PATENT: " FOOD PACKAGING FOR ULTRA-RAPID FREEZING "

Fast freezing (deep freezing) represents a preservation process that allows the food to reach a minimum temperature of -18°C in a short time (with special refrigerators called "blast chillers") and also allowing the formation of micro-ice crystals without damaging the biological structure of food.
The nutritional properties (proteins, fats, carbohydrates, vitamins, etc.) and the organoleptic properties (structure, consistency, color, smell and flavor) of the frozen food remain, therefore, unchanged compared to the original product.
For the importance of this process, the entire frozen food sector is governed by **Legislative Decree 110/1992 and Directive 89/108/EEC which provide that the temperature of the frozen food, even during transport, must be maintained at all points of the product at a value equal to or less than -18°C (process called "cold chain"),** as even minimum temperature variations, higher than -18°C, lead to a deterioration of the food, due to bacterial growth and proliferation, and a decrease in its shelf life.

The main problem that arises when a food, placed in a suitable container (and / or packaging) in any state of aggregation and of any composition, is subjected to a "fast freezing" (deep freezing), is the formation of an "effect barrier" due to the gradual thickening of the frozen food from the outer surfaces of the container towards the internal points, center of gravity and adjacent areas.
This "barrier effect" prevents the temperature of the food subjected to deep-freezing from reaching -18°C (equal to or lower) at all times, at all points, especially in the center of gravity and adjacent areas, causing:
1. the partial freezing and interruption of the "cold chain" of the food;
2. the alteration of the organoleptic characteristics of the food;
3. the formation of macro-ice crystals in the center of gravity and adjacent areas of the food, with damage to its biological structure and modification of the nutritional properties;
4. a decrease in the shelf-life of the food;
5. an irregular and unstable temperature in all points of the food.

The Patent in question allows, however, also for refrigeration and slow freezing processes (with temperatures above -18°C):

a. the continuity of the "cold chain" of the food;
b. the preservation of the organoleptic characteristics of the food;
c. the formation of micro-ice crystals in the center of gravity and adjacent areas of the food, with maintenance of its biological structure and nutritional properties;
d. the increase in the shelf-life of the food;
e. a regular and stable temperature in all points of the food;
f. a significant **energy saving** for the entire food freezing process.

Bibliografia

- Cleland D.J.; Cleland A.C.; Earle R.L. Prediction of freezing & thawing times for multidimensional shapes by simple formulae. Part: Regular shapes. 1987. International Journal of Refrigeration; 10; 157-164.
- Hossain, M.M.; Cleland, D.J.; Cleland, A.C. Prediction of freezing & thawing times for foods of two and three-dimensional irregular shape by using a semi-analytical geometric factor. International Journal of Refrigeration; 1992; 15(4); 235-246.
- Fu, B. and Labuza, T.P. (1993) Shelf life prediction: theory and application. Food Control. 4(3), 125-33.
- Gacula, Jr. M.C. and Kubala, J.J. (1975) Statistical models for shelf life failures. J.Food Sci., 40, 404-9.
- Labuza, T.P. (1984) Application of chemical kinetics to deterioration of foods. J.Chem.Edu. 61, 348-58.
- Man, C.M.D. and Jones, A.A. (eds) (1994) Shelf Life Evaluation of Foods, Blackie Academic & Professional, London.
- Pham, Q.T.; Freezing of foodstuffs with variations in environmental conditions. 1986. International Journal of Refrigeration; 9; 290-295.
- Symons, H. (1994) Frozen Foods, in Shelf Life Evaluation of Foods, (eds C.M.D. Man and A.A. Jones), Blackie Academic & Professional, London, pp. 296-316.
- Varsanyi, I. and Somogyi, L. (1983) Determination of the shelf life of food products. Acta Alimentaria. 12(2), 73-100.

More information:

Dr Diego Celotto

e-mail: *dcelotto@libero.it*

WhatsApp +39 346 7083 968

CONTENITORE PER ALIMENTI
FOOD PACKAGING

BREVETTATO / PATENTED

CONGELAMENTO ULTRA-RAPIDO (FINO A -50% DEL TEMPO) E TEMPERATURE OMOGENEE IN TUTTI I PUNTI DEL PRODOTTO

ULTRA-RAPID FREEZING (UP TO -50% OF THE TIME) AND HOMOGENEOUS TEMPERATURES IN ALL POINTS OF THE PRODUCT

UNIFORME DISTRIBUZIONE DEL FREDDO NELLE VETRINE (GELATO)

UNIFORM COLD AIR DISTRIBUTION IN THE SHOWCASES (GELATO & ICECREAM)

AUMENTO SHELF-LIFE DEL PRODOTTO

PRODUCT SHELF-LIFE INCREASE

RISPARMIO ENERGETICO (FINO AL 60%)

ENERGY SAVING (UP TO 60%)

Dr Diego Celotto – **e-mail:** *dcelotto@libero.it*