GEA EXPERT TALKS

Shaping the future of process technology.



Turning waste to value
by efficient ingredients extraction
and solvent recovery by
distillation.

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GEA Group AG

Transforming tomorrow

Engineering for a better world

Chemical Industry

Challenges

- Sustainability
- Carbon neutrality
- Profitability
- Minimize waste
- Safety & reliability

GEA

Contribution

- Energy efficient processes.
- Electrification for carbon neutrality
- Concepts to re-use and recycle valuables.

- Evaluated sustainable supply chain.
- Collaboration in innovation & development.
- Experience, knowledge & reliability.





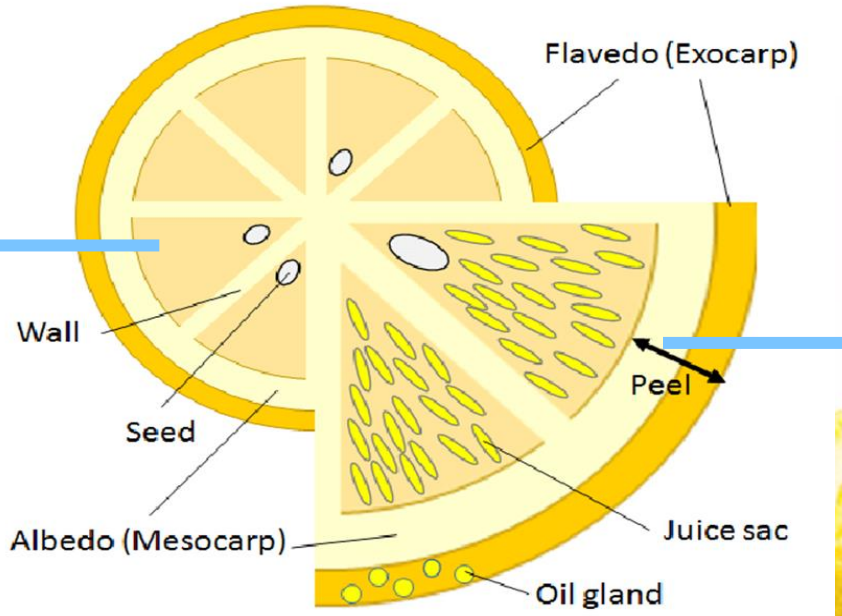
Since 2016, GEA has undergone annual evaluations by EcoVadis,
an international organization for sustainability assessments.
As one of the leading global technology corporations, GEA has the power to drive change
through a variety of sustainable products and solutions that influence multiple industries.

GEA

Processing of citrus

Components and main usage







Soft drinks

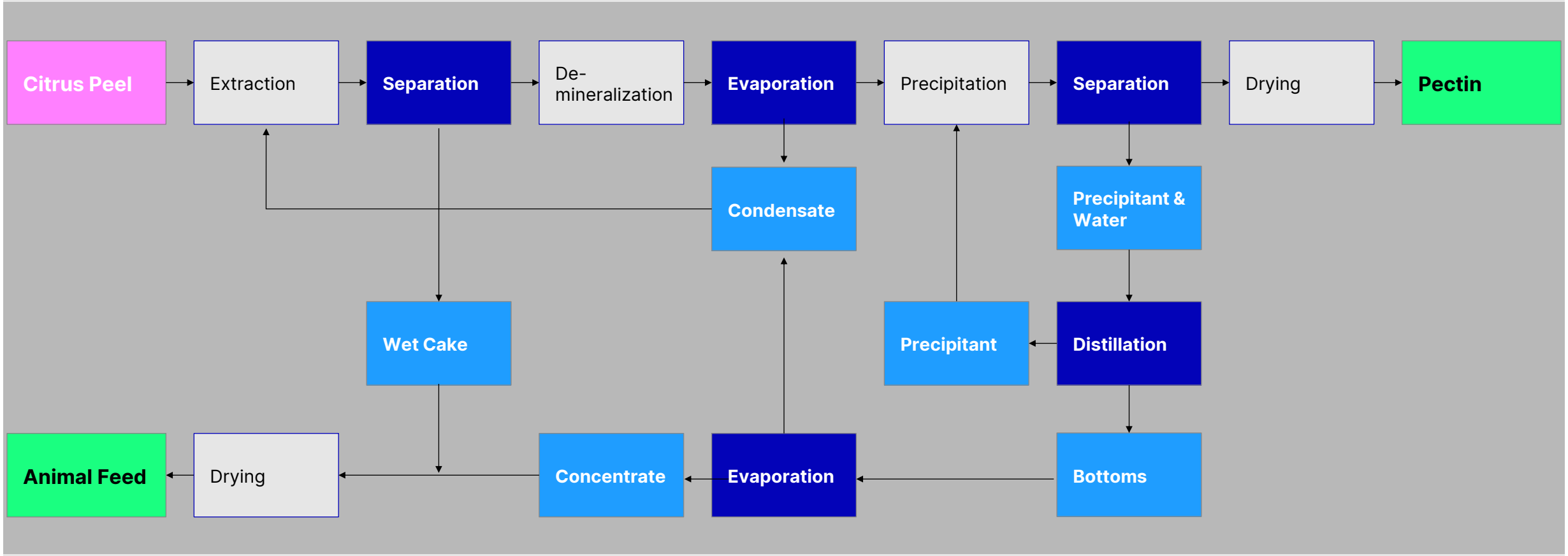


Animal feed



Pectin

Process flow scheme (Pectin)

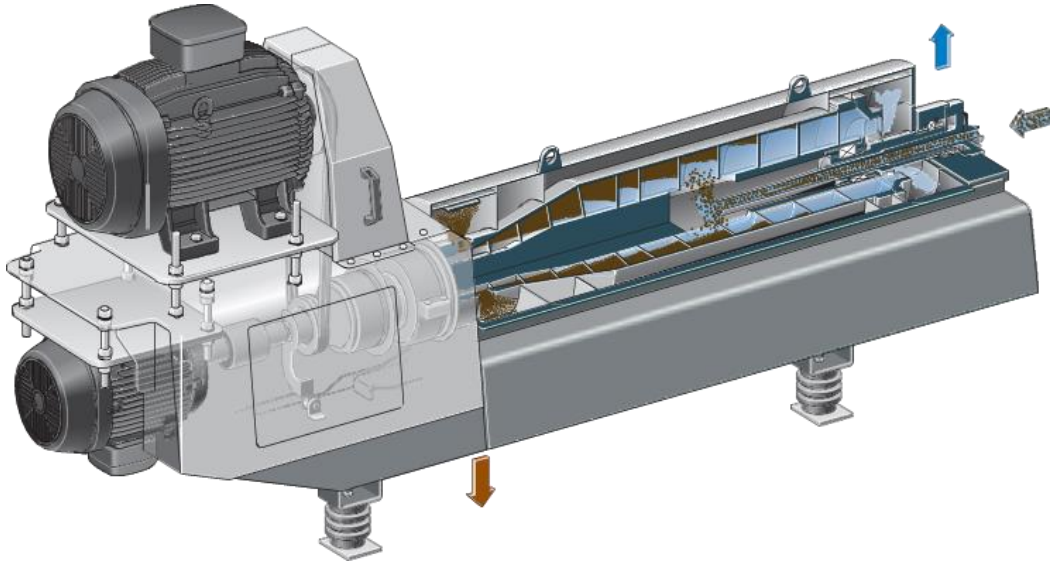


Process flow scheme (Pectin)

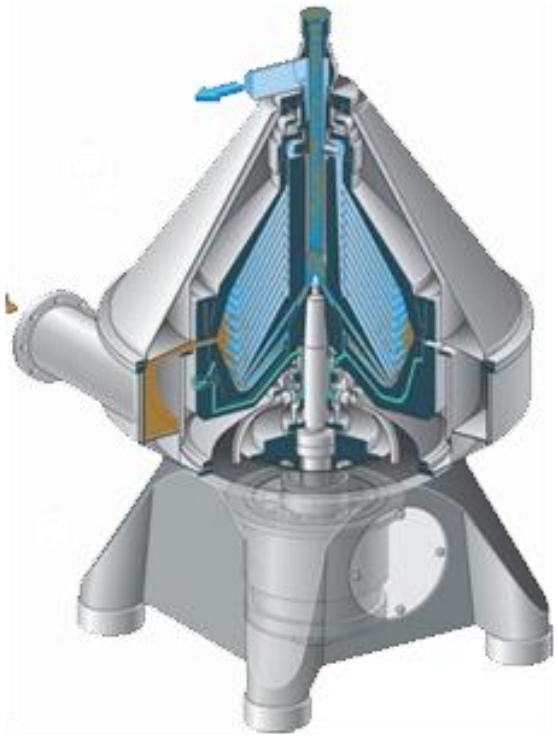
Extraction



Process features of decanters & separators

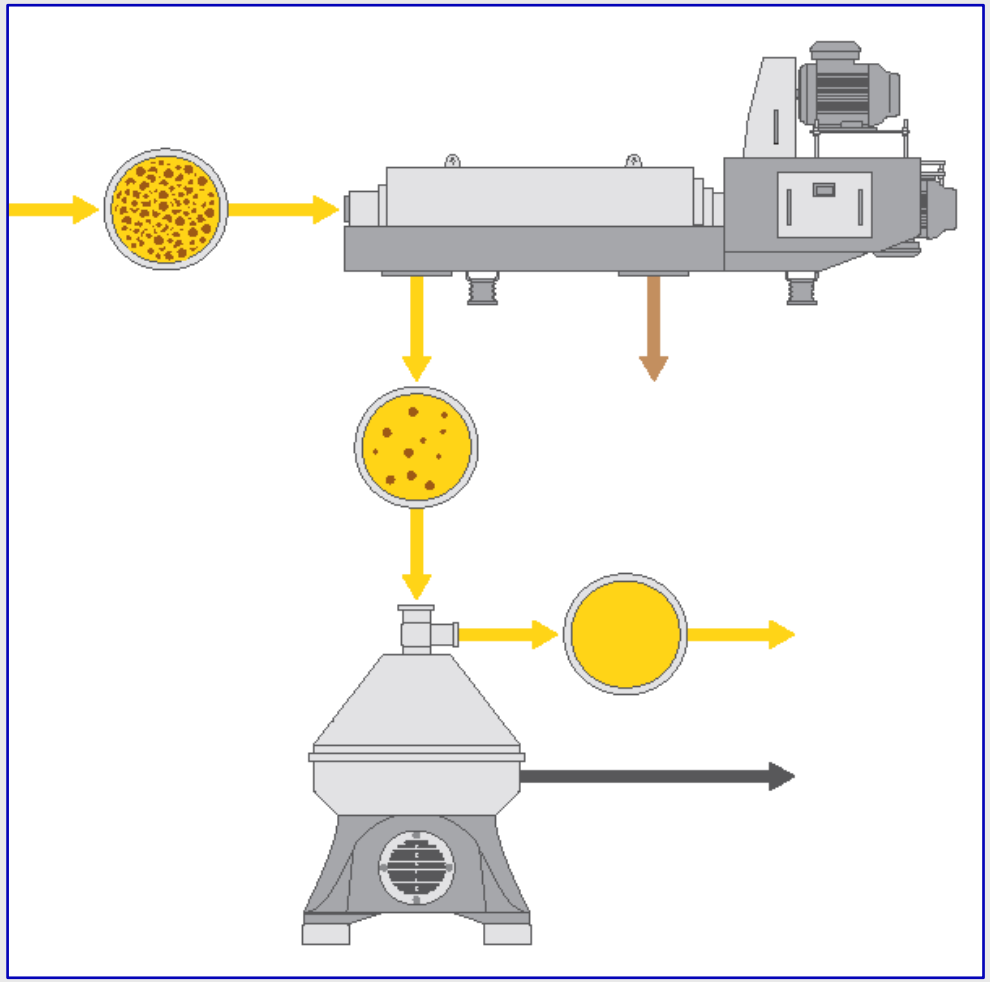


High solids load
Continuous discharge



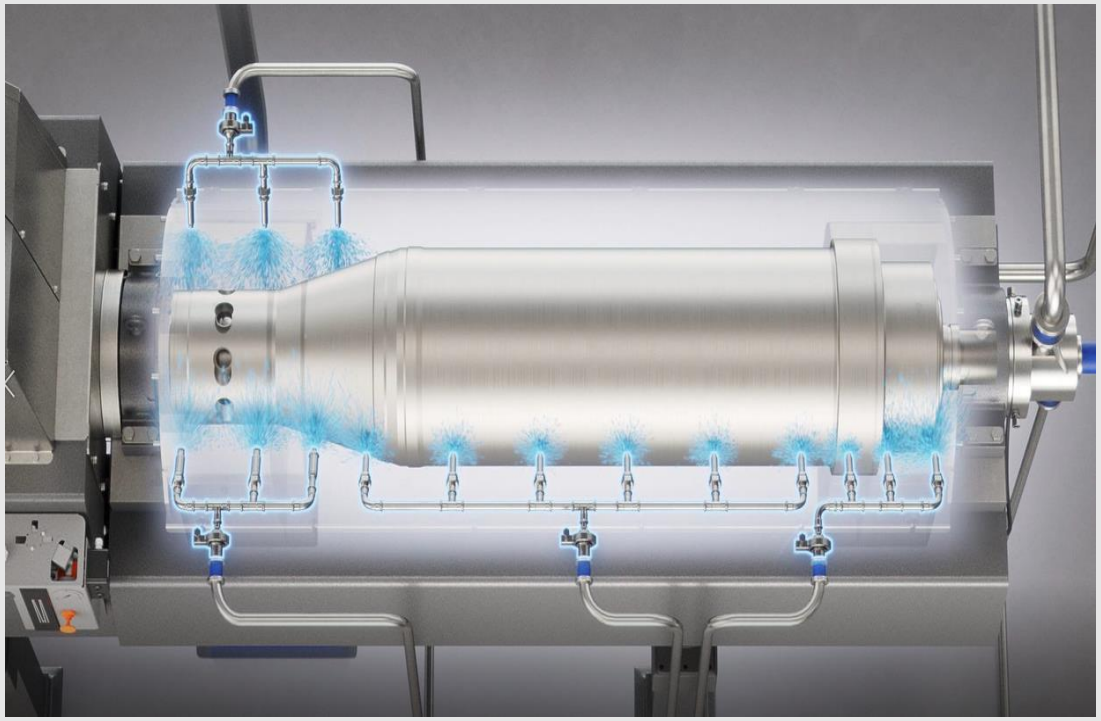
Low solids load
Automatic desludge

Typical arrangement: 2-steps clarification



1. Continuous process
2. High throughput
3. High g-force
   -> high separation efficiency
   -> high yield
   -> better clarification
   -> separable particle size ↘
4. Process time ↘
5. CIP

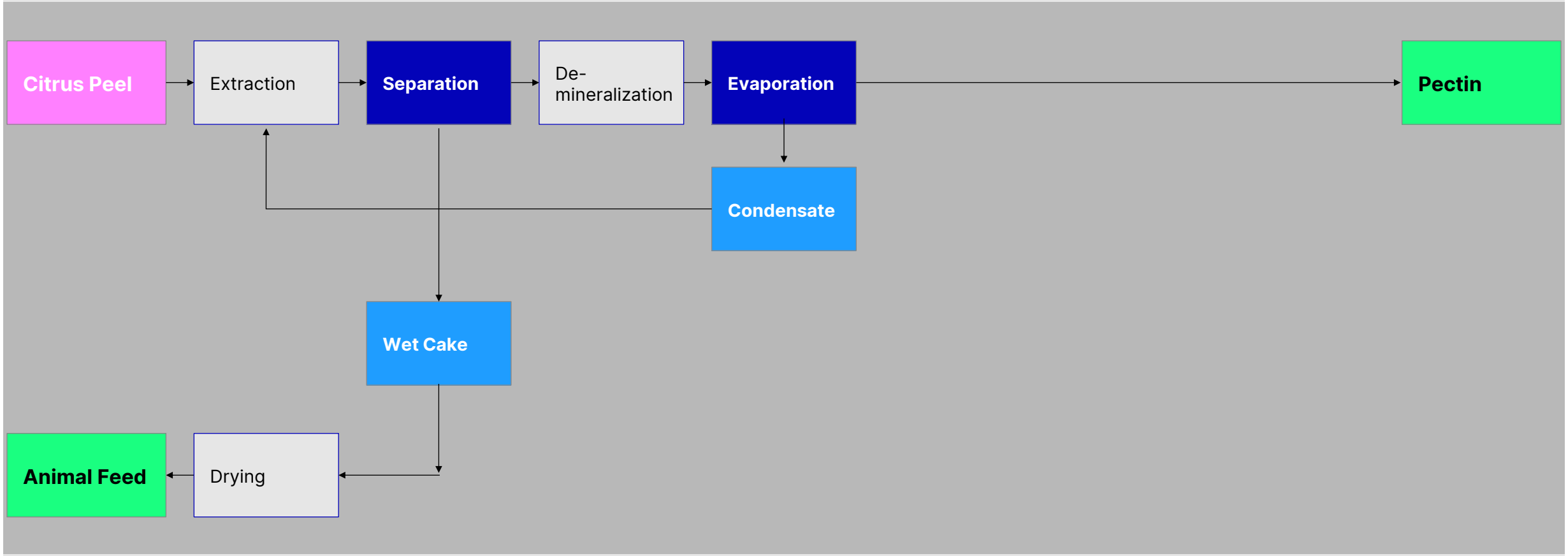
Cleanability





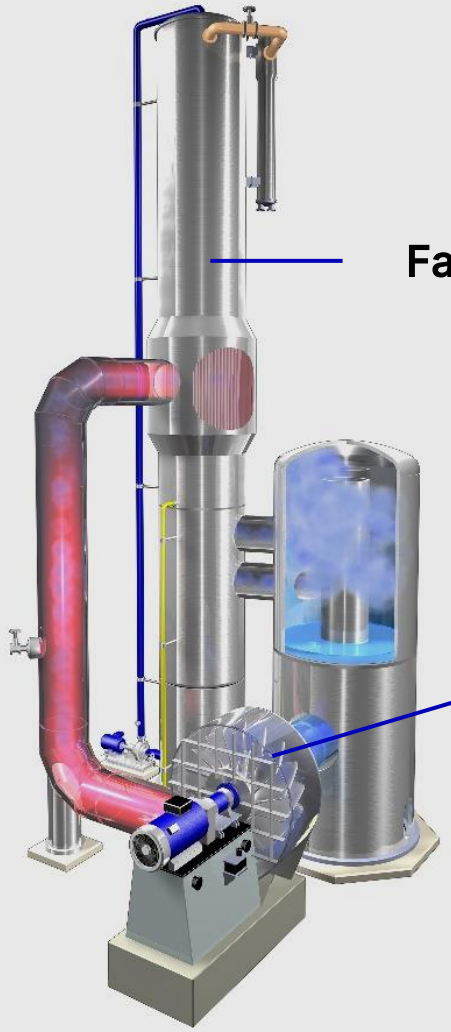
Process flow scheme (Pectin)

Evaporation



Concentration of pectin juice

by MVR Evaporation



Falling film evaporator

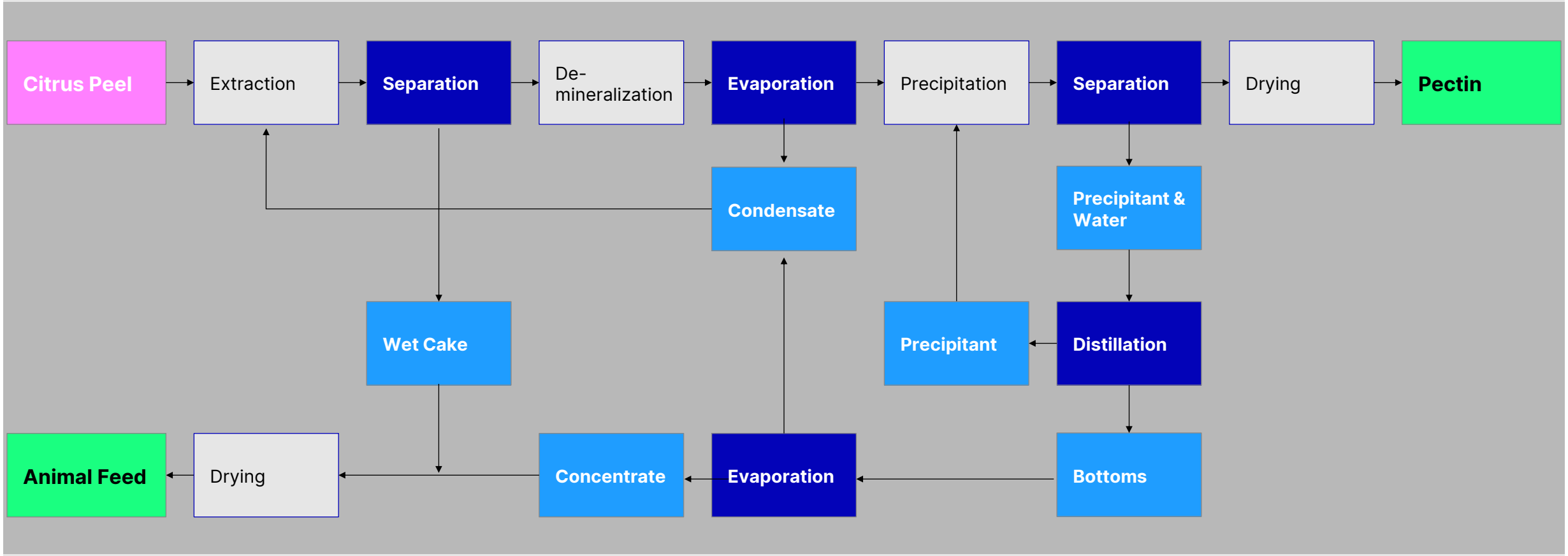
Mechanical Vapor Recompressor → MVR (high-performance blower)

1. Simple and robust design, easy to operate.
2. Low energy consumption and fully electric operation due to mechanical vapor recompression.
3. Long operating times and reduced cleaning effort due to low temperatures and temperature differences.
4. Product-friendly concentration due to low boiling temperatures over the entire concentration range.

GEA

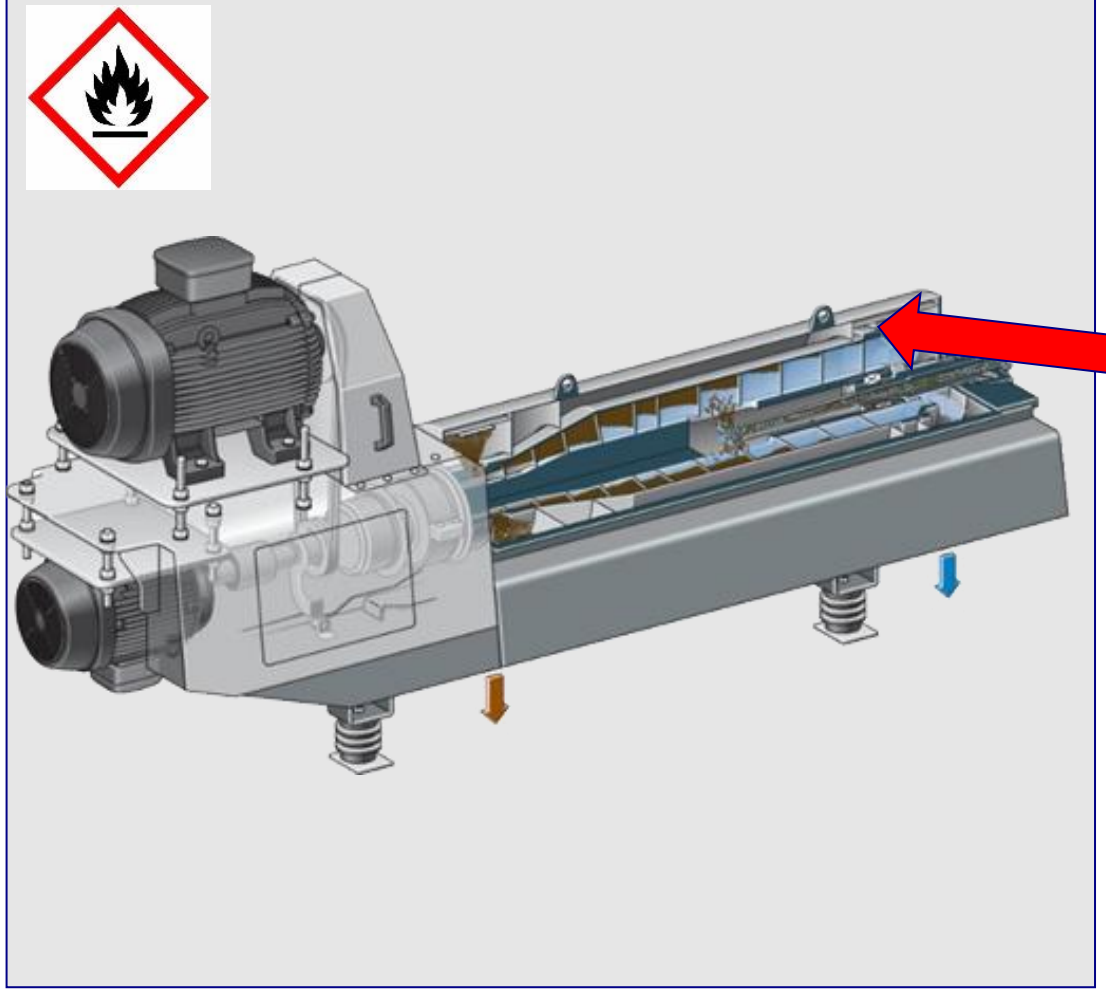
Process flow scheme (Pectin)

Precipitation

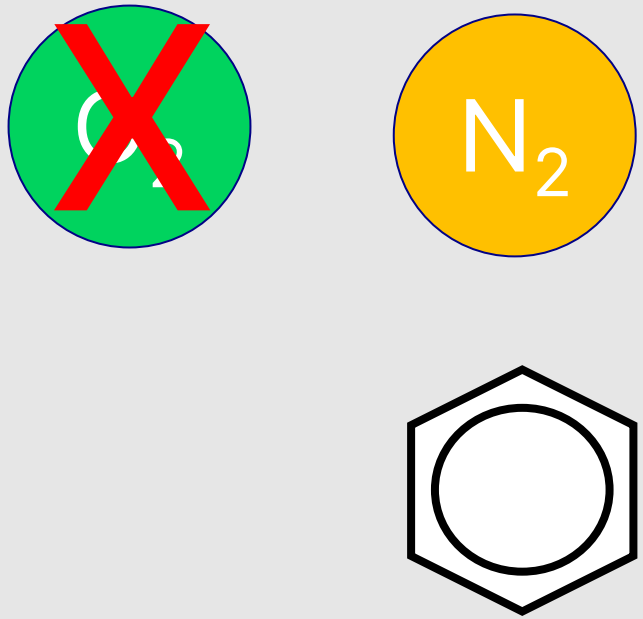


ATEX 2014 /34/ EC compliance

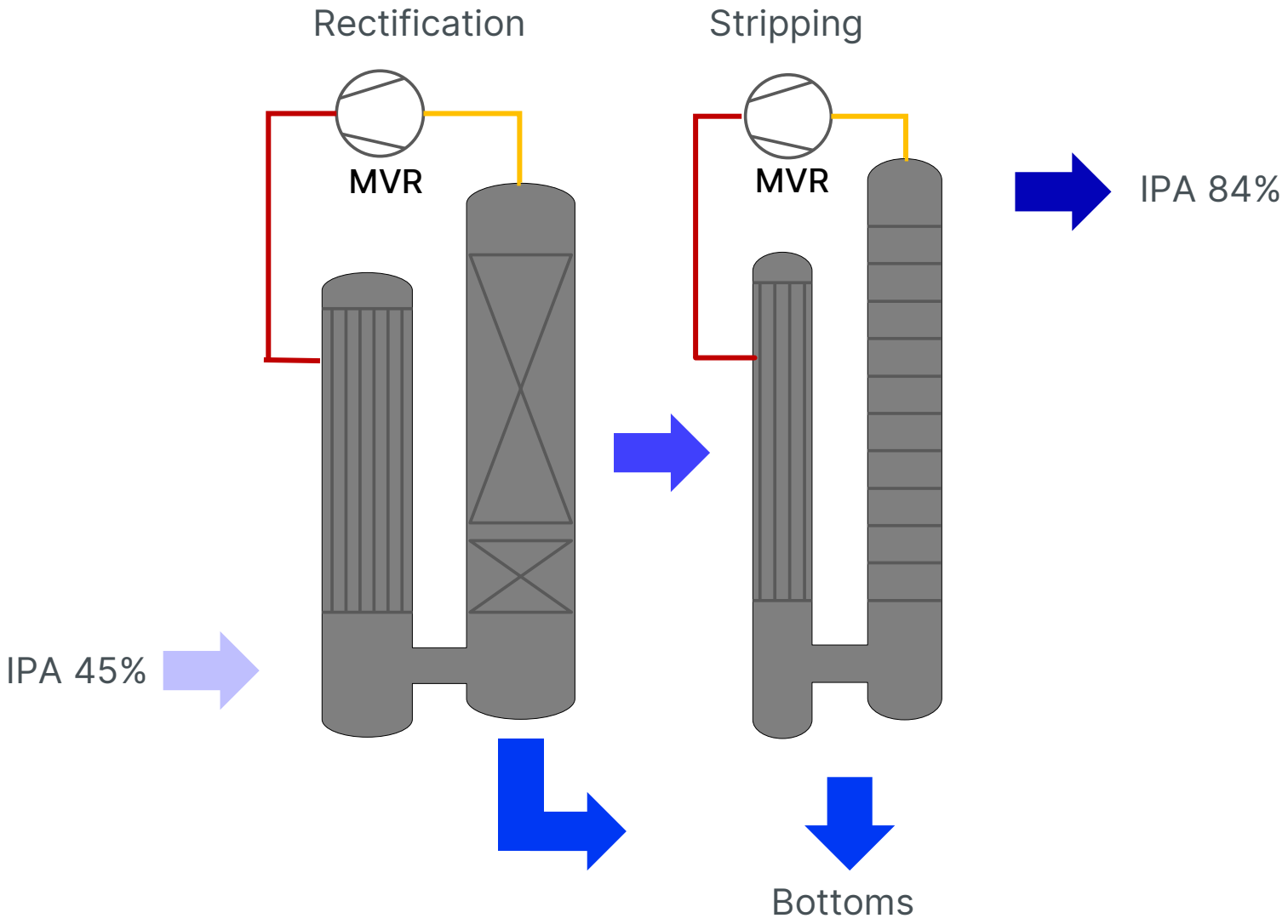
Rotating equipment – Centrifuge -



Safety by flushing and blanketing with inert gas

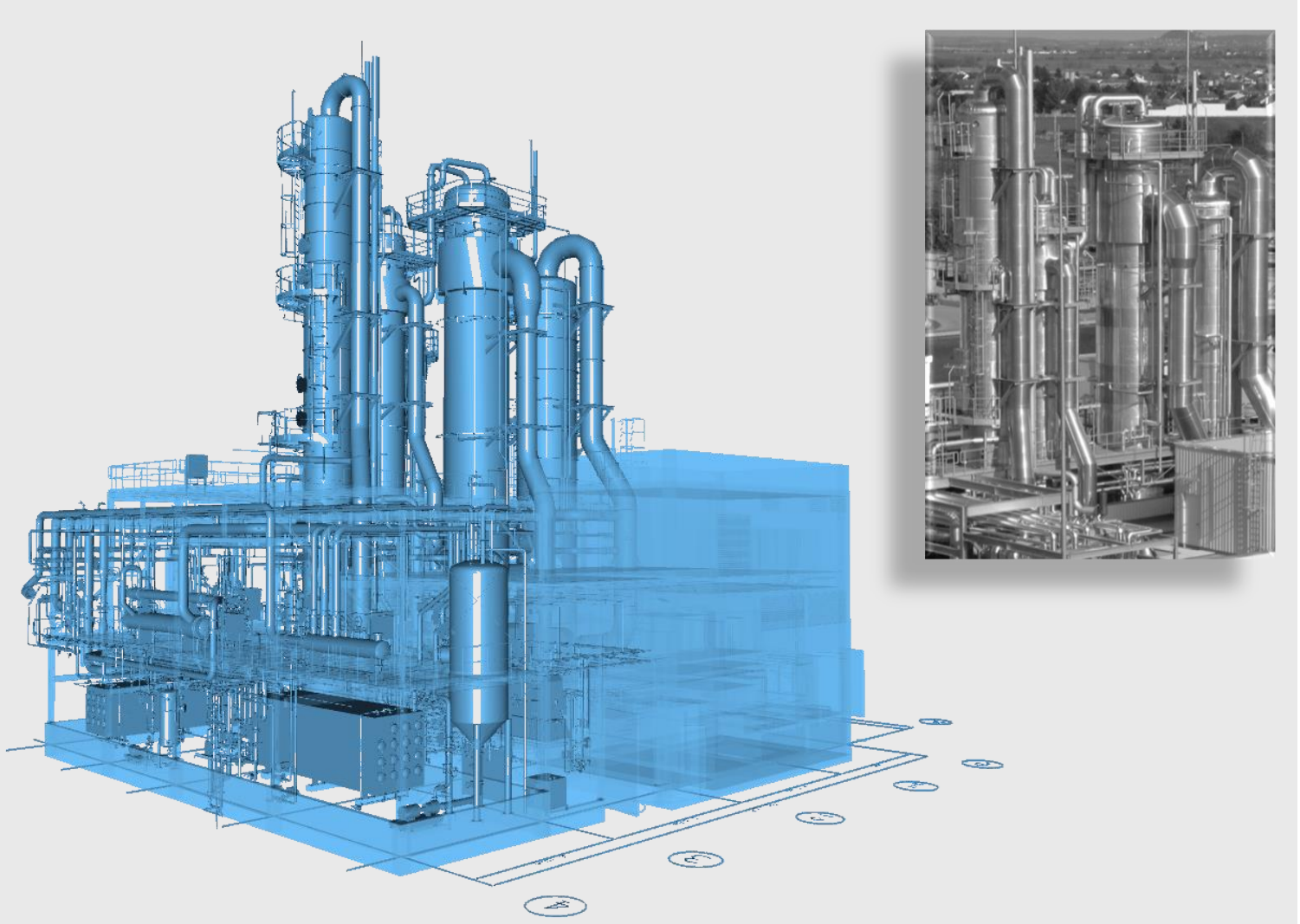


Multi-Effect MVR-Distillation of Isopropanol



1. Multi-Effect MVR-Distillation patent in 2016
2. Straight forward, most energy efficient design
3. Pure electrical operation with no steam consumption due to heat recovery with mechanical vapor recompression
4. Suitable for very large product rates of more than 100 t/h

Multi-Effect MVR-Distillation (Example)



1. Large scale distillation plant for solvent form precipitation,

   build and commissioned in 2023/2024

2. Fully automated operation

3. Test Twin for Software FAT and pre-comissioning

4. Ready for CO2 neutral operation due to fully electrical MVR-heated distillation.

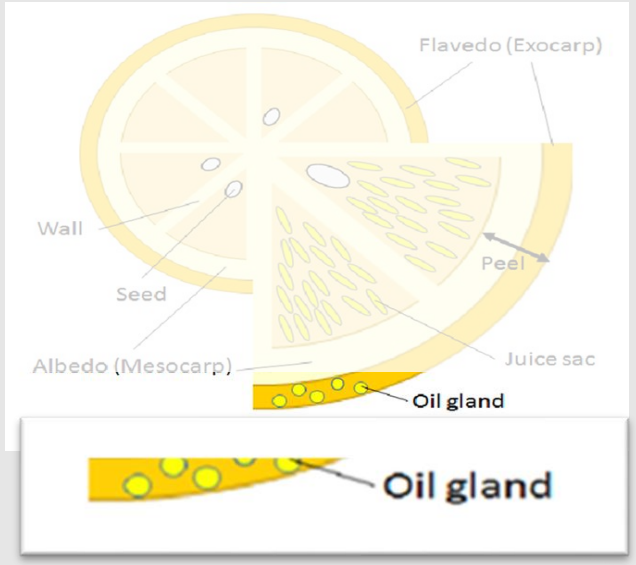
GEA

Challenges

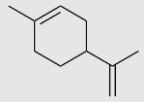
By fresh peel usage

- Trend to processing of fresh peels containing higher amounts of d-limonene
- D-Limonene decomposes during extraction to undesired flavours like
  1,8-cineol
  1,4-cineol
  α-terpinene
  γ-terpinene
- These components have to be separated.

- Solution: patented extractive distillation by GEA



Containing D-limonene

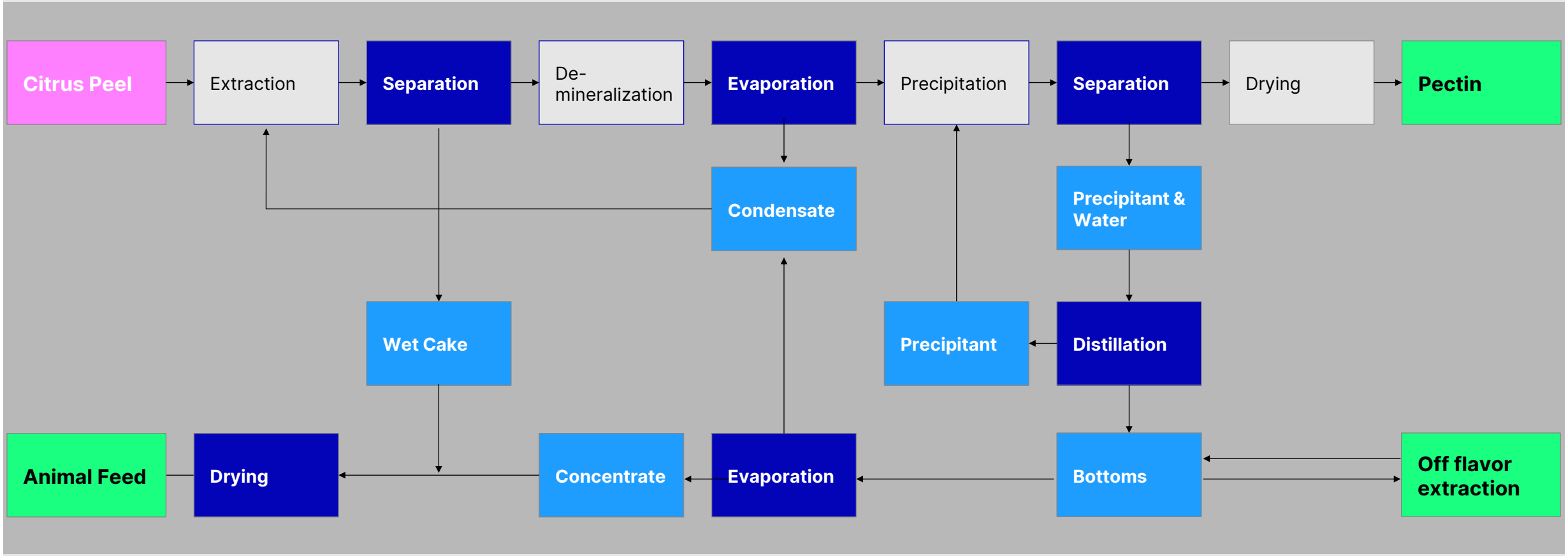


Limonene

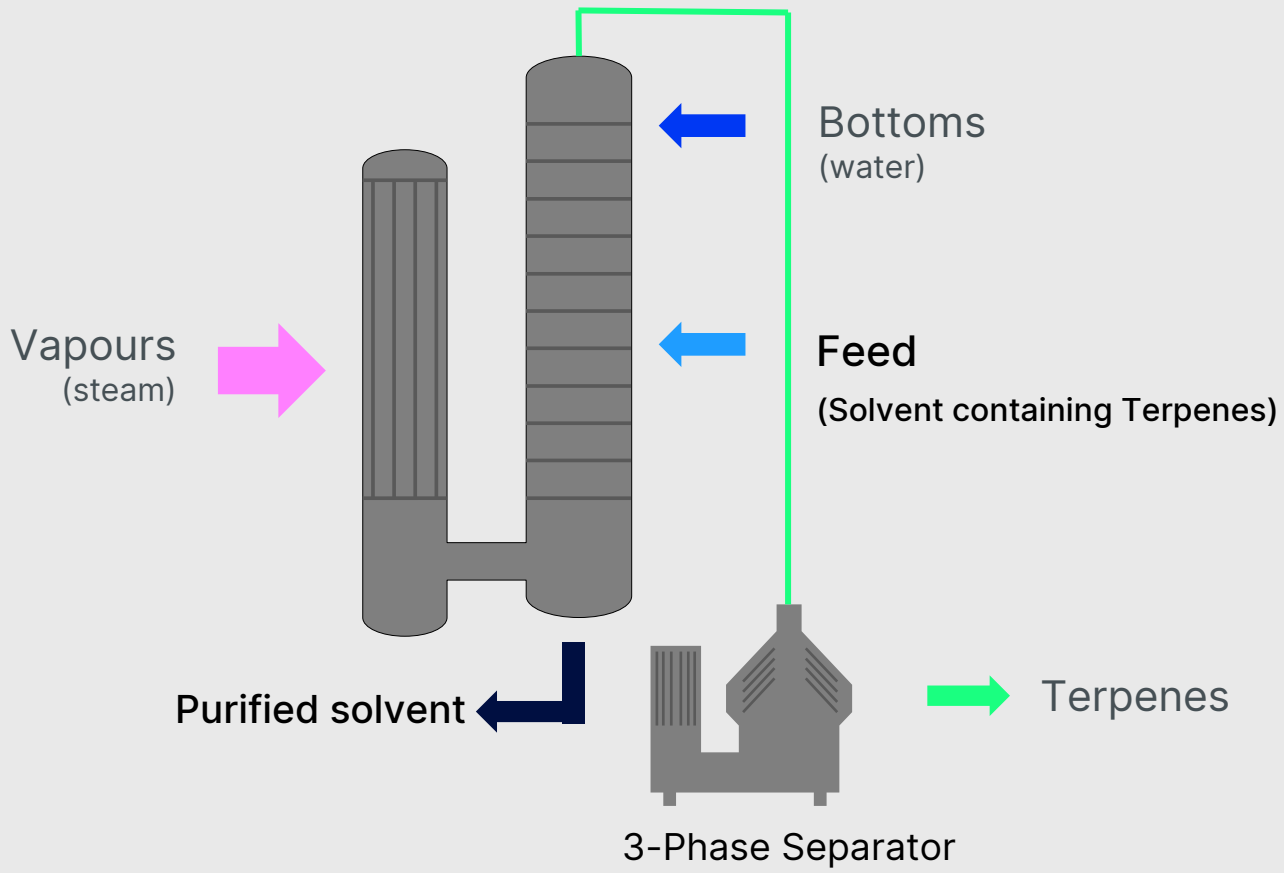


Process flow scheme (Pectin)

Off flavor extraction



Separation of Terpenes from Solvent

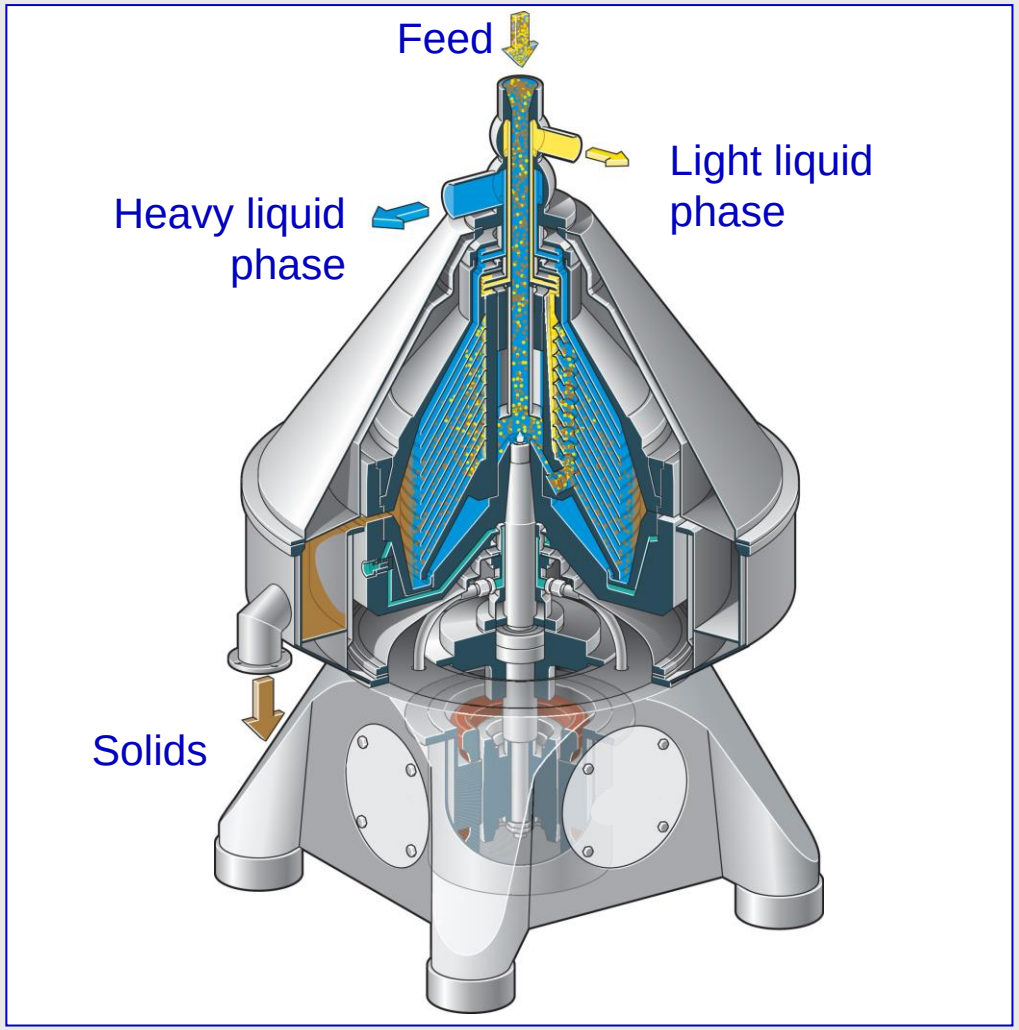


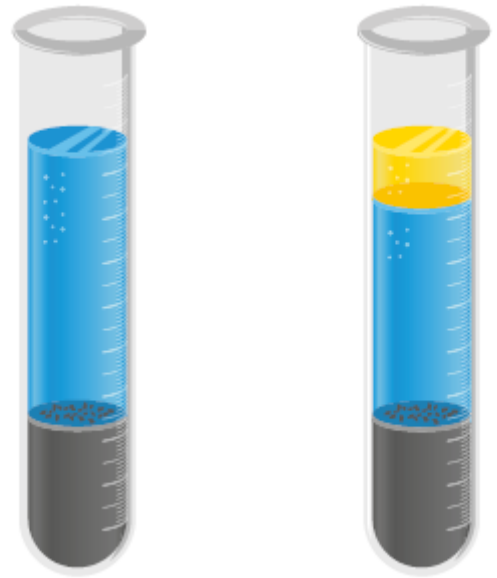
1. Separation of terpenes with extractive distillation by increasing their relative volatilities by adding water

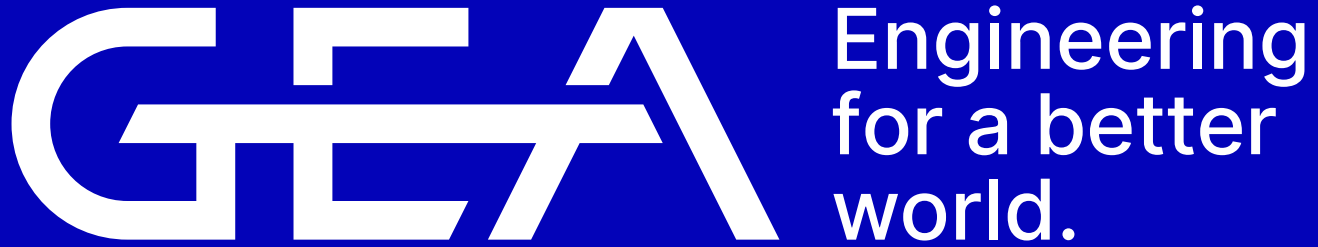
2. Heat integrated with the main solvent recovery distillation.

3. Suitable for separation of D-limonene and most of its oxidation products like:
   - 1,8-cineol
   - 1,4-cineol
   - α-terpinene
   - γ-terpinene

3-Phase Separator for **Terpenes**






Engineering
for a better
world.