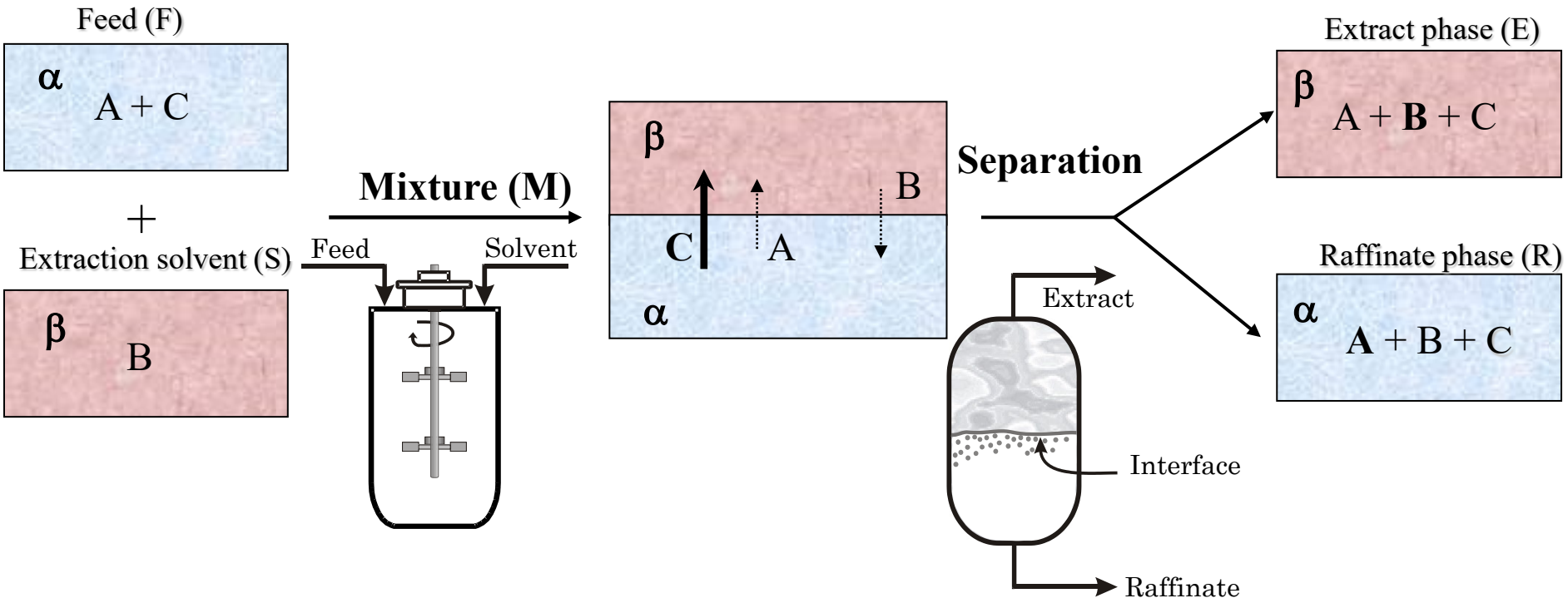
Liquid – Liquid Extraction

Processos de Separação

LEQB

2023/2024



A: Water (diluent)

C: Acetone (solute)

B: *n*-Hexane (solvent)

S - solvent flowrate (B)

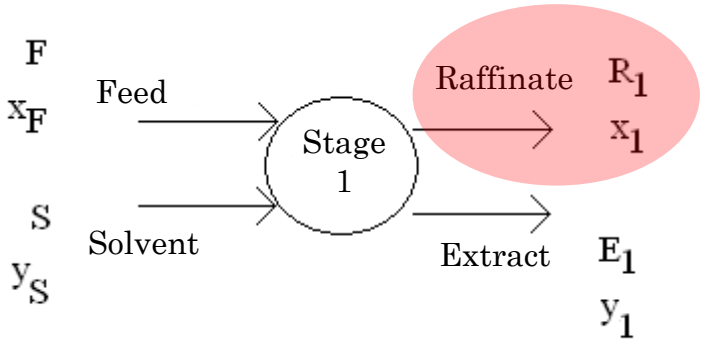
F - feed flowrate (A + C)

E - extract phase flowrate

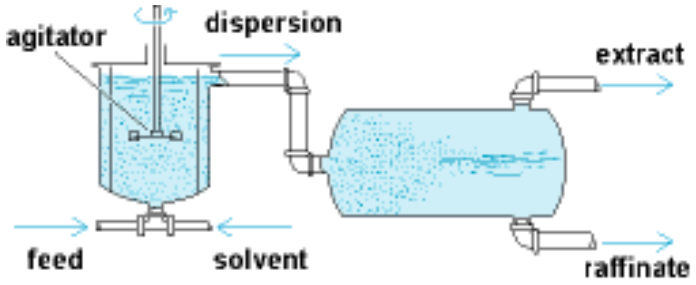
R - raffinate phase flowrate

Methods of operating LLE in the industry

1. Single-stage extraction



x_1 in equilibrium with y_1



Mixer (Misturador)

Settler (Decantador)

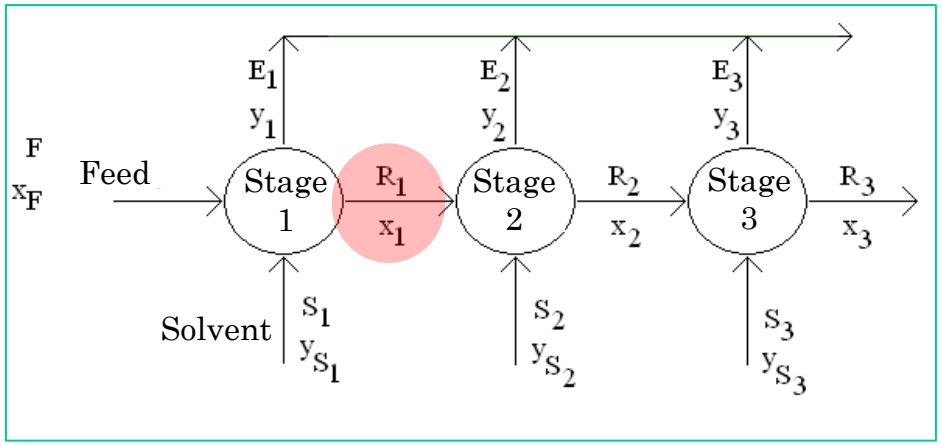
What to do with R_1?

x : fraction of solute C in the raffinate phase

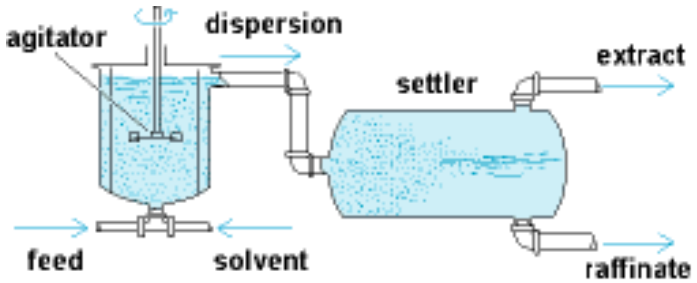
y : fraction of solute C in the extract phase

$$x, y = \frac{m_C}{(m_A + m_B + m_C)}$$

2. Multi-stage extraction (Cross Flow)



$\Rightarrow x_3 < x_2 < x_1$



Mixer (Misturador)

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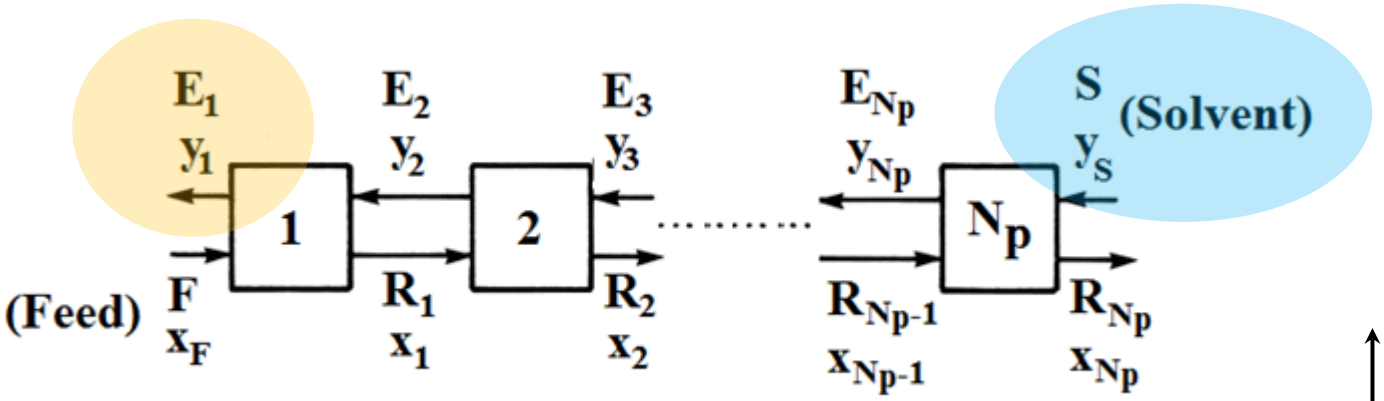
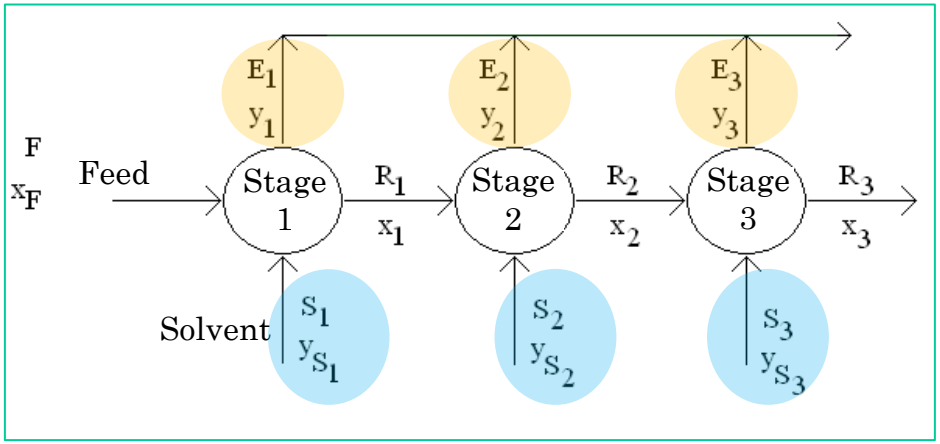
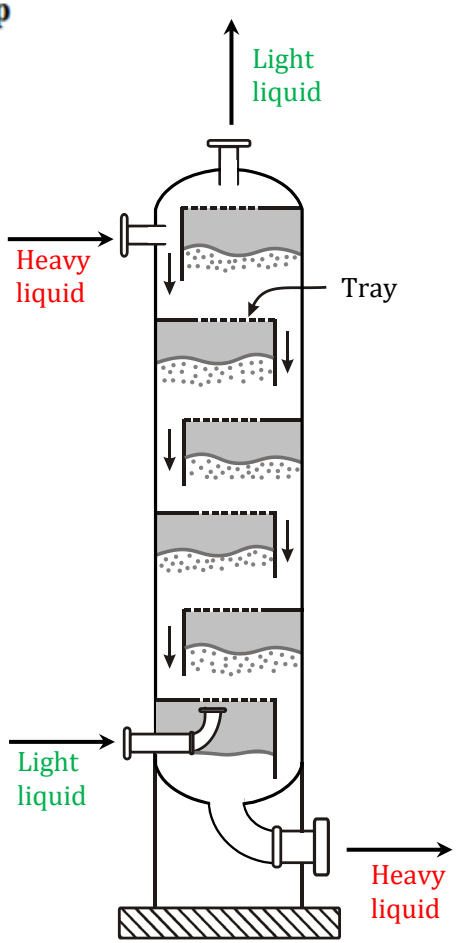
Main disadvantage: $y_3 < y_2 < y_1$

3. Countercurrent Extraction



- Lower solvent consumption
- Less polluting
- More efficient





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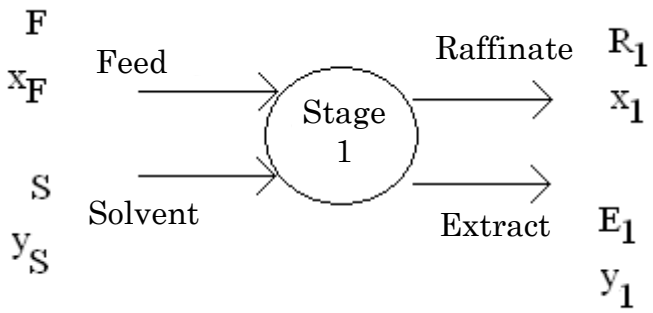
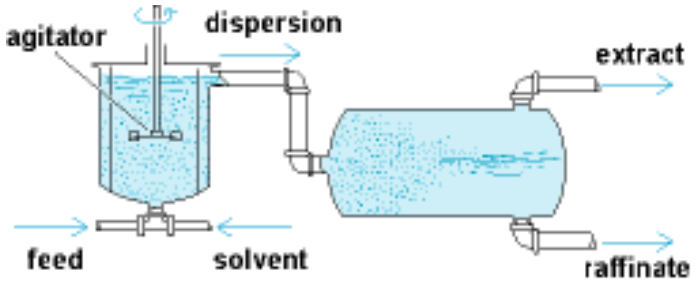


x_1 in equilibrium with y_1



Mixer (Misturador)

Settler (Decantador)

Problem 1