Session 2: Applications

Equipment and industrial lines for osmotic process of food

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Dehydration Impregnation by Soaking

Combined processes

Raw material

- pretreatments (sulfitation, blanching …)
- crystallized fruits ($a_w = 0,4$ à $0,65$)
- dried products / semi-candied ($a_w = 0,65$ à $0,75$)
- dehydro-pasteurized product
- dehydro-frozen product
- concentrated flavoring
- « salaison » « saurisserie » ($a_w = 0,50$ à $0,85$)
- Smoked product ($a_w = 0,85$ à $0,95$)

Unit operation

- DIS
- freezing
- smoking
- drying / smoking
- refining

Regeneration of the solution

- concentrated solution
- diluted solution
- solutes addition
- straining / filtration
- concentration
- By-products
Phases contactors
Principles

1 Discontinuous
   Static or dynamic

2 Continuous
   Immersed conveyer belt
   aspersion/shower-type process
Contactors

Discontinuous, static:

Cold process (2-10°C):
- Brining of fish and meat (saturated in salt, 4h - 2 days)
- Simple vessel in a cooled room.

Warm process (40-100°C):
- Candying of fruits & vegetables (2 hr.-2 days)
- Dewatering of aromatic herbs (1 to 5 min. 90-100°C)
- Heated vessel, atmospheric or vacuum, one or several vessels, syrup 25 to 70 Bx.
Contactors

Universal candying vessel

Candying in series

SUGAR

80°C

40° Bx.

75° Bx.

65° Bx.

55° Bx.

40° Bx.

25° Bx.

13° Bx.

USED SYRUP

USED SYRUP

Mixing

Concentrator

Semi-candied fruits

65° Bx.

55° Bx.

25° Bx.

13° Bx.

40° Bx.

80°C
Discontinuous, dynamic

The complete cycle in a unique tank

Stirring in the tank:
Boema: horizontal candying vessel (6,000 - 18,000l) under vacuum. Heated by steam in the spiral agitator.
3 - 10 tons /24hr.

Forced convection of the syrup:
Bertuzzi Kandimat: vertical candying vessel under vacuum. Syrup recirculation in a heat exchanger. Fruits pieces in baskets. 600 - 4,800 kg/cycle. Model KK: 3,000 - 6,000 kg/24 hrs.
Dynamic batch contactors

BOEMA UNIVERSAL CANDYING PLANT
BOEMA

Universal vacuum candying machine

FAIR CT 96 1118
Karlsruhe - June 2000
Contactors

Electronic refractometer

Condenser

Vacuum pump

Syrup recirculation

Fruit Pieces in baskets

BERTUZZI “KANDIMAT”
Bertuzzi « Kandimat »
Bertuzzi
Continuous process

1 Flow of foodstuff conveyed by the brine and a conveyer belt.
   For example: AFOS equipment for herring brining. 1 ton/hr.
   Treatment duration: 10 to 20 min.

2 Showering of the fish on trays.
   For example: ARBOR equipment for fish-salting. Saturation in salt, 100 - 500 g sugar/kg water. 400 kg/h herring. 30 min. to 3 hrs (salmon). Complete regeneration of the brine.
Continuous brining
( AFOS/ herring )
Continuous brining (AFOS)
Continuous brining
(herring /AFOS)
Continuous brining
(herring / AFOS)
Shower-type continuous process (brining - marinades)  
ARBOR (pat. CIRAD/IFREMER)
Shower type contactor

fish salting/drying
Shower type contactor
salting/drying