Long life milk products

Concentrated milks

Milk powder

Aim:

1- Reduction weight &volume so– easy transport & small storage place.

2- Extended the shelf life time (method of milk preservation).

3- Stock for seasonal fluctuation in milk production.

4- Easily used after reconstitution to be fluid milk .

5-Used in adverse conditions in wars.

6-Milk powders are used by consumers as a substitute for fresh milk &a
ingredients for the manufacture of a range of processed food products.

7-High N.V.

1- Concentrated milks

partial

Un sweetened evaporated milk

25% milk solids
no sugar

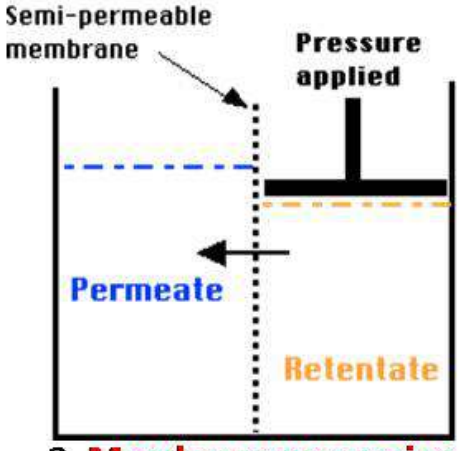
Sweetened condensed milk

(condensed milk) 75% total solids
(45% sugar +30% milk solids)

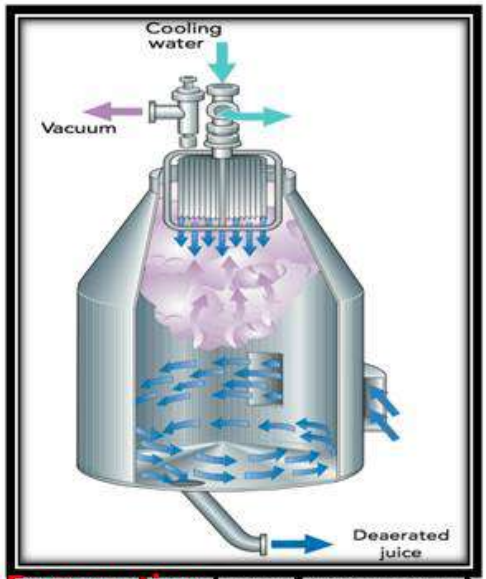
Methods of water removal:

3- Freezing

Membrane Processing

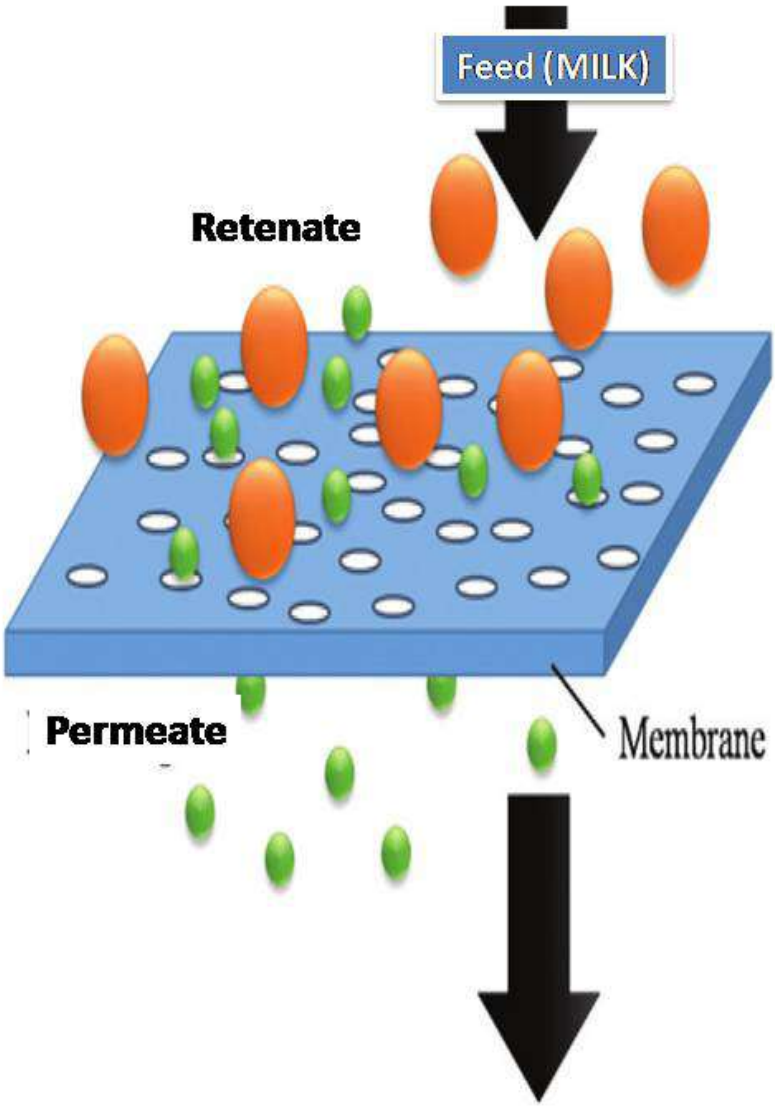


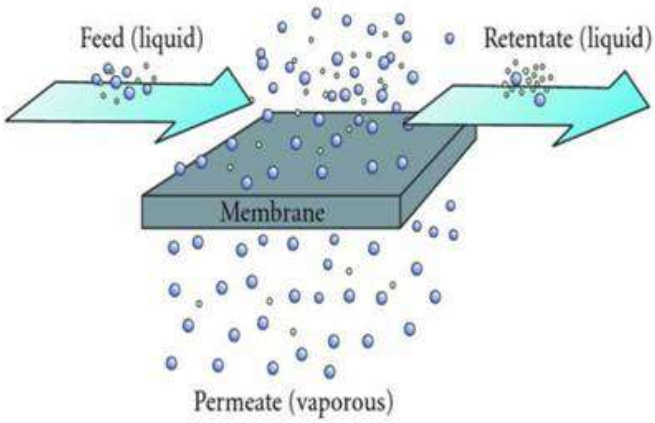
2- Membrane processing (UF&RO)

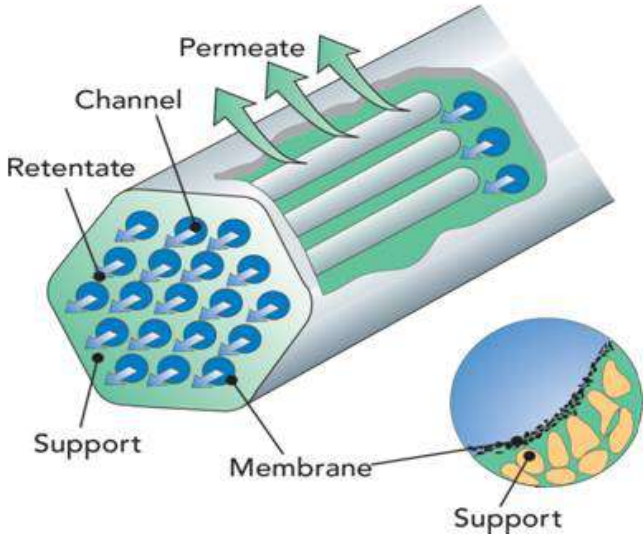


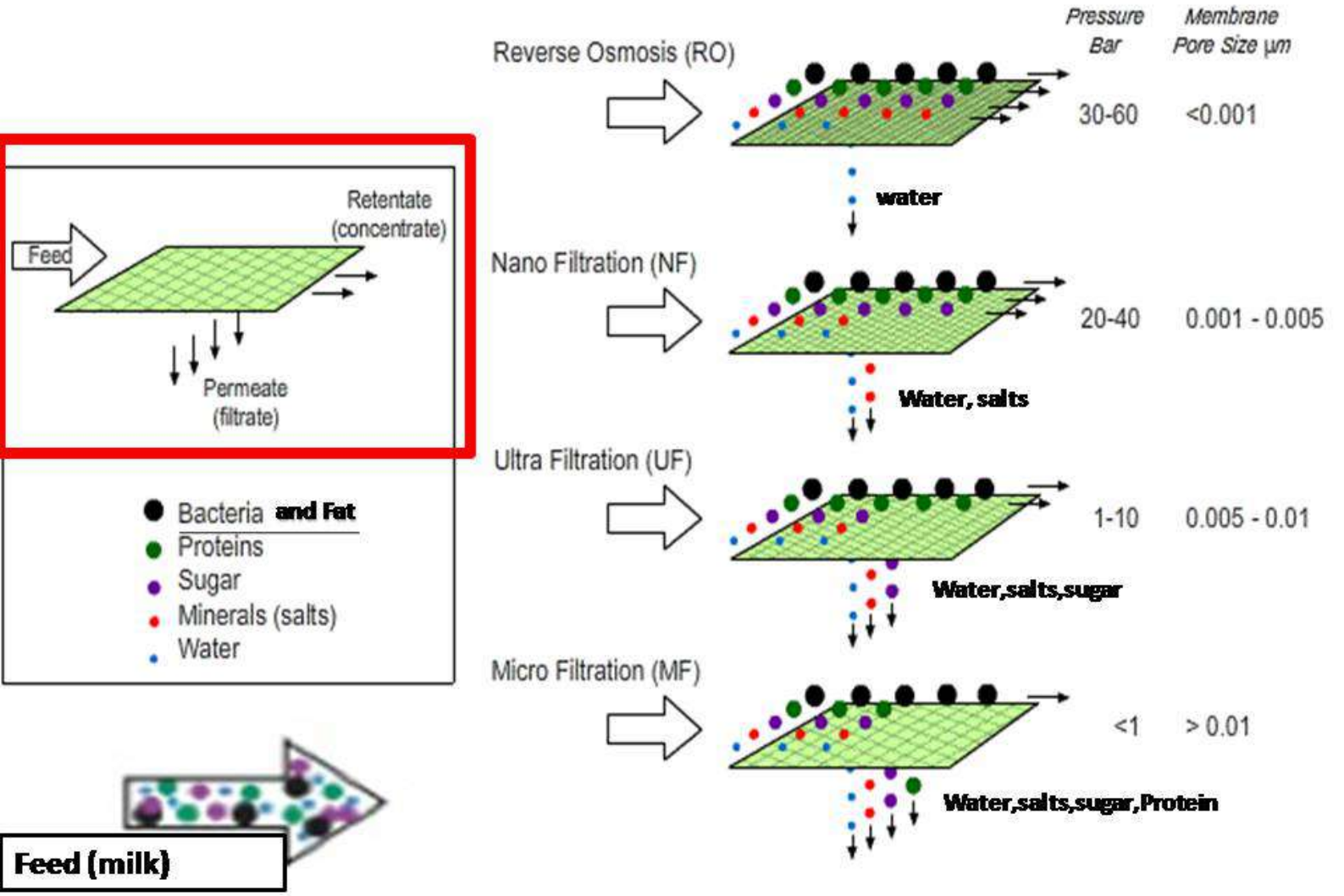
1- Evaporation (most common) by heat under vacuum.

Membrane processing








Pressure Bar
Membrane Pore Size µm
Reverse Osmosis (RO)
30-60
<0.001
water
Nano Filtration (NF)
20-40
0.001 - 0.005
Water, salts
Ultra Filtration (UF)
1-10
0.005 - 0.01
Water,salts,sugar
Micro Filtration (MF)
<1
> 0.01
Water,salts,sugar,Protein
Retentate (concentrate)
Feed
Permeate (filtrate)
Bacteria and Fat
Proteins
Sugar
Minerals (salts)
Water
Feed (milk)

Technological steps of concentration

1- Selection & preparation of milk

- Color& flavour abnormalities
- Spore& thermodurics bacteria
- Clafication by centrifugal separator

2- Standardizedization

- The ratio of fat to total solid should be 1:3.4

3- Casein stabilization

- stabilization (Sod citrate.)
- preheating

4- Preheating

- 85 C for 10-20 min

5- Concentration

- (1:3 in evaporated milk or 1:2.5 in condensed milk).
- 50-55C for about 2 h

Casein stabilization:

Casein has tendency to precipitate when subjected to high heat treatment that leads to gelation or thickening in the final products ————So, addition of stabilizing salts as trisod.phosphate or sod. citrate 0.2-0.3 g/kg milk———— These salts act as emulsifiers, help in homogenization and prevent precipitation of caseins.

Preheating:

It is applied before milk concentration at 85°C/10-20min.or 115-128°C/1-6 min.

it is important for:

1-Improve milk quality.

2- Inactivation of milk enzymes.

3-Help in stabilization of casein micelles.

4- Temperature adjustment before concentration process.

5- Prevent sticking to evaporator.

Technological steps of un-Sweetened evaporated milk

6- Homogenization

↓ 50 C under high pressure

7- Rapid cooling

↓ 4 C to prevent lactose crystalization

8- Filling & canning

↓ Atmospheric method

9- Sterilization

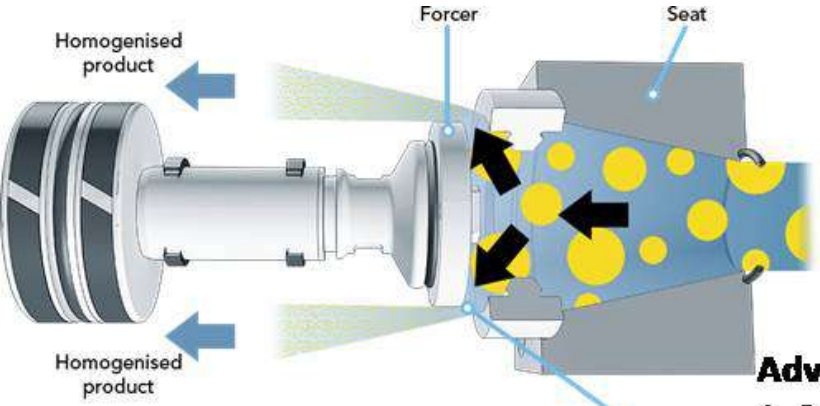
↓

10 - Cooling -

↓ 17 C within 15-20 min)

11 - Storage

10 C or at room temperature



Effect of homogenization

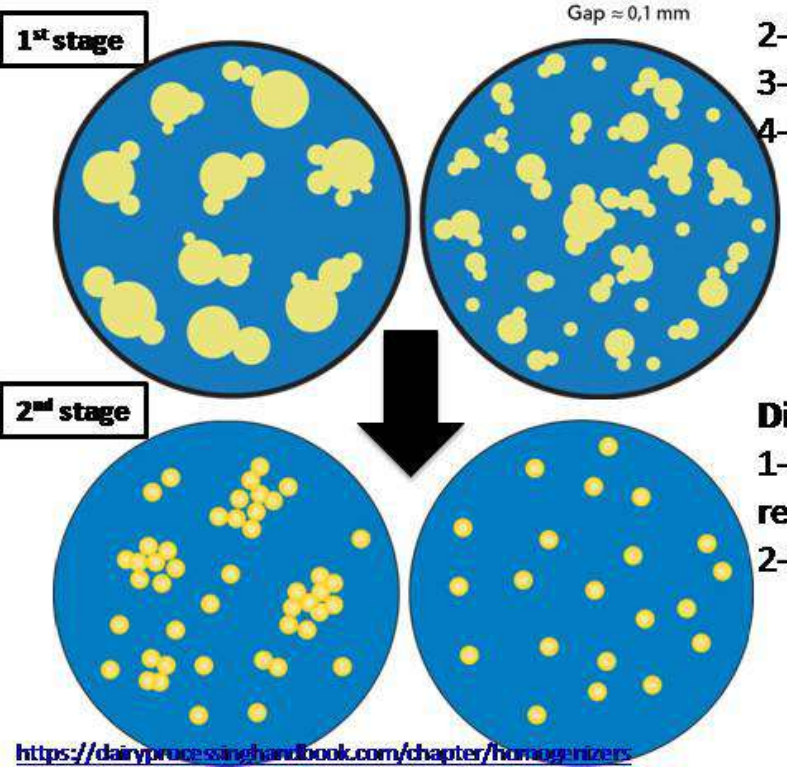
Advantages:

1- Smaller fat globules –no cream-line formation

2-Whiter and more appetizing colour.

3-More better mouthfeel.

4-Better stability of cultured milk products.



Disadvantages:

1-May increased sensitivity to light – sunlight can result in "sunlight flavour" .

2-More susceptible for rancid flavour.

https://dairyprocessinghandbook.com/chapter/homogenizers

Technological steps of Sweetened condensed milk

5- Addition of sugar 16-18 kg/100 litter milk

↓ Carefully selected

6- Concentration

↓ 57.2 C.

7-Cooling & crystallization Preheated,

↓ 12-16 C

Forced crystallization

8- Filling & canning

↓ Atmospheric method or vacuum method)

Homogenization ✗

Sterilization ✗

Nutritive value of concentrated milk

-High protein
- High lactose
- High of mineral content
- Easily digested