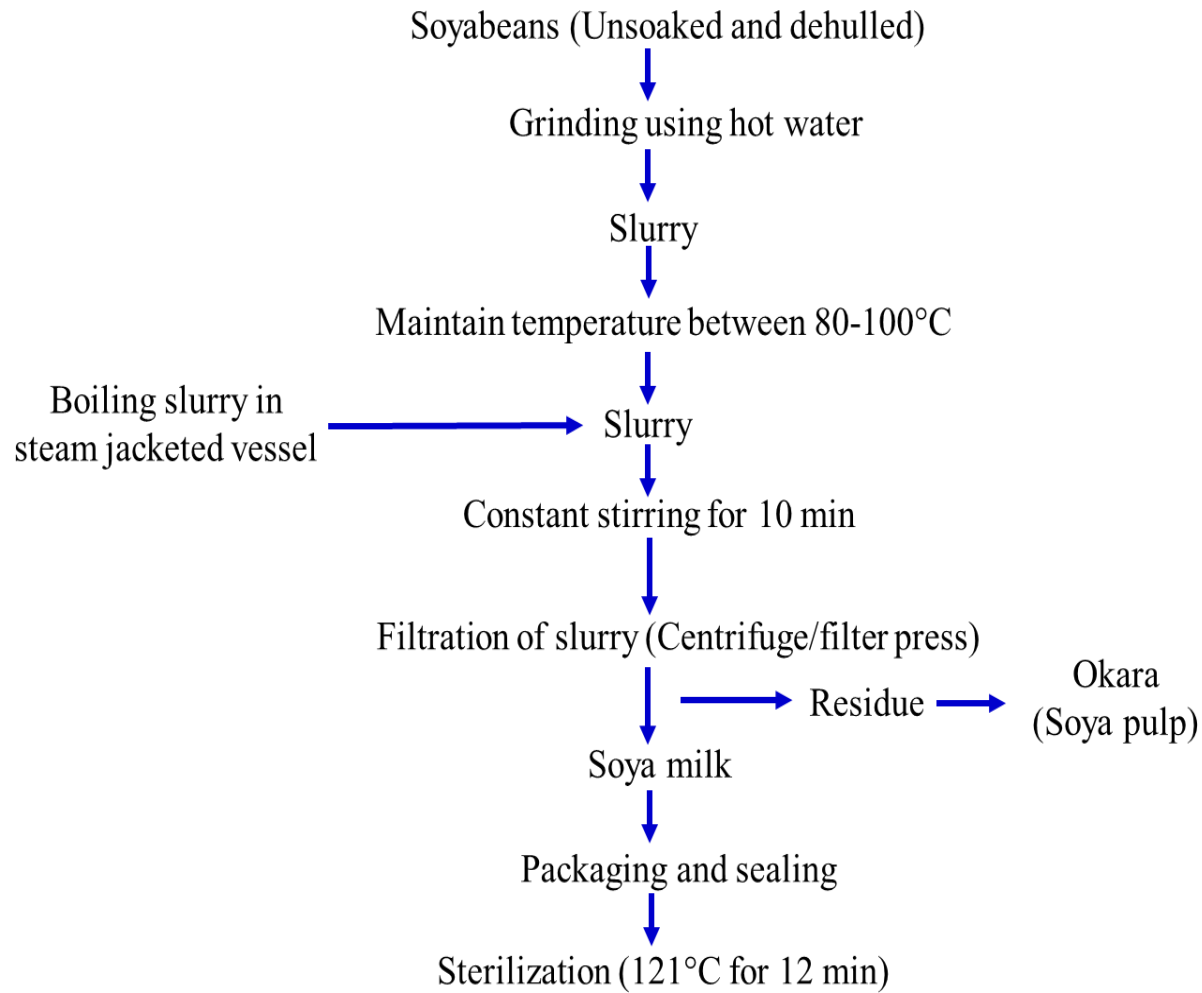


1. Cornell method- Also known as hot grind method
2. Illinois method - Also known as Pre-blanch method
3. Rapid hydration hydrothermal cooking
4. Utilization of defatted soya material – Direct use and Solvent extraction method
5. Commercial methods
6. Novel approaches



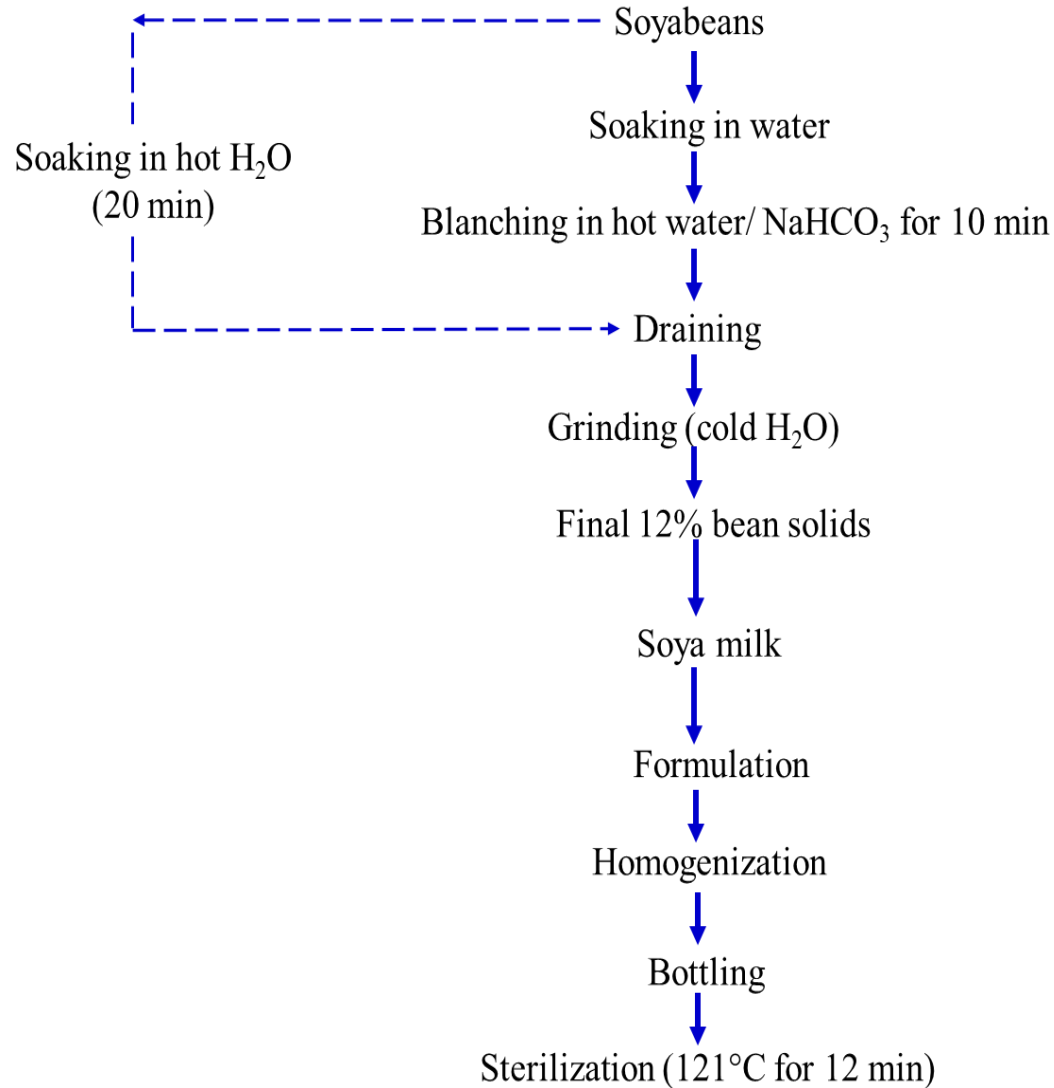
CORNELL METHOD/HOT-GRIND METHOD

Cornell Method/ Hot-grind Method





ILLINOIS METHOD





Advantages

1. Production of soya milk with bland taste and flavor
2. 100% recovery of solids and protein

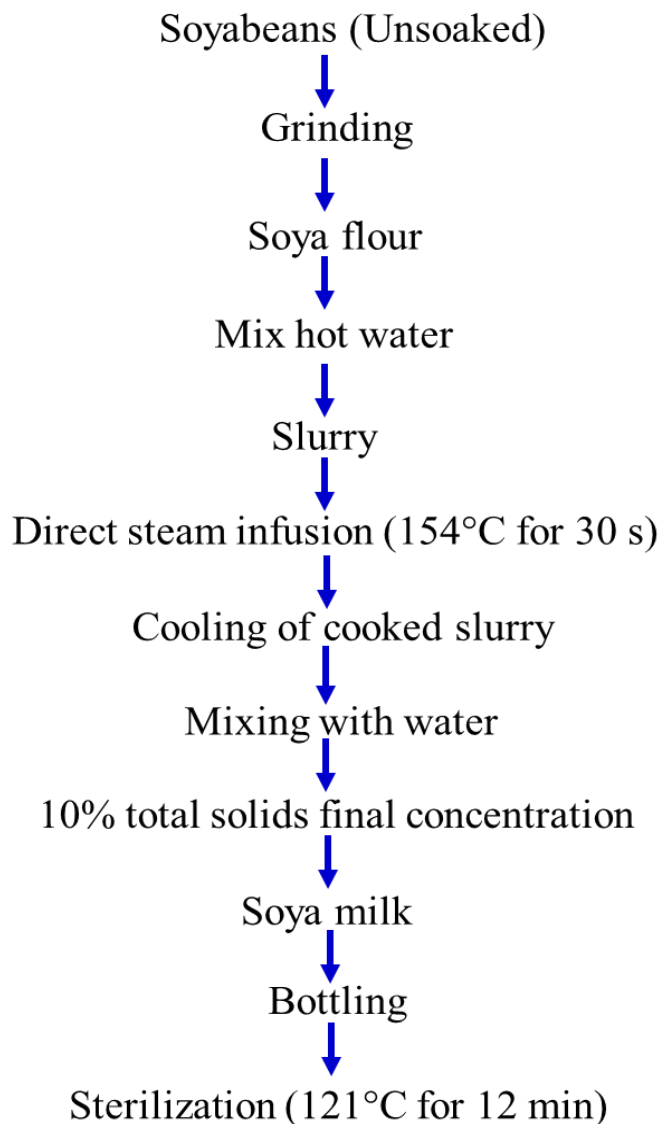
Disadvantages

1. Chalkiness mouthfeel while consuming soya milk.

- This method was mainly focused on eliminating the soya bean flavor
- Controls the enzyme action completely
- Illinois method is considered to be 'Greatest Milestone in Soya Milk research'

RAPID HYDRATION HYDROTHERMAL COOKING METHOD

Rapid hydration hydrothermal cooking method





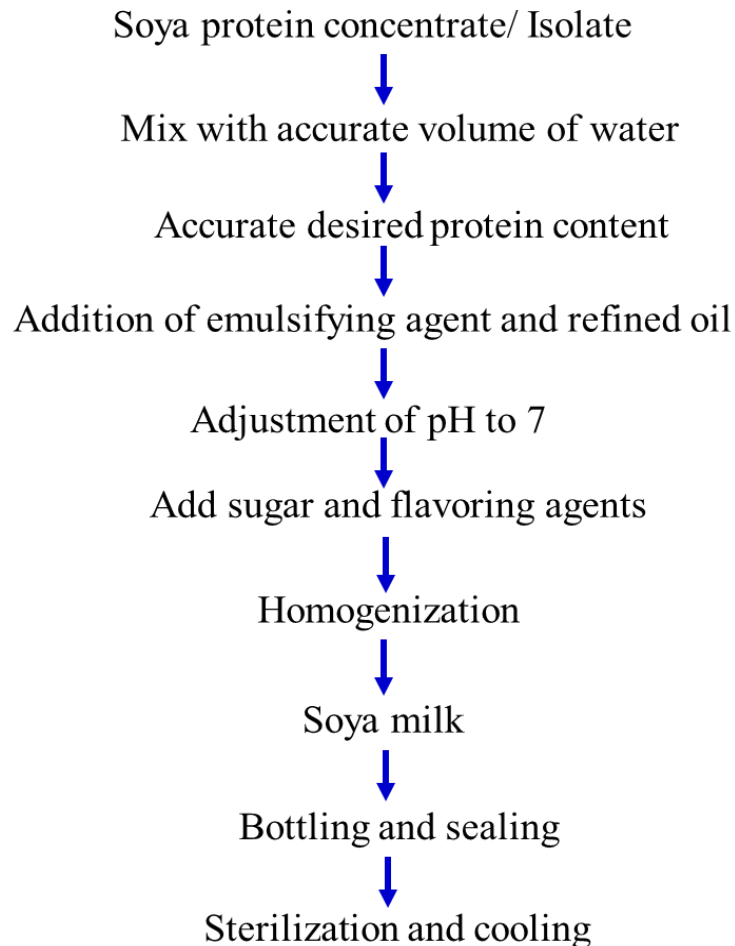
ADVANTAGES OF RAPID HYDRATION HYDROTHERMAL COOKING

- Method was developed by Johnson and co-workers in 1981
- Bland flavor and aroma of soya milk
- Higher recovery of proteins and solids

SOYA MILK PREPARATION USING DEFATTED SOYA MATERIAL

Soya milk preparation using defatted soya material

I. Direct use





ADVANTAGES OF SOYA PROTEIN ISOLATES AS RAW MATERIALS

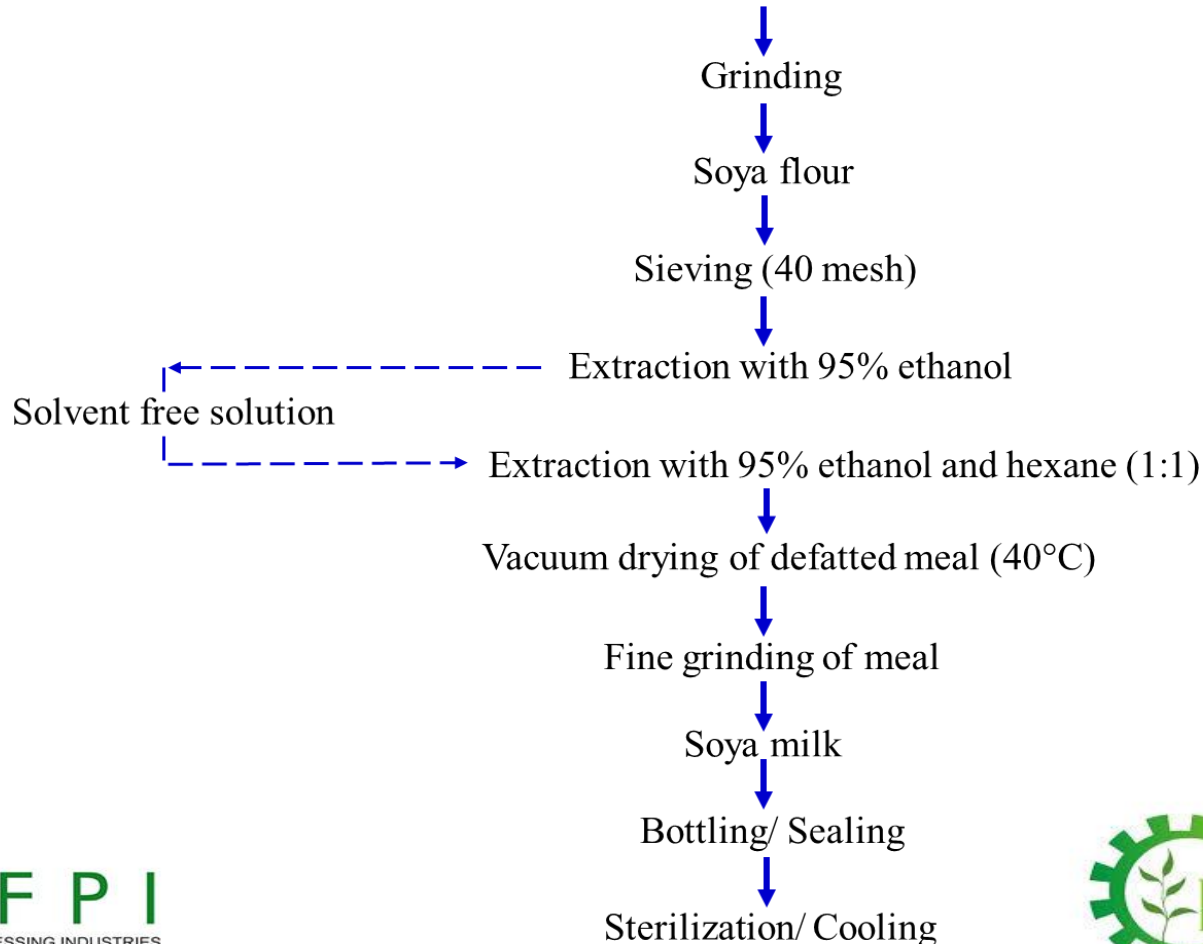
- Lesser requirement of processing equipment
- Lesser requirement of space
- Shorter production time
- Okara is not obtained, thus no disposal problem
- Soya milk contains bland taste
- Lower content of oligosaccharides with no beany flavour

SOYA MILK PREPARATION USING DEFATTED SOYA MATERIAL

Soya milk preparation using defatted soya material

II. Solvent extraction

Defatted soya material (soya protein concentrate/isolate)





DEODORIZATION TECHNIQUES

- Eliminates the volatile metabolites responsible for off-flavor and aroma
- Utilized to completely remove the off-flavor which had been developed during production and processing through a vacuum pan under high temperature. Cooked soya milk is passed through a vacuum pan under high temperature.
- Sulfhydryl compounds, short chain fatty acids and sterol compounds are removed



Advantages

1. No beany flavors
2. No intensive heat treatment.

- Method is not recommended to be used alone
- Used by many Japanese soya milk manufacturers in conjunction with other techniques.

Disadvantages

1. Complex method involving high expenditure and machinery.
2. Only followed by large scale industries

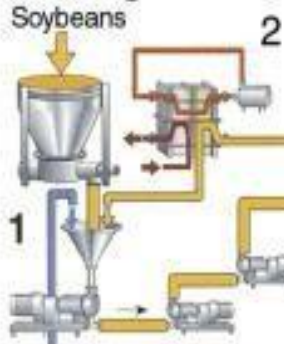


- Enhances both quality and yield of soya milk
- Developed by large companies in Europe, Asia and United States
- These methods are considered to be modification of Illinois method
- Overcomes the chalkiness problem of soya milk produced by Illinois method
- Tetra Alwin[®]- Soy process line is a commercially available system for soya milk processing.
- Employs extraction of soya base from soyabeans on a continuous line system

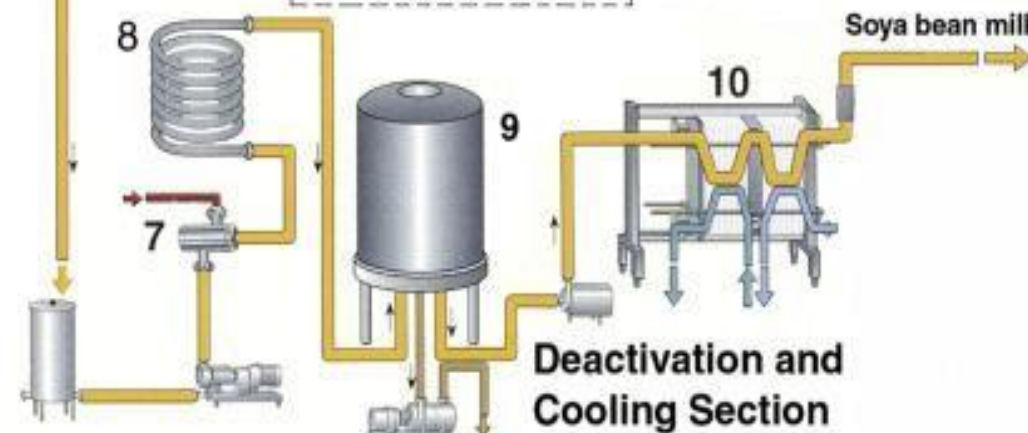
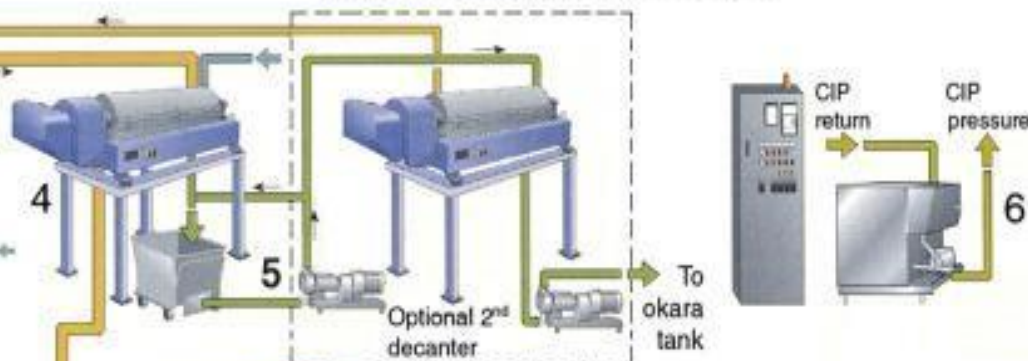


TETRA ALWIN

Grinding Section



Fibre Separation Section



Yellow line: Soy
 Green line: Okara
 Red line: Steam

Orange line: Hot water
 Blue line: Cooling water
 Light blue line: Ice water

Brown line: Vacuum
 Purple line: NaHCO₃
 Yellow line: CIP solution



- Soaking of soya beans in hot water at 70°C for 5 minutes before grinding
- Using hot water before grinding decreases the content of n-hexanal (major contributor to off- flavor component in soya milk) to just 1% as compared to the untreated soya milk.
- Hydroperoxide lyase is inactivated instead of lipoxygenase
- Micro Soy Flakes- Commercially available soya milk flakes produced by MyCal Group, Niichi Corp., Jefferson Iowa, since 1991 and can be utilized to produce soya milk.



NOVEL APPROACHES

Advantages

1. Reduced soaking time
2. Decreased production time
3. Energy efficient (less water and electricity is used).

- Method was developed by Omura and co-workers in 1991
- Method can be extended to the production of soya milk from full-fat soya flakes

Disadvantages

1. No significant effect on beany flavor



- Flavor of soya milk is described as "beany," "painty," "rancid," or "bitter."
- Difficulty in marketing soya milk and reduced consumption.
- Flavor: Due to lipoxygenase which catalyzes the oxidation of polyunsaturated fatty acids or esters.
- Conditions required for activation of the enzyme:
 - ❖ Interaction of released enzyme and substrate
 - ❖ Presence of water
- Ratio of water to beans along with temperature of mixture is critical determinant subjecting the soya flour to water at 80°C for the formation of slurry, no volatile metabolites and objectionable flavor is produced.



BIS SPECIFICATIONS FOR SOYA MILK

- BIS doesn't specify any specifications for soya milk

CODEX STANDARDS FOR SOYA MILK

- The term 'soybean milk' is also inconsistent with the use of terminology in the Codex General Standard for Food Additives, CODEX STAN 192, (GSFA), section 06.8.1 which uses the term 'Soybean-based beverages' and does not use the term 'Soybean milk'. Furthermore, the GSFA 06.8.1 acknowledges that in a number of countries the category 'Soybean-based beverage' includes products referred to as 'soybean milk' but does not use this terminology in the Codex standard. This approach is consistent with the spirit of the GSUDT (General Standards for the Use of Dairy Term) and is prudent.



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