

Drying of Milk

LPT-610

UNIT - I

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Dried Product

Products which when recombined with water gives little or no evidence of detrimental changes when compared to the original/liquid product.

Purpose: Utilisation of product in flush season; consistent supply in the lean season and price maintenance throughout the year.



Why the need to dry milk?

(aim/objective)

- Increase shelf-life and stability of the product.
- Proper utilisation of the product during flush season.
- Maintain product cost throughout the year.
- Ease storage and transport.
- Increase usage based on versatility.

Dried Milk

Product obtained from by removing water/moisture from milk by heat or other suitable means, to produce a solid containing 5% moisture or less.

- Dried Whole Milk or Whole Milk Powder (WMP)
- Dried Skim Milk or Skim Milk Powder (SMP) or Non-Fat Dry Milk (NFDM)



Dried Milk

Definition(PFA Rules, 1976)

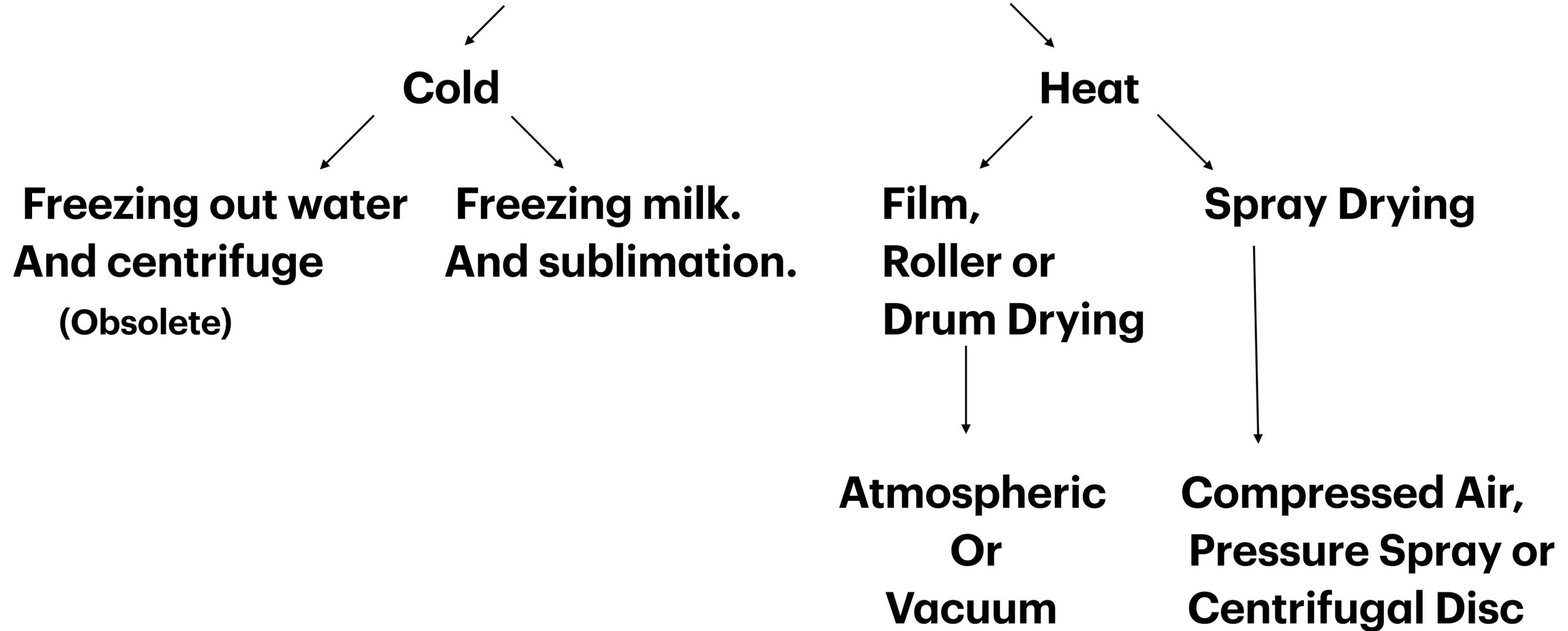
- WMP- It is the product obtained from cow or buffalo milk or a combination thereof or from standardised milk, by the removal of water. It may contain calcium chloride, citric acid and sodium citrate, sodium salts of ortho-phosphoric and poly-phosphoric acids, not exceeding 0.3% by weight of the finished product and 0.01% of butylated hydroxy anisole by weight of the finished product. Such additions need to be declared on the label. Milk powder should not contain more than 5.0% of moisture and not less than 26.0% fat. The total acidity expressed as lactic acid should not be more than 1.2%. The standard plate count may not exceed 50,000/gm and the coliform count may not exceed 90/gm. The solubility index should be 15.0 for a roller dried and 2.0 for a spray dried product.
- Note: Process of drying should be mentioned on the label and spray dried product should be packed in hermetically sealed containers when the quantity exceeds 510/gm.

Dried Milk

Definition(PFA Rules, 1976)

- SMP- It is the product obtained from skim milk of cow or buffalo or a combination thereof of by the removal of water. It may contain calcium chloride, citric acid and sodium citrate, sodium salts of ortho-phosphoric and poly-phosphoric acids, not exceeding 0.3% by weight of the finished product. Such additions need to be declared on the label. Skim milk powder should not contain more than 5.0% of moisture and not more than 1.50% milk fat. The total acidity expressed as lactic acid should not be more than 1.5%. The standard plate count may not exceed 50,000/gm and the coliform count may not exceed 90/gm. The solubility index should be 15.0 for a roller dried and 2.0 for a spray dried product.
- Note: Process of drying should be mentioned on the label and spray dried product should be packed in hermetically sealed containers when the quantity exceeds 510/gm.

Milk Drying Systems



Freezing of Milk and Sublimation

Steps

Step 1: Freezing the product.

**Step 2: Supplying heat to remove
moisture by sublimation.**

Film, Roller or Drum Drying

Principle

A thin film of concentrated milk is applied upon the smooth surface of a continuously rotating steam heated metal drum and the thin film of dried milk is continuously scrapped off by a stationary knife located opposite to the point of application of the milk . The thin film of milk is then ground to obtain powder.

Types: Single Drum, Twin drum and Double Drum & Atmospheric/Vacuum

Materials used: Steel; Alloy Steel; Stainless steel; Cast Iron; Chrome and Nickel Plated steel.

Most commonly used :- Cast Iron & Double drum atmospheric drier

Spray Drying

Compressed Air, Pressure Spray and Centrifugal Disc

Principle: Atomizing the pre-heated and concentrated milk to form a spray of very minute droplets, like a fog or mist. These droplets are then directed into a very large, suitably designed drying chamber where they come in contact with currents of hot air. Due to high temperature and large surface area the milk particles evaporate their moisture almost instantaneously and transform into a fine powder. This is then removed continuously.

Note: The process of atomisation reduces the particle size to a range of 50-150 microns.

Foam Spray Drying



Other than drying whole milk and skim milk, this process is mainly applied to dry milk products and by-products such as butter milk, Cream (sweet and sour), whey and emulsified cheese slurry. This is done by forcing gas into the liquid product after pump but before the atomiser .

Note: Air is commonly used as the added gas for making foam spray non-fat dry milk and nitrogen is used as added gas for making foam spray dried whole milk.

Particles of the dried product obtained by foam spray drying are more uniform in size

Instantiation & Agglomeration

Definition, Principle and Purpose

Thank You

Dr. Gargi Mahapatra