ICE-CREAM & FROZEN DESSERTS

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Module 7. Packaging, hardening, storage and shipping of ice cream

Lesson 19
PACKAGING OF ICE CREAM AND HARDENING

19.1 Introduction

When ice cream is drawn from the freezer, it is put into containers that give it the desired form and size for convenient handling during the hardening, shipping and marketing processes.

19.2 The Factors that Need to be Considered In Selection of Ice Cream Container

- Cost
- Protection against moisture loss, temperature loss and contamination.
- Ease of handling and disposal (i.e. ease of opening and reclosure, if required)
- Effect upon the quality of ice cream
- Neatness of appearance
- Advertising that package may carry.
- Storage problem.
- Point of consumption in relation to the location of the factory.
- Size of unit desired.

19.2.1 Bulk containers

The three types of packaging materials used for Bulk containers for ice cream include:

i) Fiber board containers

ii) Metals containers

iii) Plastic (Polyethylene) containers

The type of package can be cups, tubs, cones, wrappers, etc.

19.2.2 Wrappers

These may be composed of vegetable parchment or foil laminate.

Containers can be made up of fiberboard, either paper or card board which has been treated to make it impervious to moisture.

19.2.3 Plastic (polystyrene) or wax-coated paperboard cartons may also be used.

19.2.4 Steel cans

These can be tin cans with lead solder(reusable containers). It can be cylindrical or square section cans with radiused corners and with ‘slip-on-lids’.

Semi-rigid plastic containers may be used that can be closed with plastic ‘wrap-on-lids’. Pre-cut Aluminium lids are also now available.

The ice cream bars may be wrapped with wrapper made of BOPP laminates. Ice cream cone sleeves are made specifically for packaging of cone ice cream. The ice lolly packs maybe packaged in double-sided Polyethylene card board squeezers.

19.3 Ice Cream Hardening

In hardening process, the aim is to reduce the temperature of the product to at least 0^{o}F in the center of the package as quickly as possible. After the ice cream reaches this point, it is only necessary to store it at a uniformly low temperature to prevent ice melting and recrystallization.

19.3.1 Objectives of hardening ice cream

- The physical nature of ice cream when drawn from the freezer is such that it is seldom practicable to market it in this form.
- To freeze more water in the ice cream that has been drawn from the freezer and filled in the container to obtain better consistency.
- To make ice cream stiff enough to hold its shape.

19.3.2 Hardening time: The time necessary for the temperature at the center of the package to drop to -18°C is known as ‘hardening time’. A hardening time of 6-8 h for 19 liters (5 gal). package is considered as ‘excellent’ operation when performed in hardening rooms. When hardening tunnels are used, the rate of hardening is several times faster.

Table 19.1 Factors affecting hardening time in same hardening unit

Type of hardening	Package size	Hardening time
Still-air hardening room	118 ml (¼ pint)	30 min
- do -	19 liters (5 US gallon)	24 h

* I US Pint= 473.18 ml; 1US gallon= 3.78 l

19.3.3 Hardening process

After ice cream is drawn from the freezer, it is put into containers to be placed in hardening room. Here the freezing process is continued without agitation until the temperature of ice cream reaches -18°C or lower, preferably -26.1°C (-15°F).

Quick hardening is desirable, since slow hardening favours formation of large ice crystals and a corresponding coarseness of texture.

19.3.4 Factors that affect the rate of hardening

- Temperature of ice cream when drawn from the freezer
- Composition of the mix
- Percent overrun taken in ice cream
- Size of the containers
- Whether several containers are bundled together
- Nature of the wrapping material (paper or plastic)
- The manner of stacking of the containers
- The temperature and velocity of the circulating air
- Obstructed versus unobstructed exposure of the containers to the cooling medium.

Very small containers harden quickly, but they warm up quickly when removed from the freezing temperatures. Hence, they are more prone to body and texture damage as a result of heat shock. This also applies to novelties (stick bars, small cups,etc.). Large containers (i.e. 11.34 liters) harden much slower in the interior(cooling is largely by conduction) and

must be given ample time to reach -18°Cin the interior.

If containers are stacked before they are adequately hardened, deformation may occur and some overrun may be squeezed out causing surface discoloration.

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