

CREAM SEPARATION FROM MILK

Cream:

The portion of milk which is rich in milk fat is called cream. When milk fat is concentrated into a fraction of the original milk, that portion is known as cream.

It contains all the milk constituents but varying proportion. The milk fat in cream may vary from 18 to 85%. The SNF constituents occur in lower proportions than in milk.

In general, cream is classified into two types.

- 1) Market Cream
- 2) Manufacturing Cream

1-Market Cream:

This is used for directly consumption.

2-Manufacturing Cream:

This is used for manufacture of dairy products.

Types of Cream Separation Process:

There are two types of cream separation.

- 1) Gravity separation
- 2) Centrifugal separation

Principle of Cream Separation:

Cream separation principle based on difference in density.

Types of creams:

- Light cream - contains 20 – 25% of milk fat
- Heavy cream - contains 30 – 40% of milk fat
- Plastic cream - contains 65 – 85% of milk fat

CREAM SEPARATION TECHNIQUES

1 .Gravity Separation Method:

When milk is allowed to stand for some time, there is a tendency for the fat to rise. The velocity at which the fat globules rise, is given by the following equation, which is known as Stoke's law.

$$V = \frac{2G}{9} \left(\frac{d_s - d_f}{n} \right) r^2$$

Where;

V- Velocity at which fat globules rise

G- Acceleration due to gravity

d_s - Density of skim milk

d_f - density of fat

r- Radius of fat globules

n- Viscosity of skim milk

Factors affecting gravity separation method:

- Size of the fat globules
- Viscosity, Velocity and Temperature
- Addition of adhesive
- Clumping formation

Disadvantages:

Time is taken is too long.

Advantages:

- Low Energy
- Low Cost
- Simple Method

2. Centrifugal Separation:

When milk enters rapidly into the revolving bowl of the cream separator, it is immediately subjected to a tremendous centrifugal force, which 3000-6000 times greater than gravitational force while both the fat and skim milk are subjected to the centrifugal force; the difference in density affects the heavier portion (skim milk), than the lighter portion cream. Thereby skim milk is moved to the periphery which the fat portion moves towards the centre.

Stoke's Law applied to centrifugal separation;

$$V = \frac{r^2 (d_s - d_f)}{n} \frac{N^2 R K}{2}$$

Where,

V- Velocity at which fat globules rise

d_s - Density of skim milk

d_f - density of fat

r- Radius of fat globules

n- Viscosity of skim milk

N- Revolution per minute

R- Size of the bowl

K- Constant

Factors affecting centrifugal separation:

- Decrease in temperature causes more fat loss
- Decrease in speed causes more fat loss
- Increase in rate of milk flow causes high fat loss
- Size of the fat globules
- High acidity decrease the efficiency
- Increase in vibration reduces the efficiency
- Disk size
- Slime formation