Apple juice processing technology

Written by Mónika Stéger-Máté

Concentrate

- Natural
- Semi-finished product
- Pressed juice
- Without added materials

Stored

- Cool
- Aseptic system

Concentrate

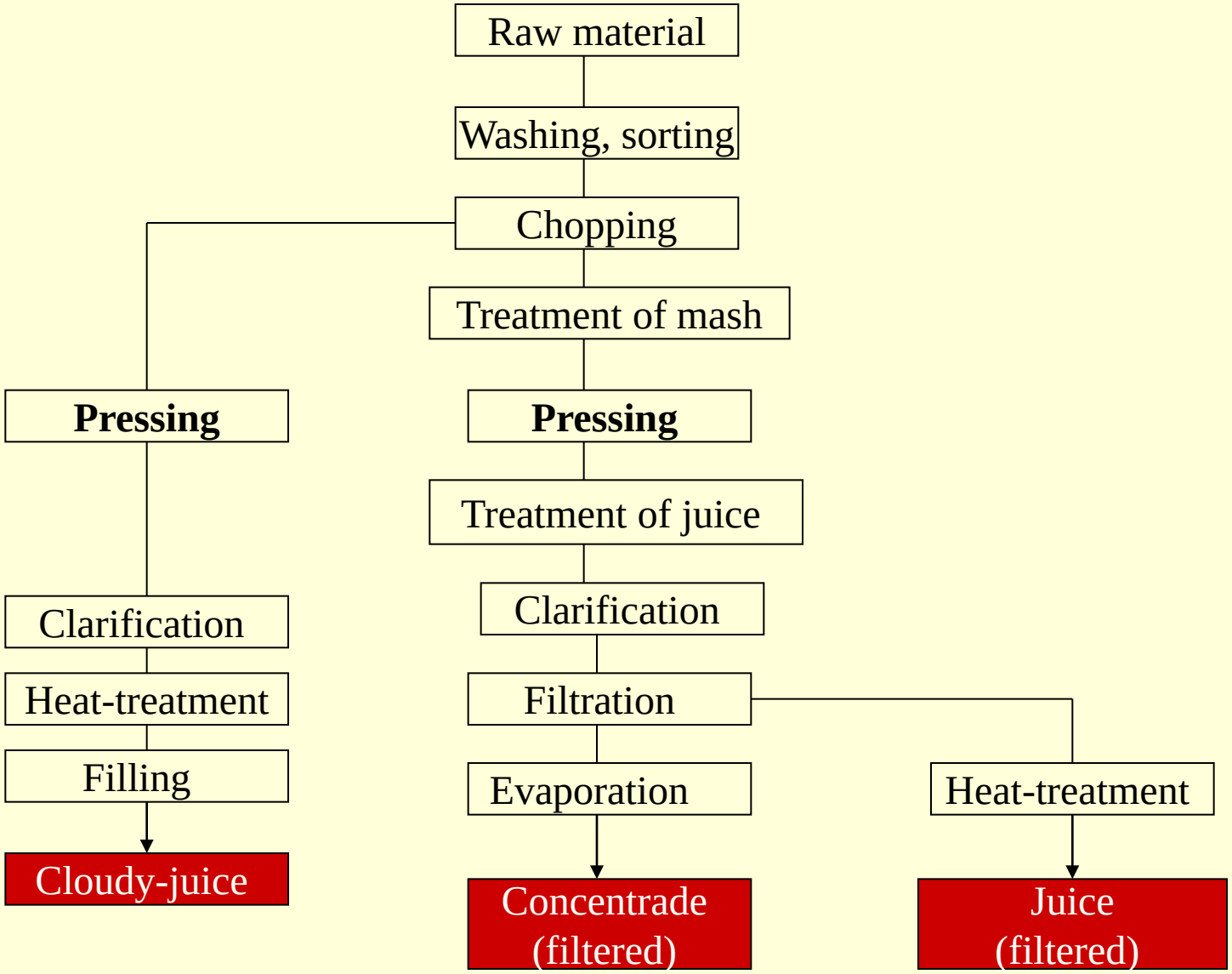
- Ingredient of several fruit-based products

  baby foods, fruit gels, filtered juices, filtered drink with, syrups with, instant powders

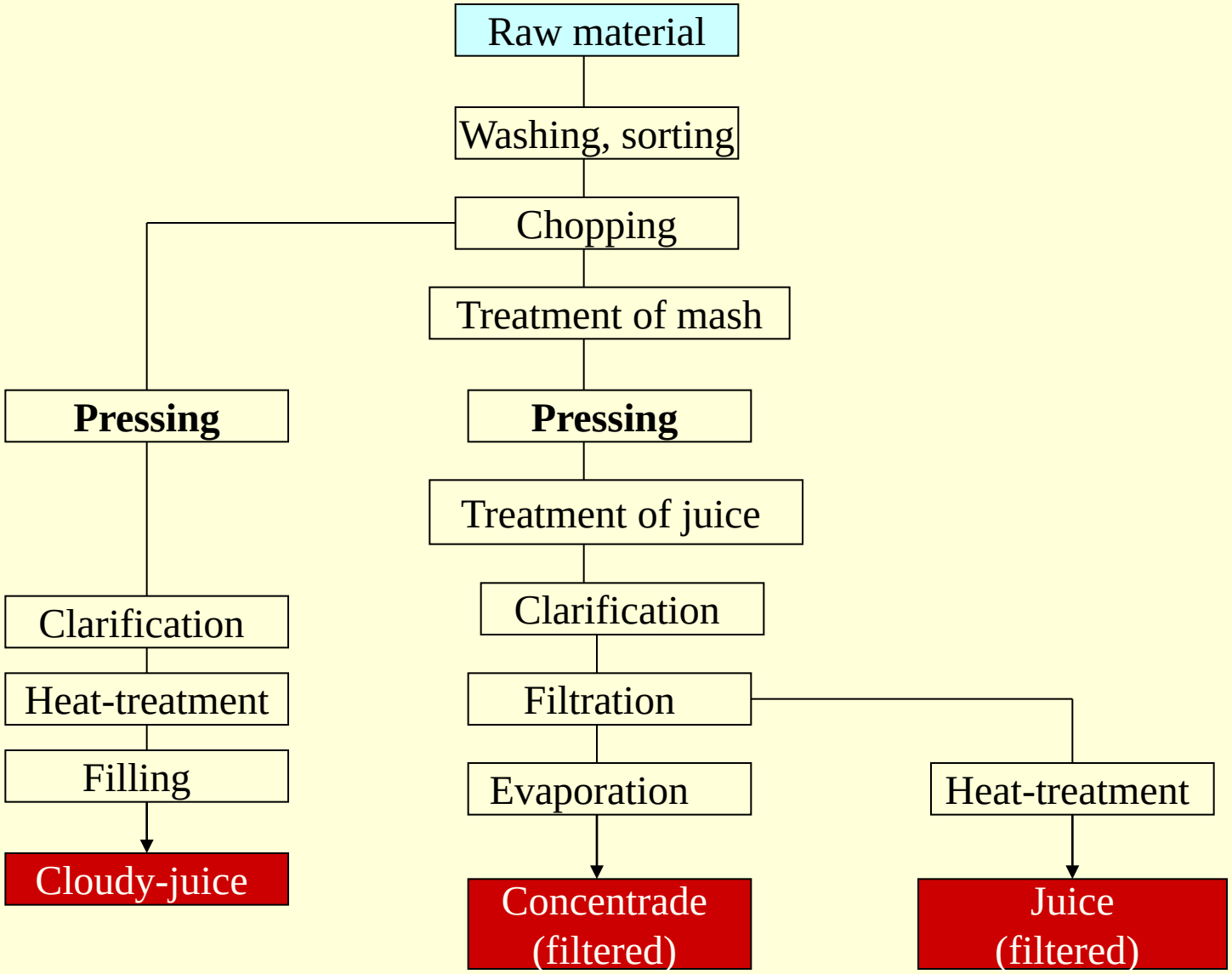
- Substance for other industries

  dairy, confectionery, bakery

Main steps of concentrate procedure



Main steps of concentrate procedure

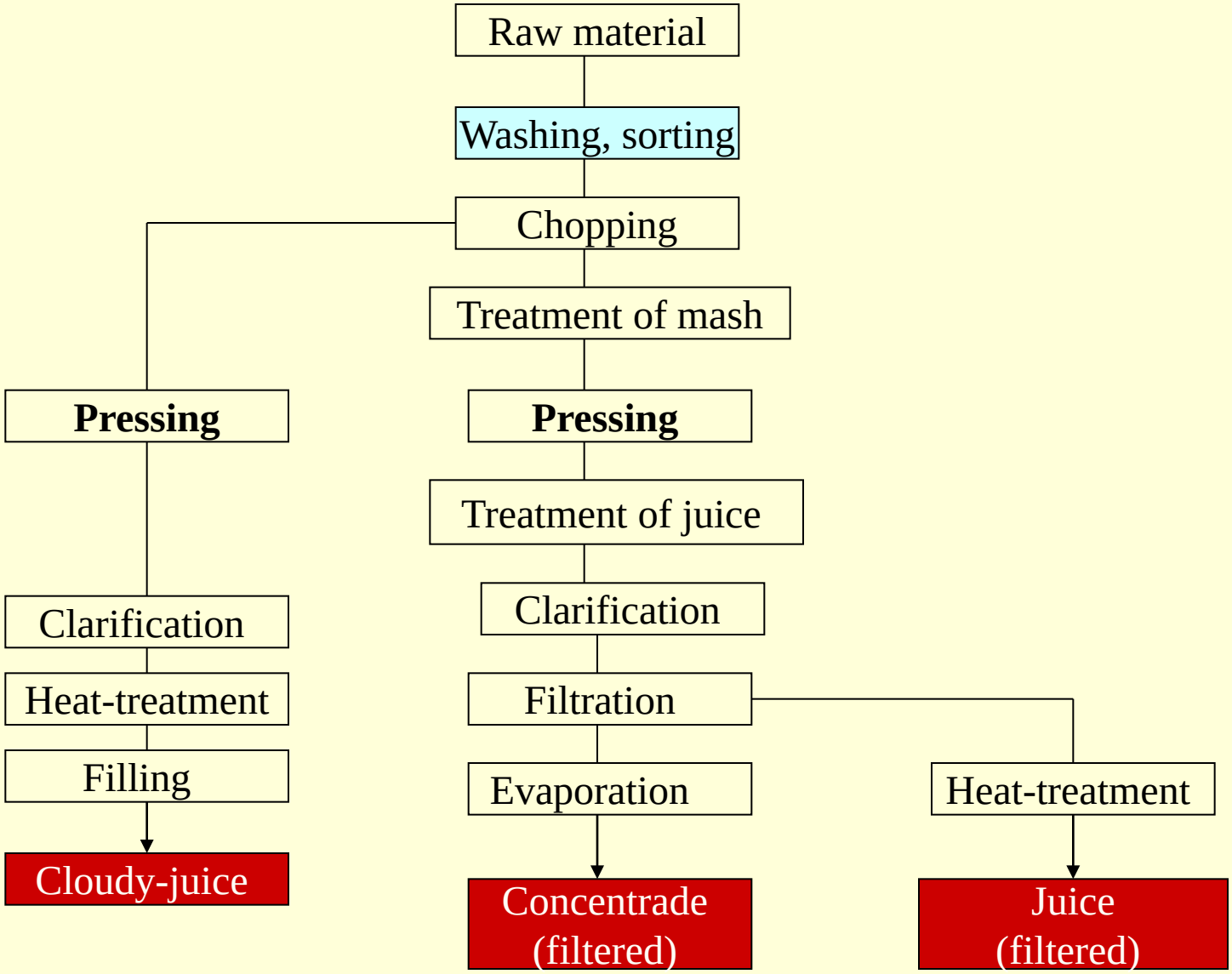


Raw material reception

Quality criteria

- Totally/fully Ripe
- Sound
- Stiff flesh
- High juice content
- Dark red

Main steps of concentrate procedure

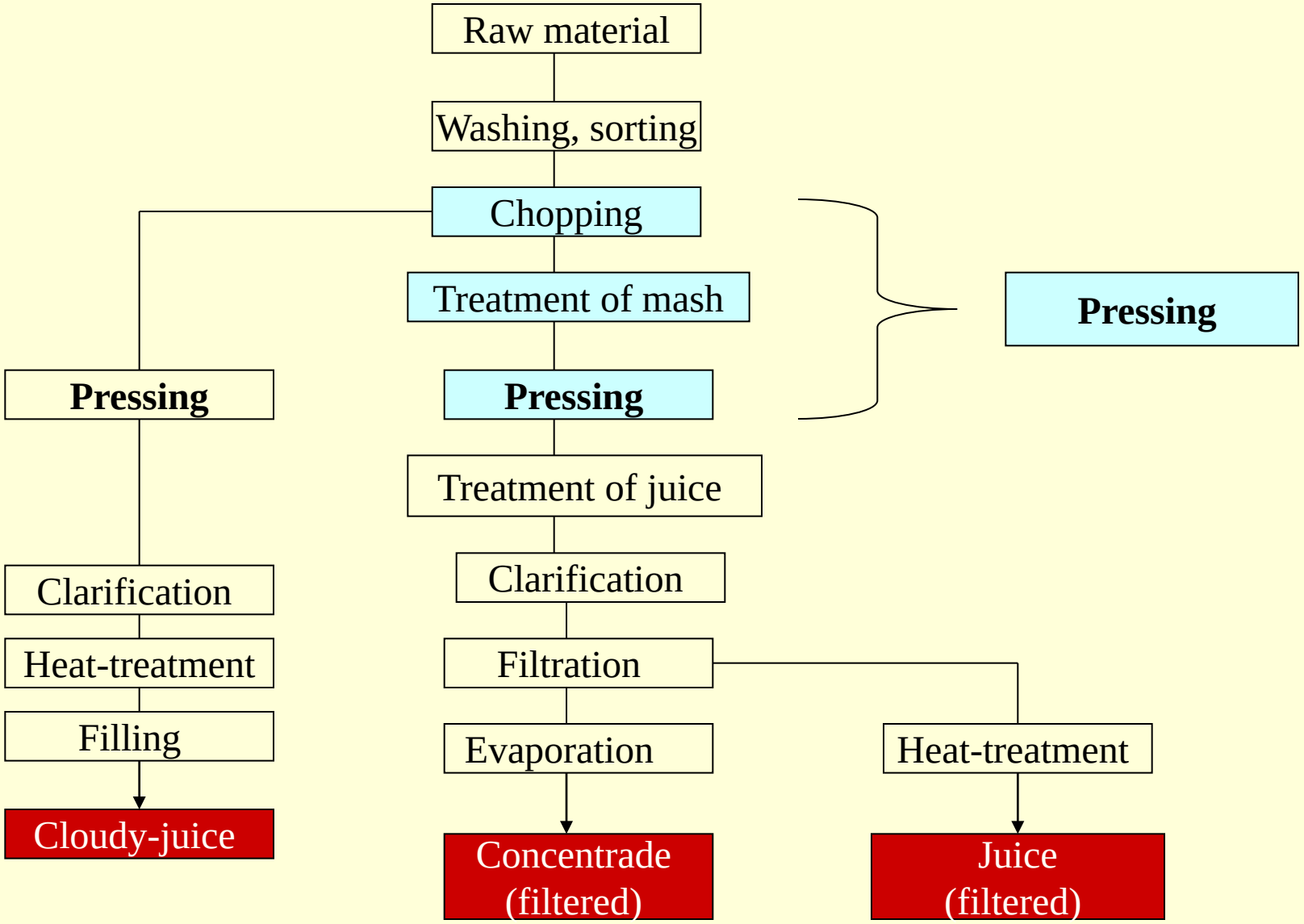


Washing, sorting, selection

- Selection

  (moldy and deteriorated fruits)

Main steps of concentrate procedure



Pressing technology

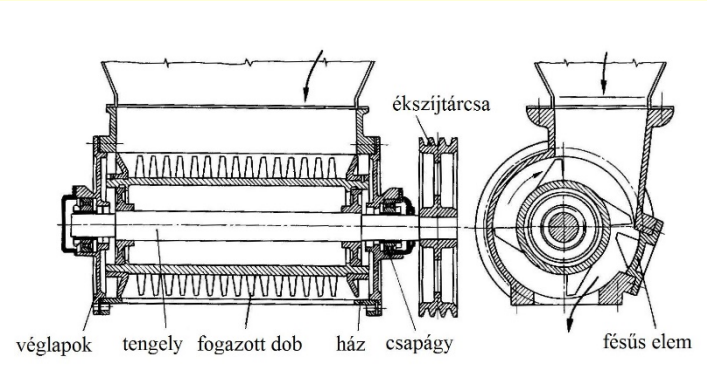
This process can be divided into more separate operations

- Chopping or cracking of fruits
- Chopped fruit preparation/pre-treatment
- Pressing

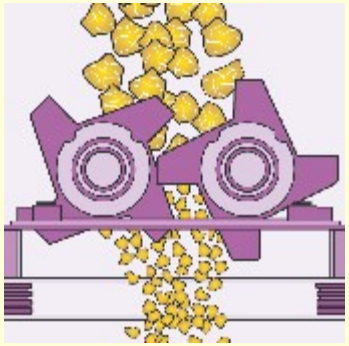
Chopping

- Aim: tissue structure breaks up
- There are several devices for crushing:

hammer

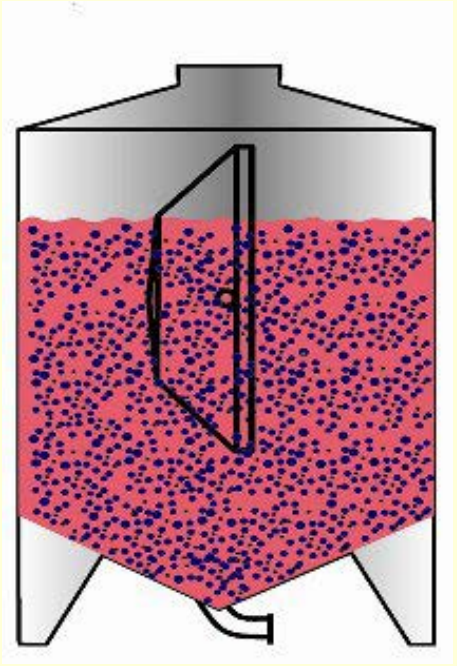


barrel



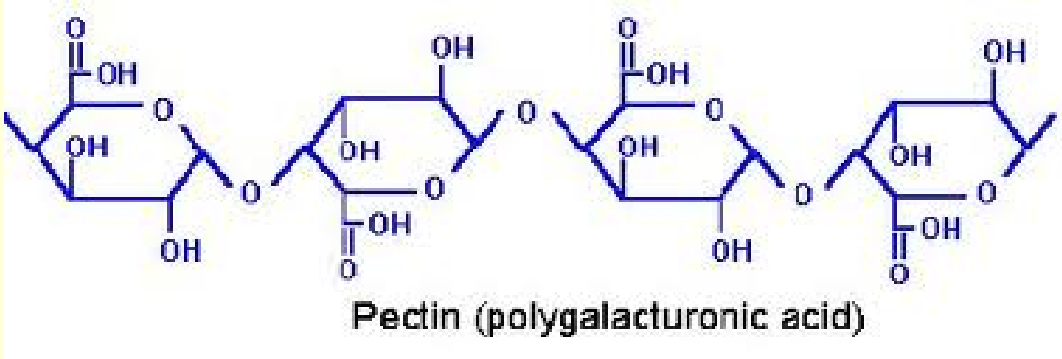
Chopped fruit preparation/pre-treatment

- Aim: increase juice yield, achiveve better aroma, taste, color
- Prefferd pre-treatment: thermal and enzymatic



Enzymatic treatment

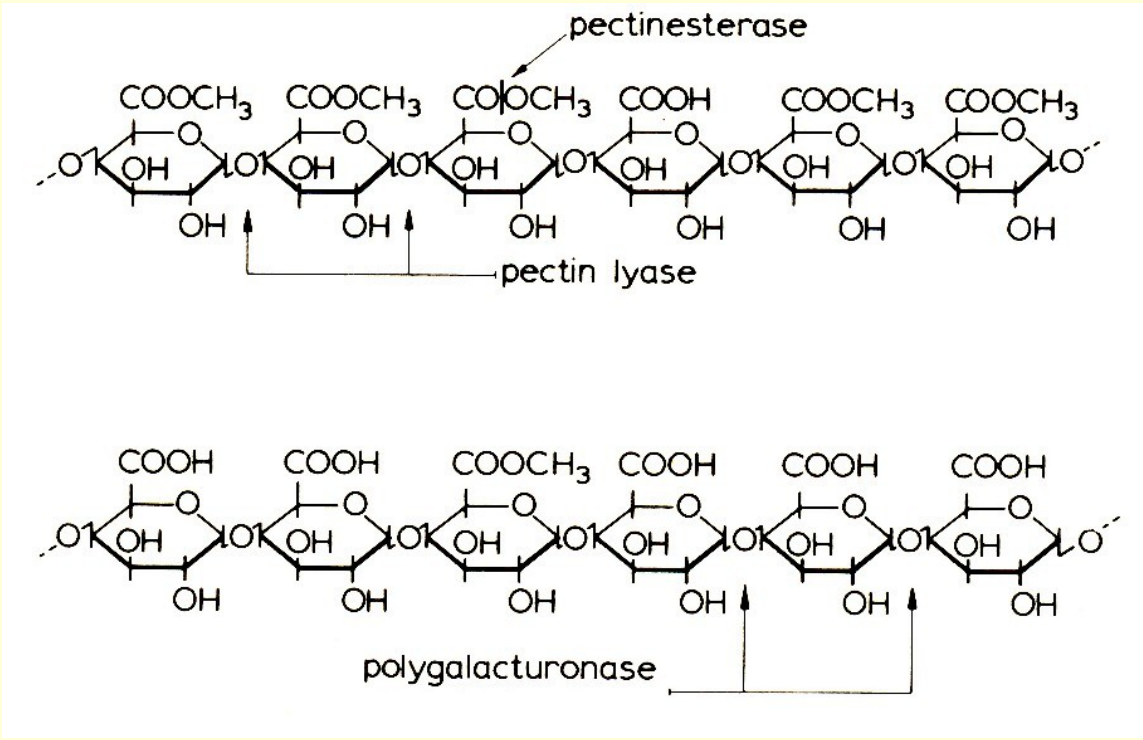
Pectins: polysaccharides (polygalacturonic acid chain esterified with methanol)



Complex enzyme mixtures („enzyme cocktails”)
Pectinase products consist of enzymes with different activity

Pectin degrading enzymes

- Pectin lyase or pectin transeliminase
- Polygalacturonase
- Pectinesterase



Temperature: 45-55 °C

(10-30 °C)

Time: 30-60 min

Complex enzyme mixture contains: pectin depolymerizing enzyms, cellulases, hemicellulases

Pressing

- Aim: to separated the liquid phase from the solids particles
- There are several methods: **pressing**, diffusion extraction, centrifuge procedure, reverse osmosis
- Pressing machines:
  - Periodical/fractionally: package press, basket press
  - Continuously: belt press, spiral press, decanter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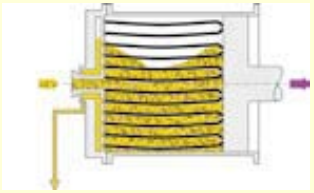
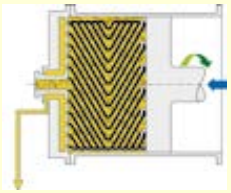
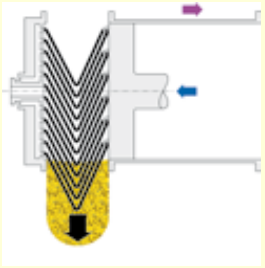
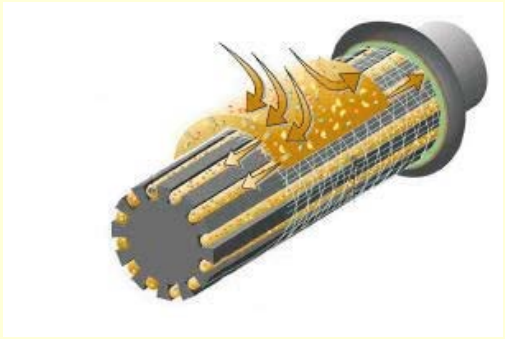
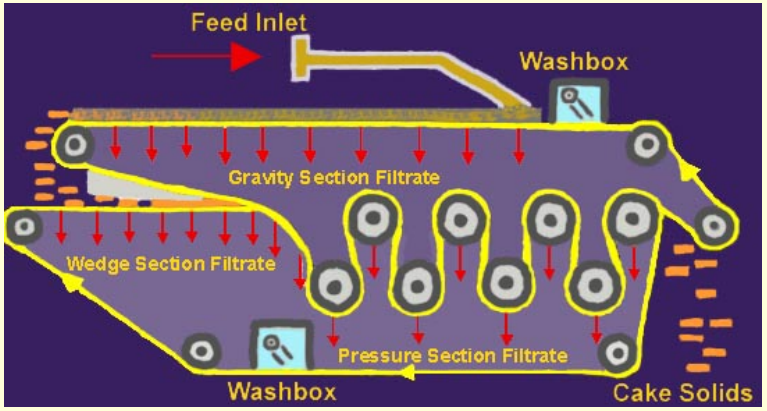
Gyártástechnológia áttekintése
6-26 000 kg










Feed Inlet
Washbox
Gravity Section Filtrate
Wedge Section Filtrate
Pressure Section Filtrate
Washbox
Cake Solids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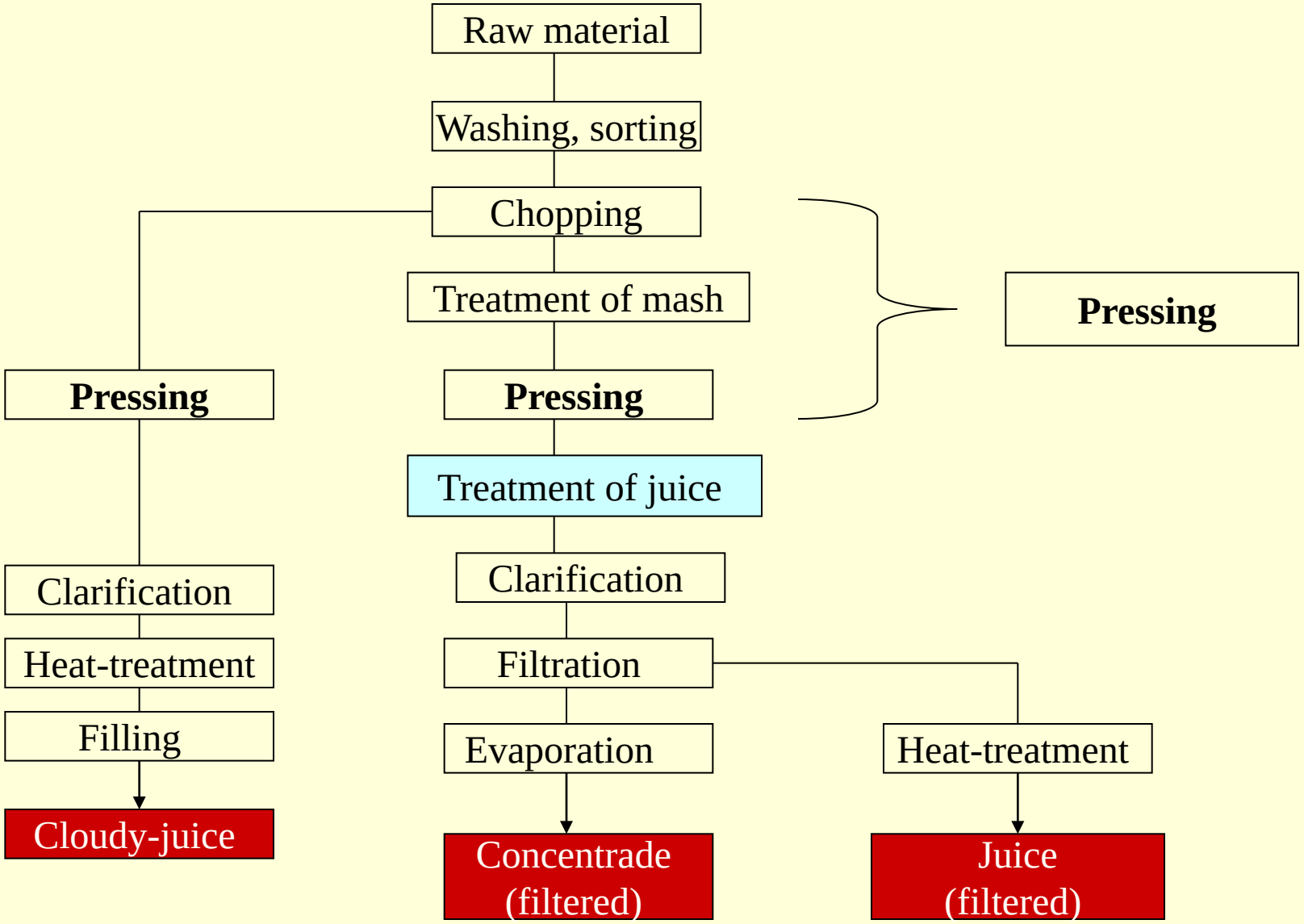
Main steps of concentrate procedure



Clarification

Aim:

- Inhibit the further turbidity
- To preserve sensory properies (taste, aroma, color)

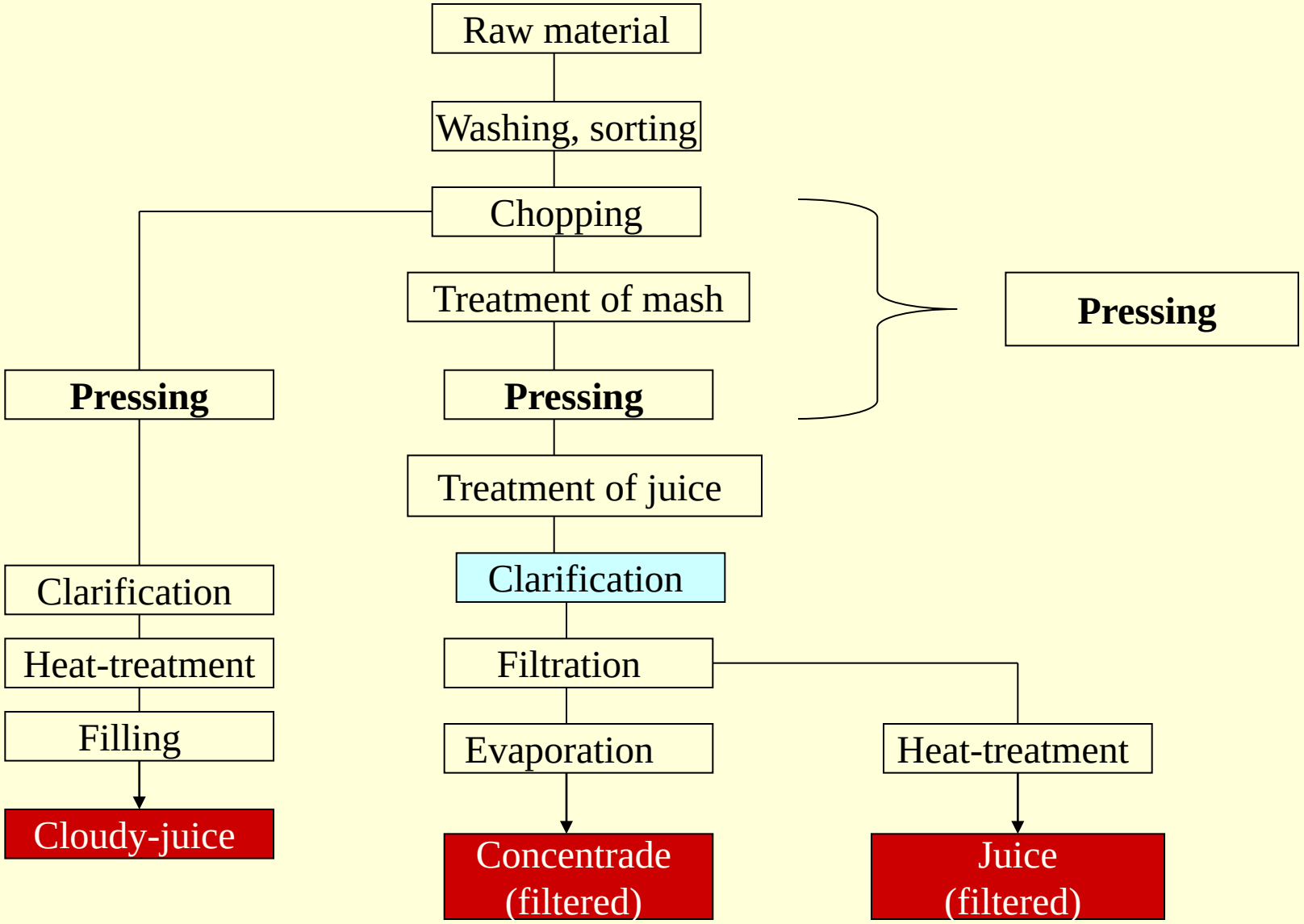
There are

- enzymes,
- physicochemical methods and
- their combination

Enzymatic treatment

- Aim: to decompose pectin molecules
- Break down the starch, hemicellulose and araban
- Concentration: 10-100 g/l
- Temperature: 45-55 ^{o}C
- Time 60-90 min

Main steps of concentrate procedure



Physicochemical clarification

Mineral clarifying agents

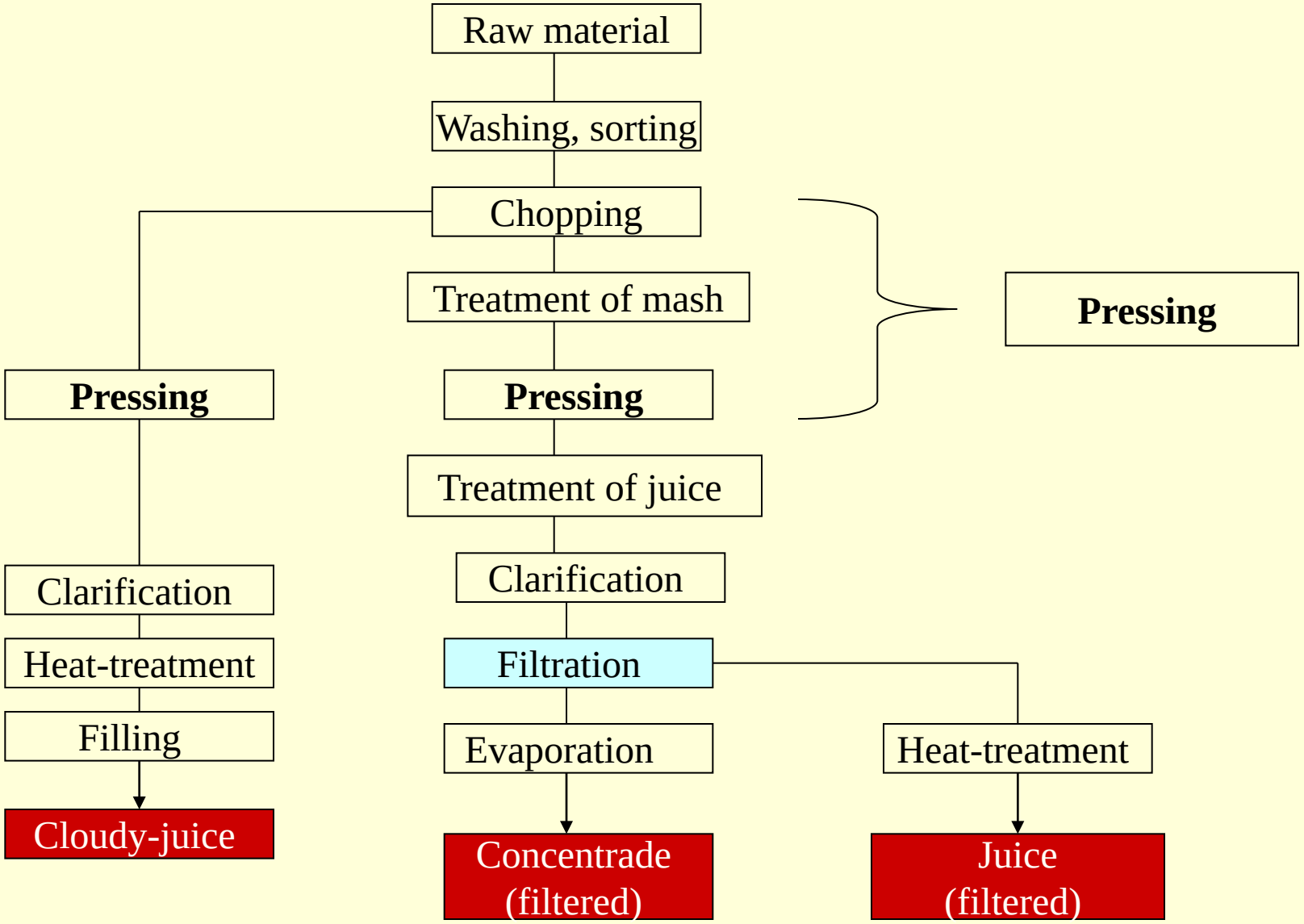
- Surface activity
- Electric charge

Bentonite (-): big surface, good thickening properties, negatively charge, adsorb positivily charged proteins

Silica sol (-): good clarification efficacy, short clarification period

Gelatine (+): protein-based, adsorb negatively charged polyphenols and pectins

Main steps of concentrate procedure



Mechanical clarification

Aim:

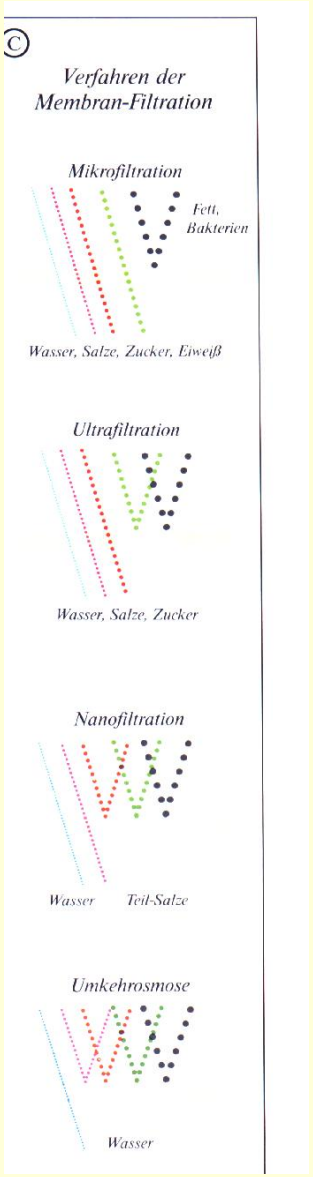
- Elimination of natural fruit fibers
- Elimination of precipitation formed

Filtered machines:

- Bag, frame, candle filters
- Ultrafilters

Ultrafiltration

- Pore size: 0,1-0,01 μm
- Pressure diference: 3-8 bar
- Cutoff value: 1-500 kDa

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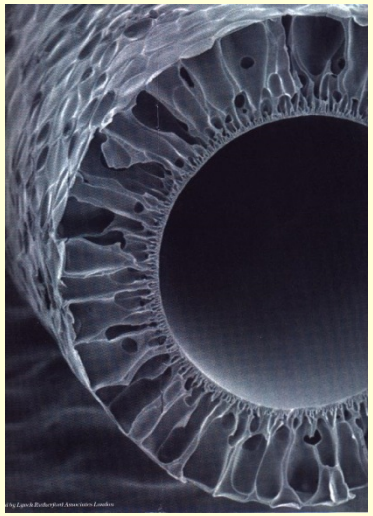

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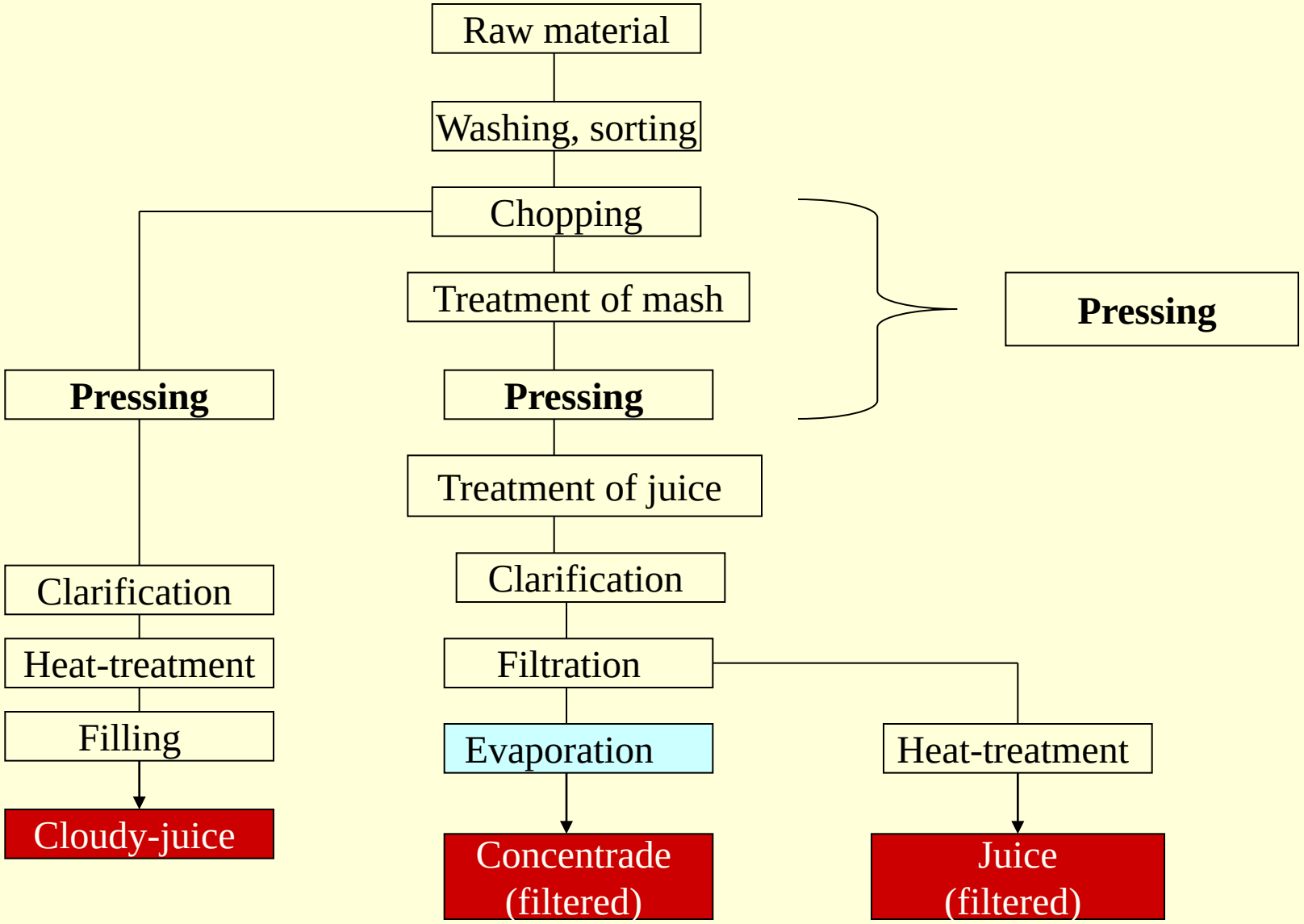
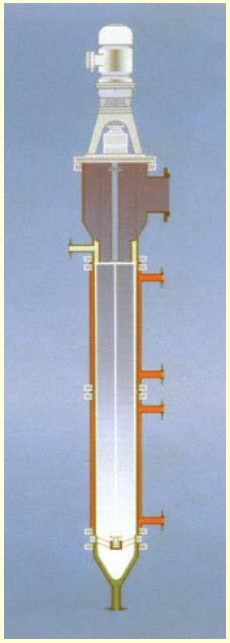


Concentration

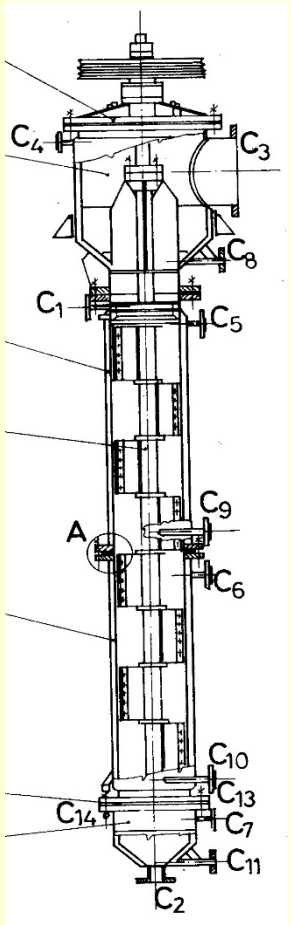
Aim:

- Decrease water content,
- Increase dry matter content
- Improve shipping and storage properties of the juice



Techniques:

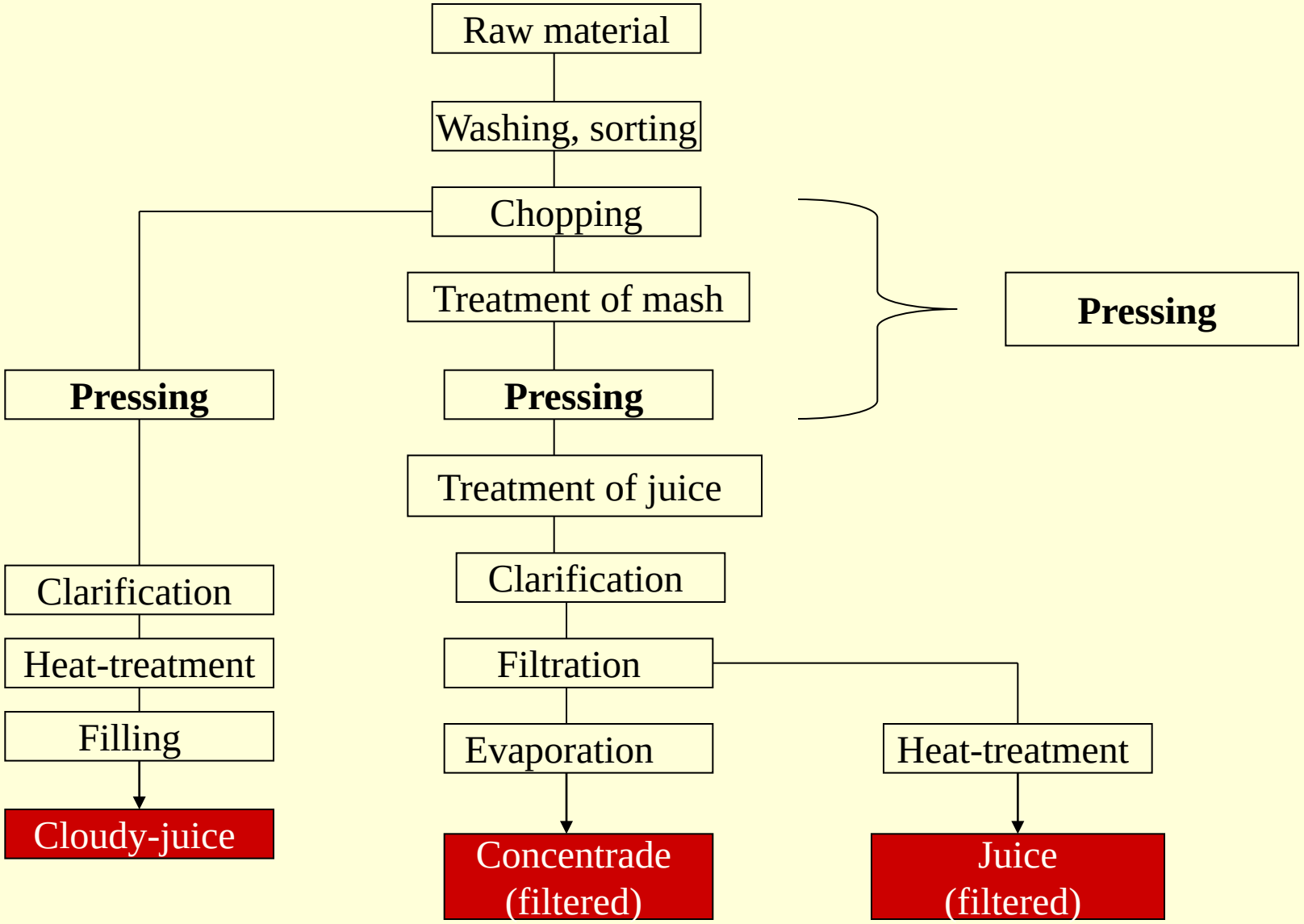
- **Vacuum evaporation: <u>film</u>, tube, plate types**
- Freeze concentration
- Reverse osmosis



Storage

- Sweet and sour cherry concentrate: 45-55 ref% (Bx^{o})
- Storage: under aseptic conditions or frozen
- In the absence of these: 60-65 ref% (Bx^{o})

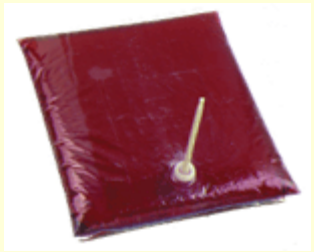
Main steps of concentrate procedure



Cloudy juice

- After chopping are used pressing
- Enzyme pretreatment is not applied in the production of cloudy juice or concentrate, because their main ingredients are dissolved colloid substances in the liquid phase.

- Decanters are used to eliminate fibers from cloudy juice

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Technical contributor:

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