Simulación y Optimización

Modelado
Parte VII

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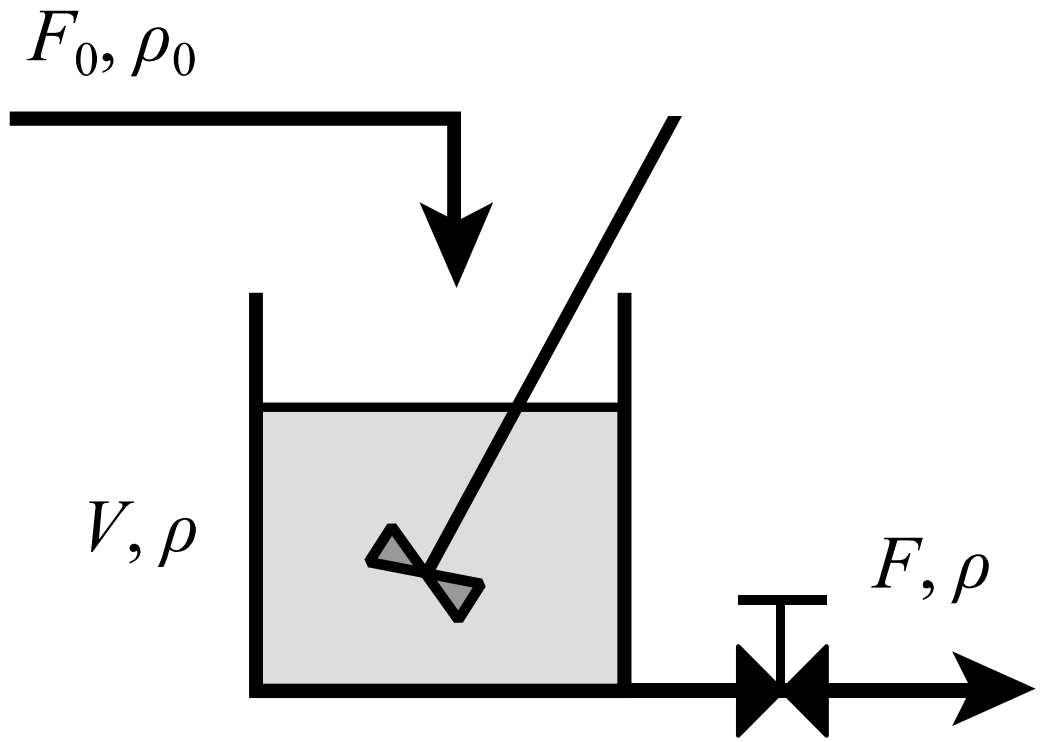
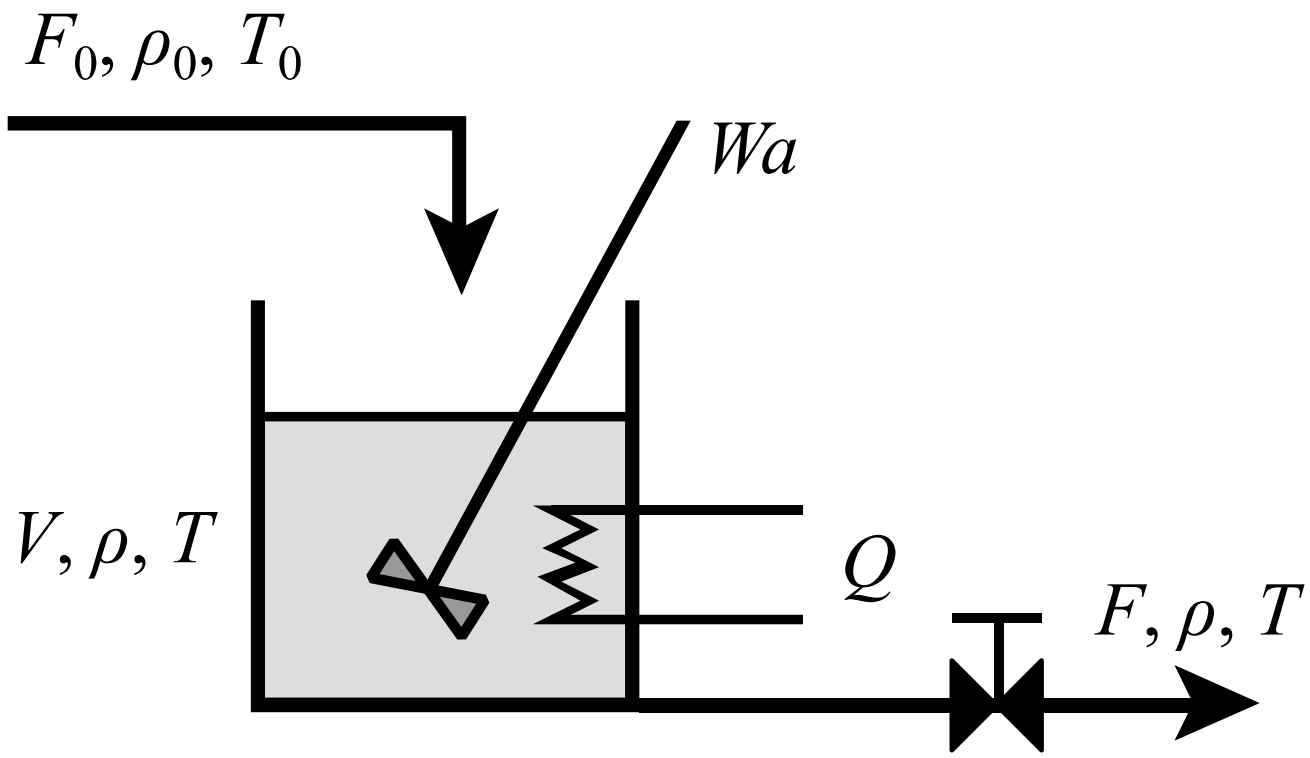
Otros equipos

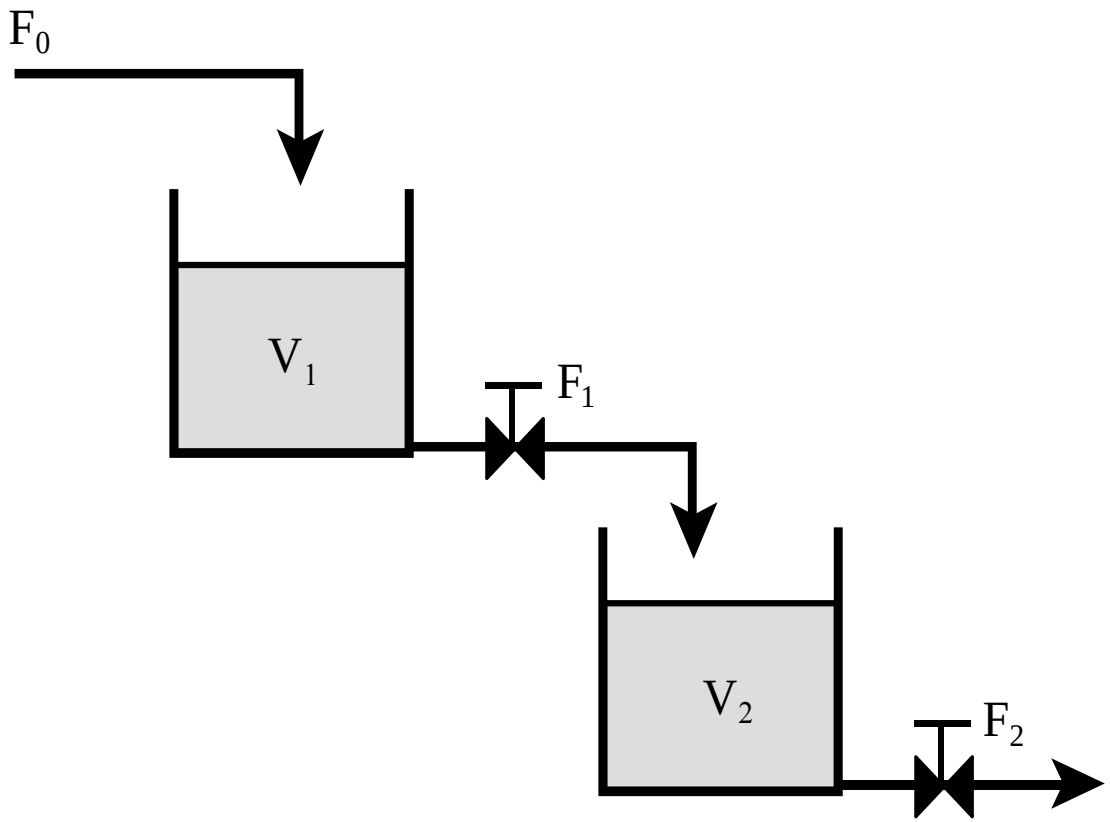
Tanque con descarga gravitatoria



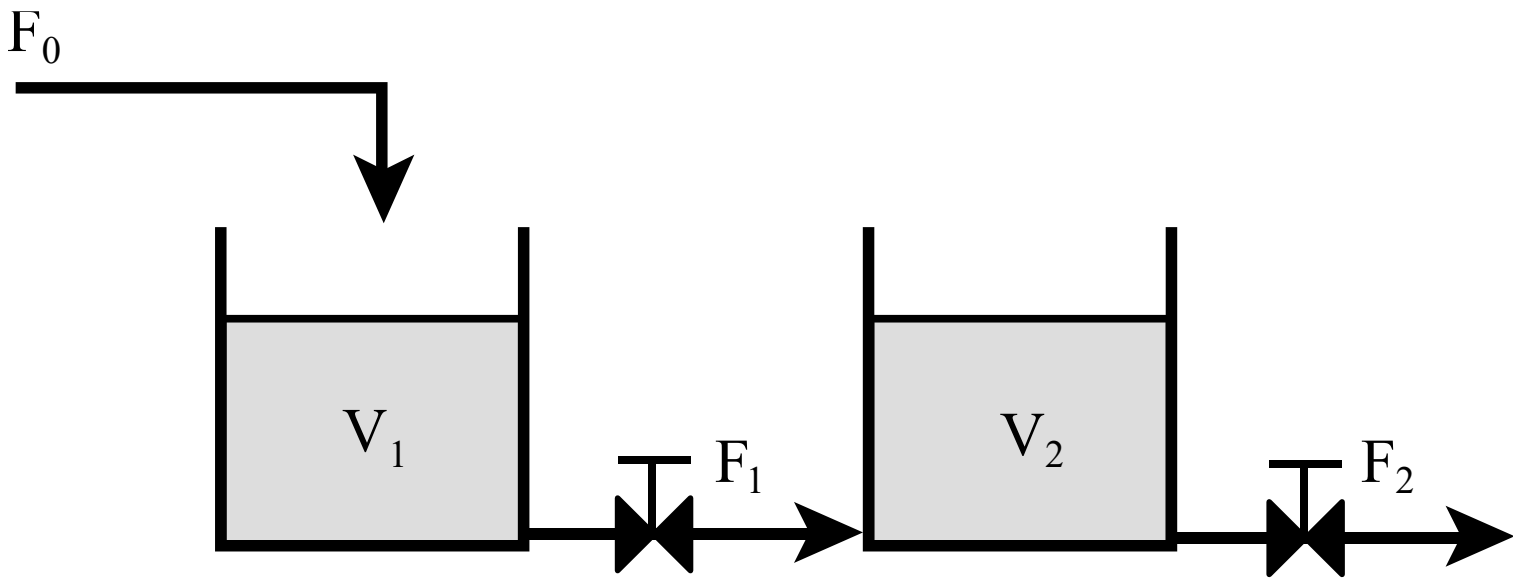
Tanque calefaccionado



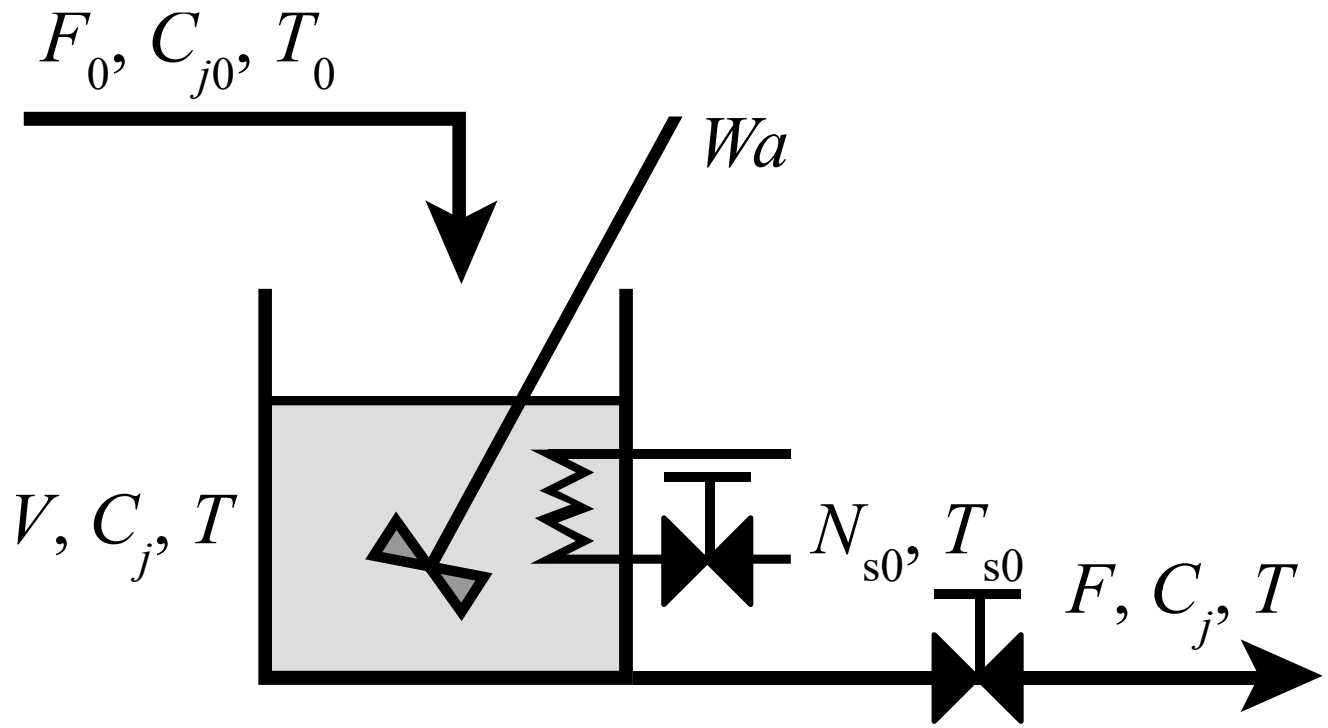
Tanques en serie no interactiva



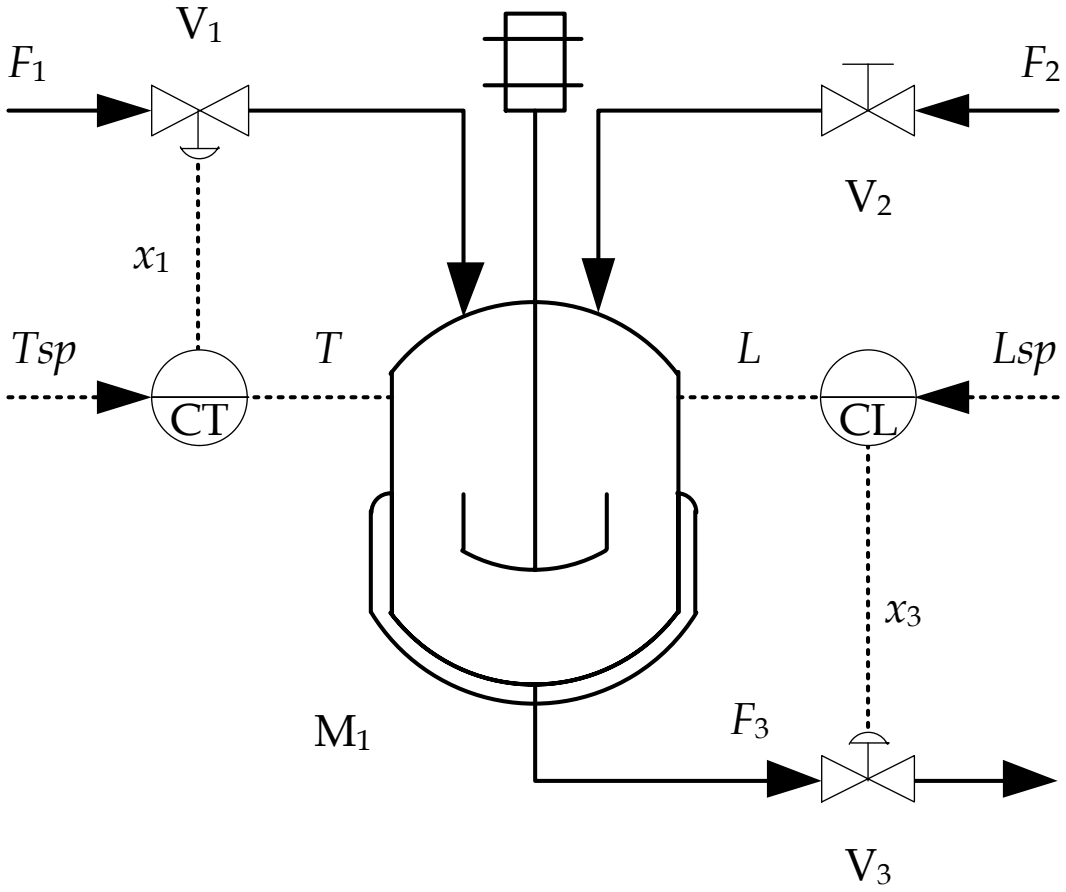
Tanques en serie interactiva



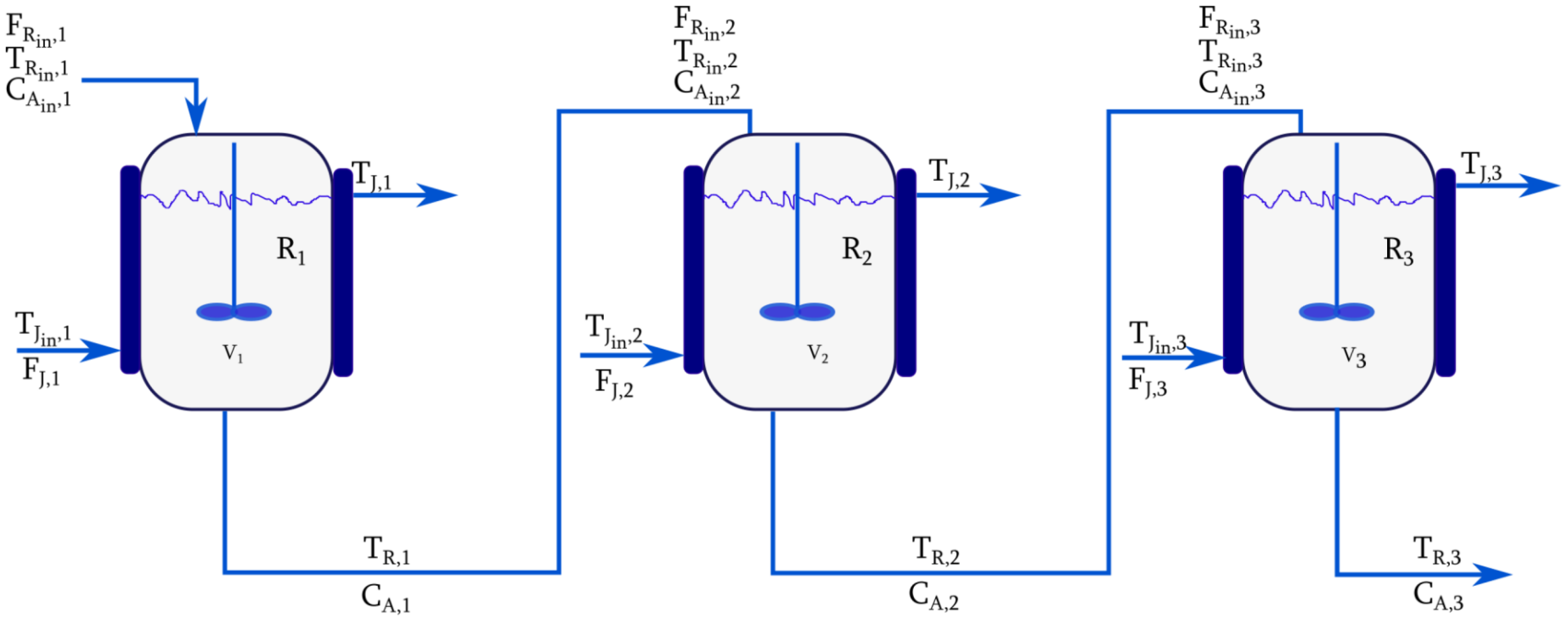
Reactor CSTR



Reactor con control

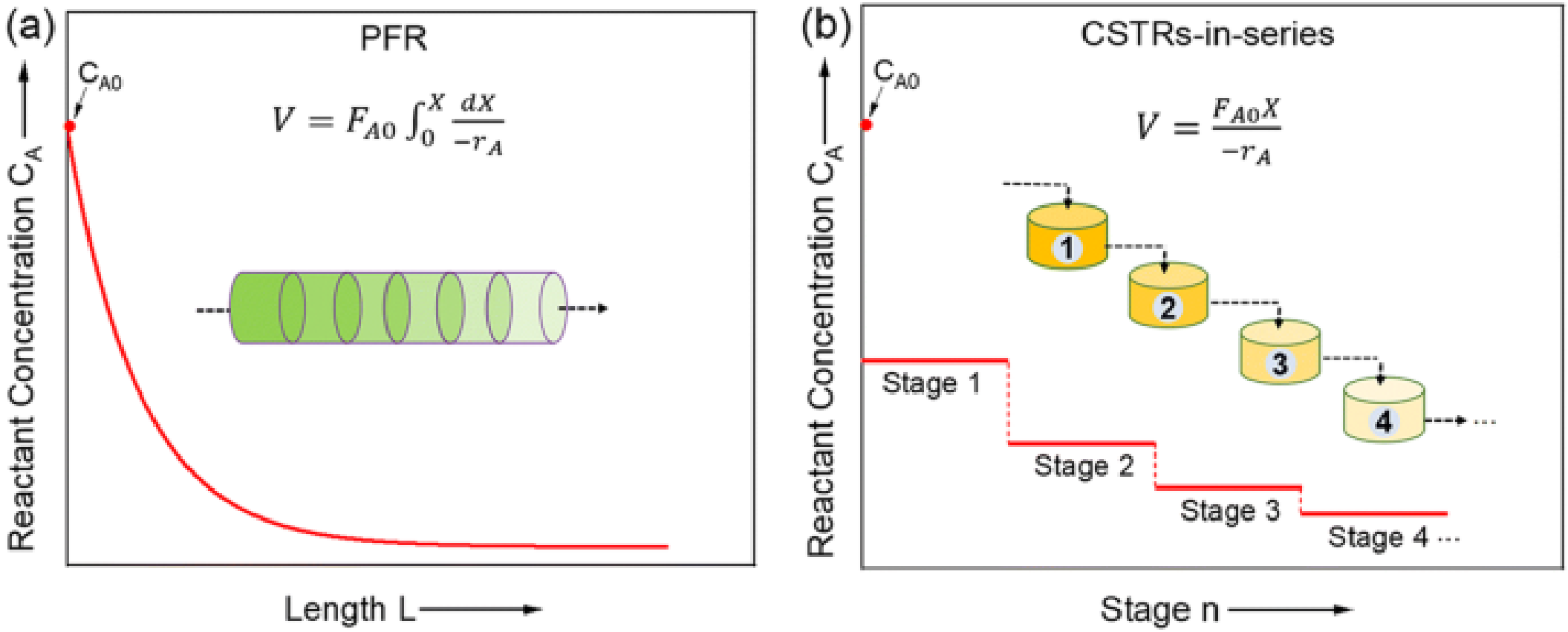


Tren de reactores

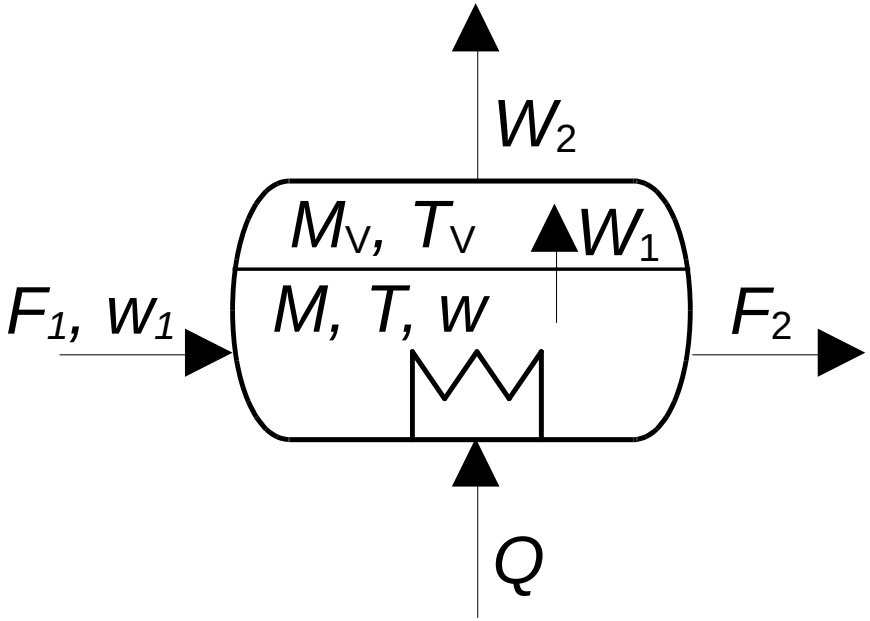


Del equipo *i*, salen las corrientes *i*.

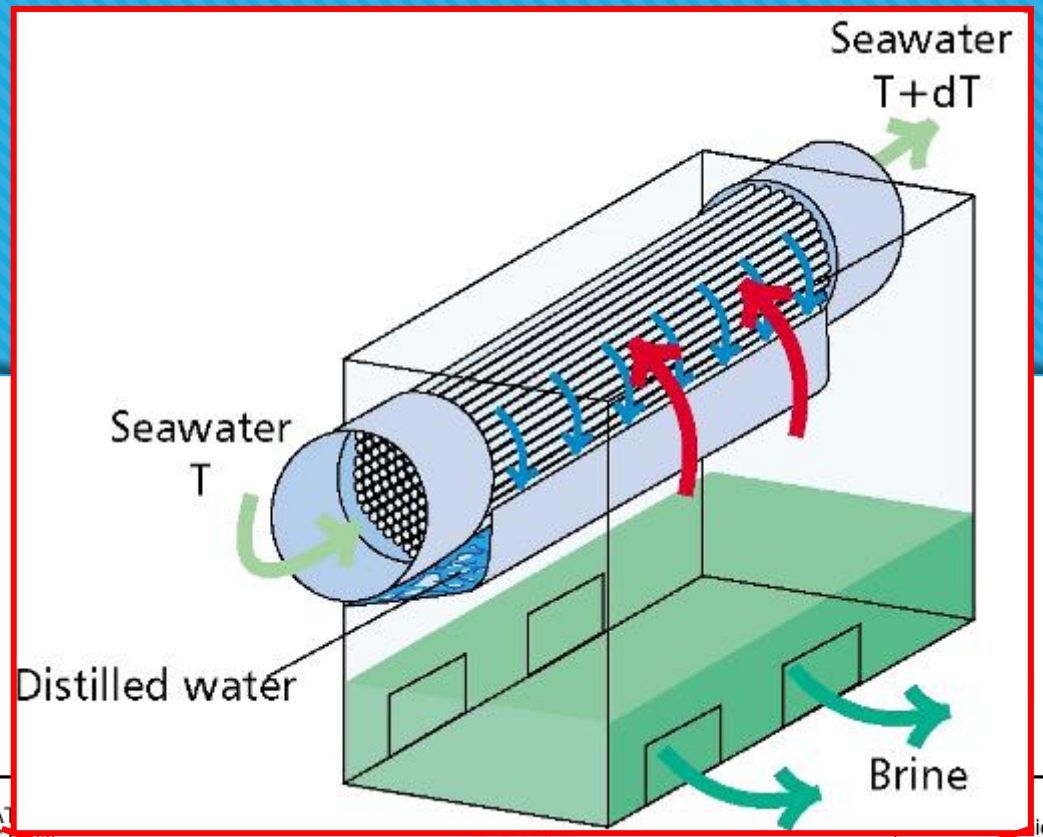
Reactor tubular

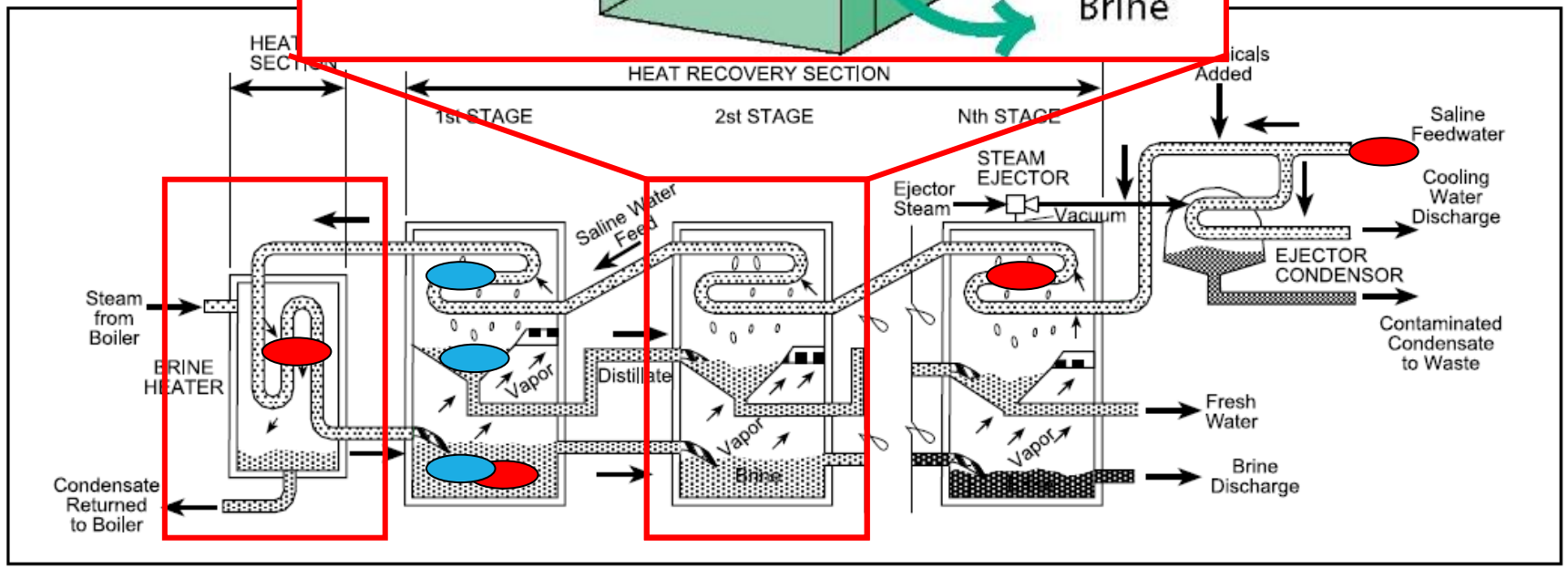


Evaporación

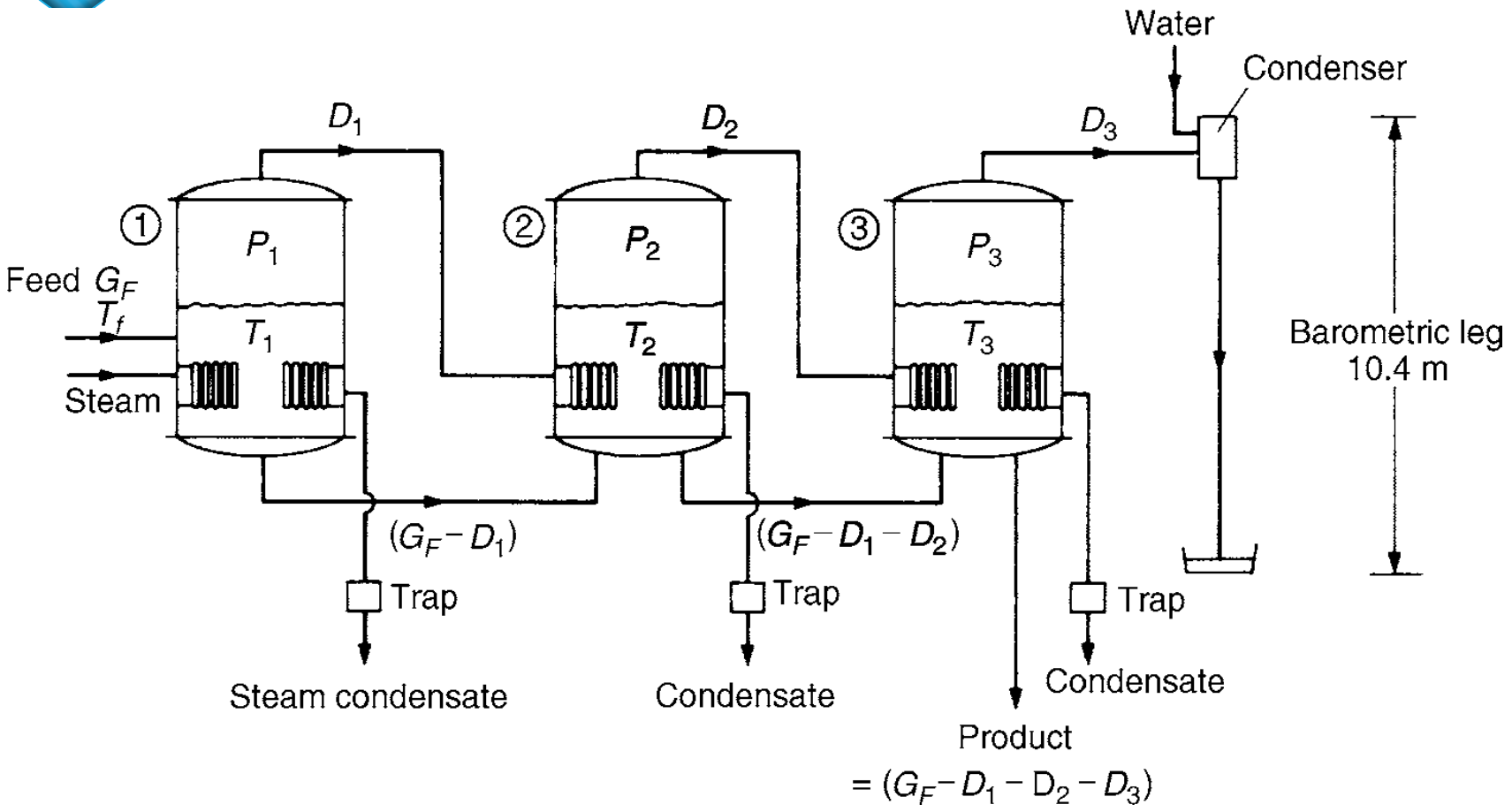


Desalador

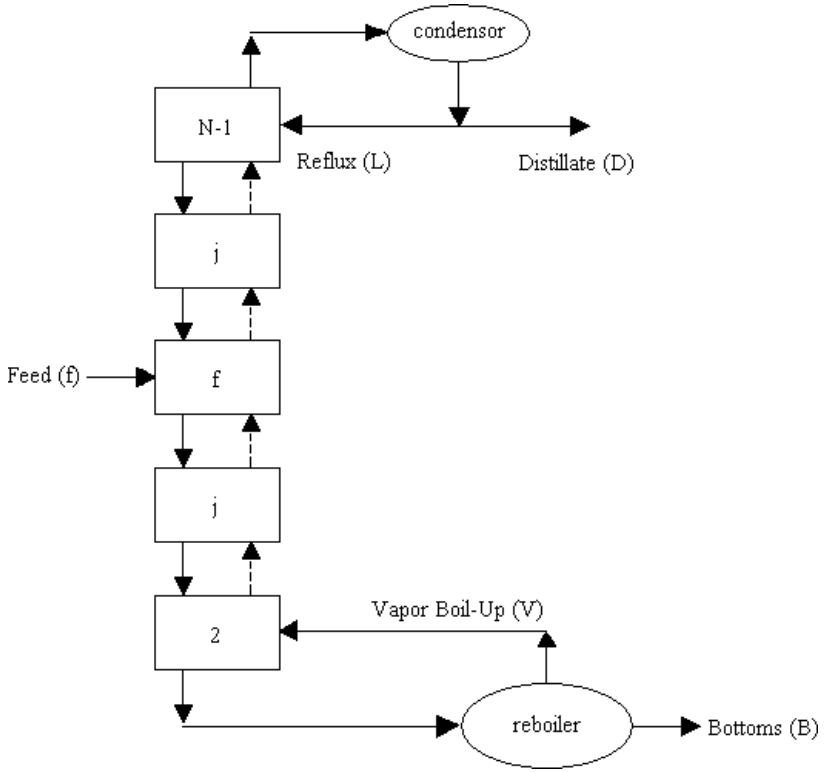

Seawater
T+dT
Seawater
T
Distilled water
Brine

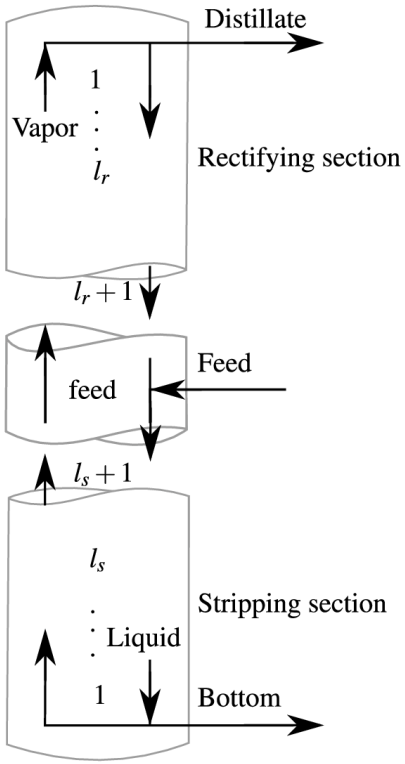

HEAT RECOVERY SECTION
1st STAGE
2st STAGE
Nth STAGE
Saline Feedwater
STEAM EJECTOR
Ejector Steam
Vacuum
Cooling Water Discharge
EJECTOR CONDENSOR
Contaminated Condensate to Waste
Saline Water Feed
Steam from Boiler
BRINE HEATER
Vapor
Distillate
Brine
Fresh Water
Brine Discharge
Condensate Returned to Boiler

Evaporador de efecto múltiple

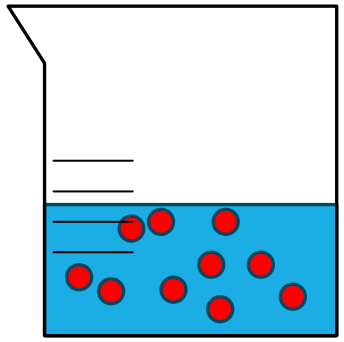


Columna de destilación

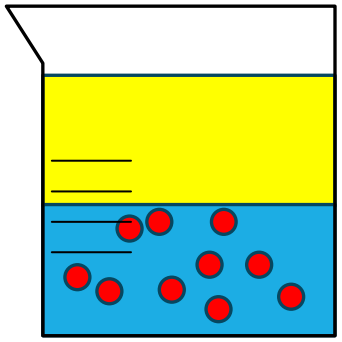




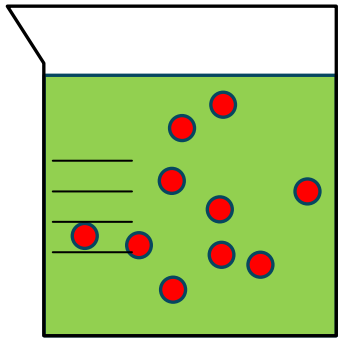
Extracción por solvente



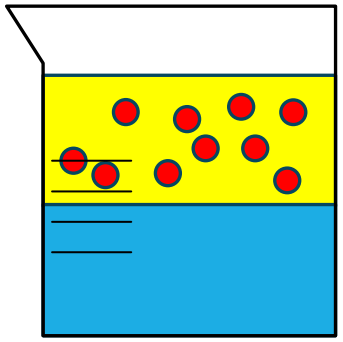
Solución original



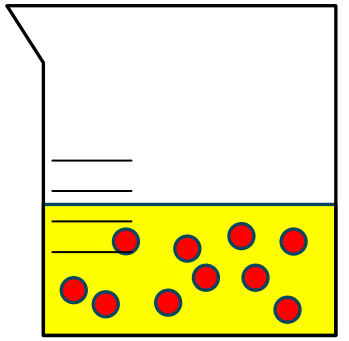
Agregado de solvente

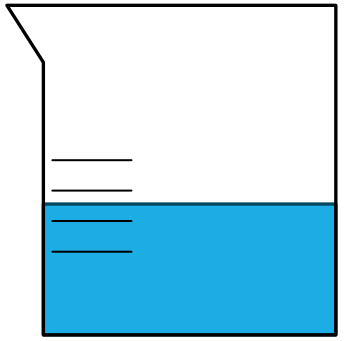


Mezclado

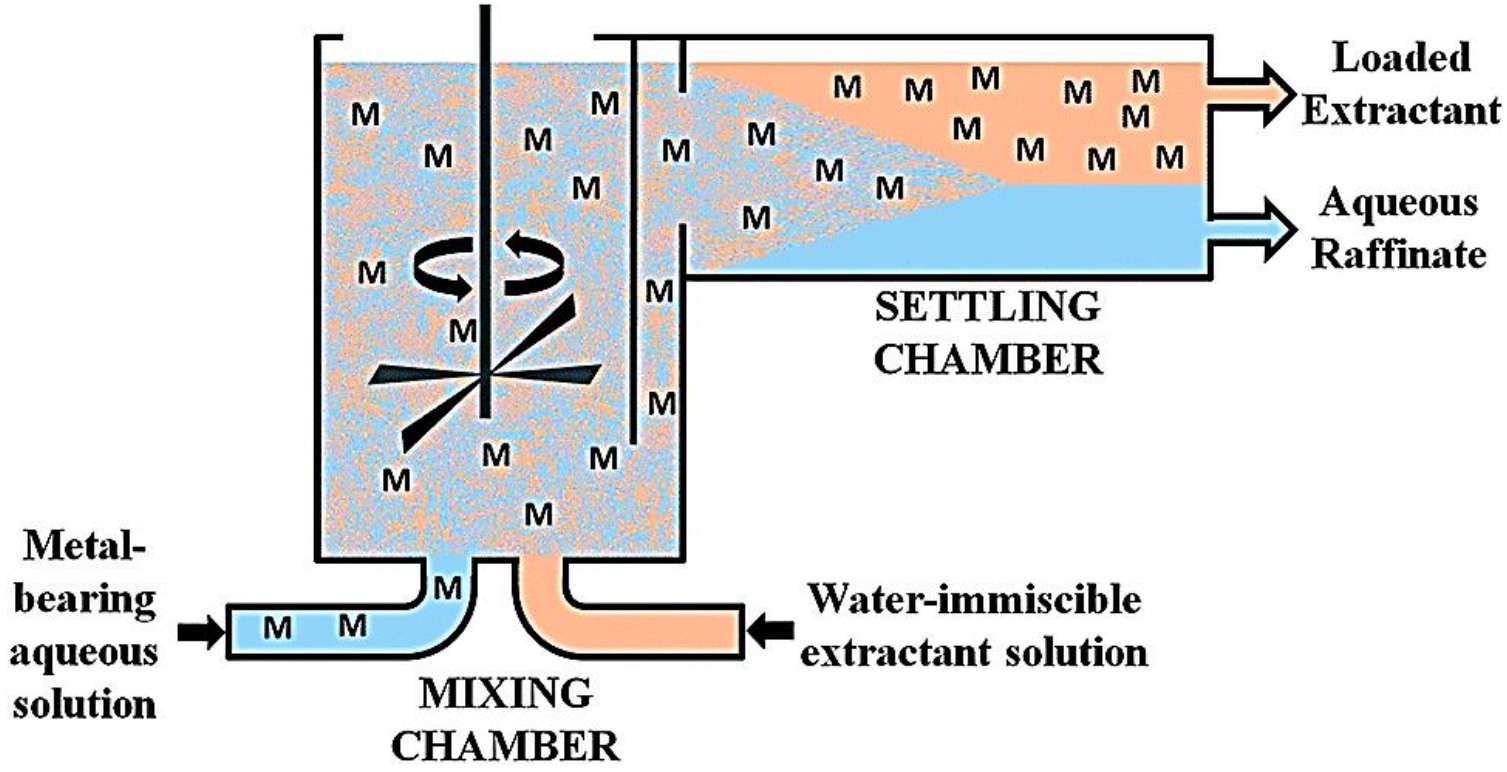


Decantación

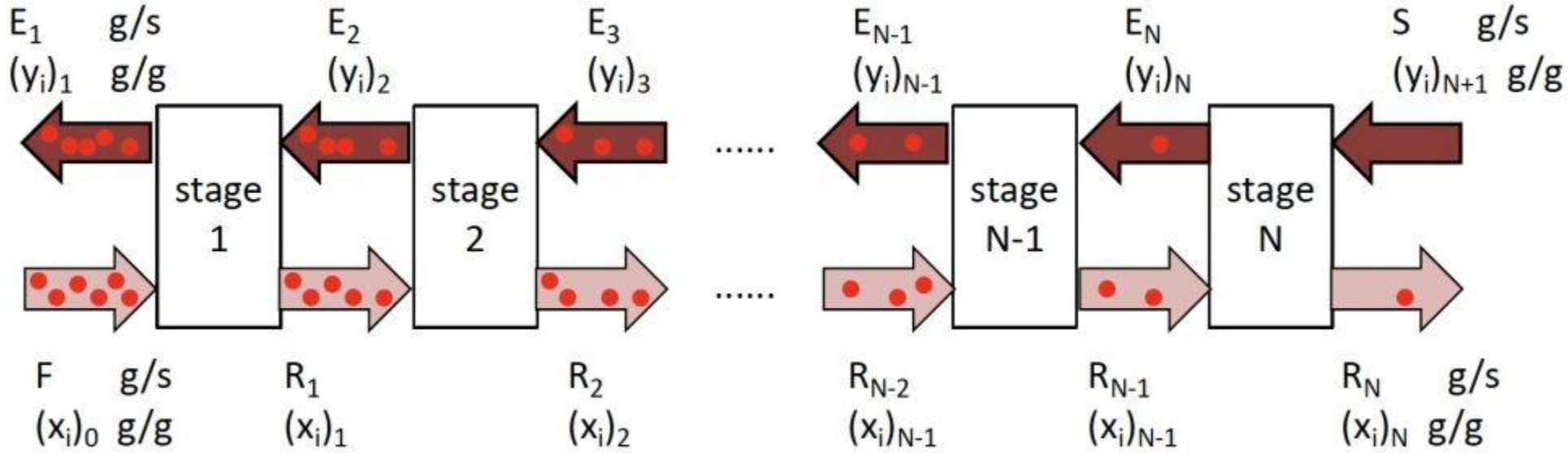




Extracción por solvente

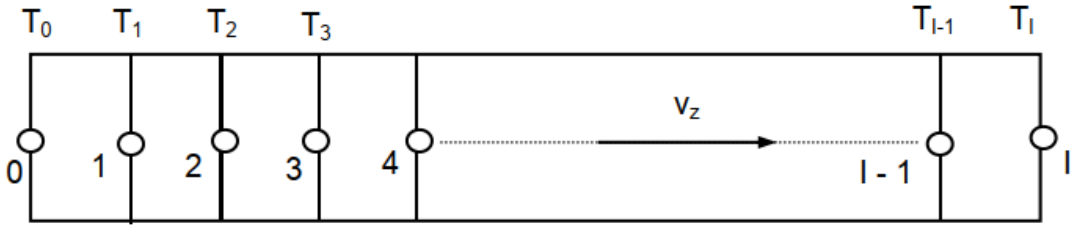


Extracción líquido-líquido contracorriente



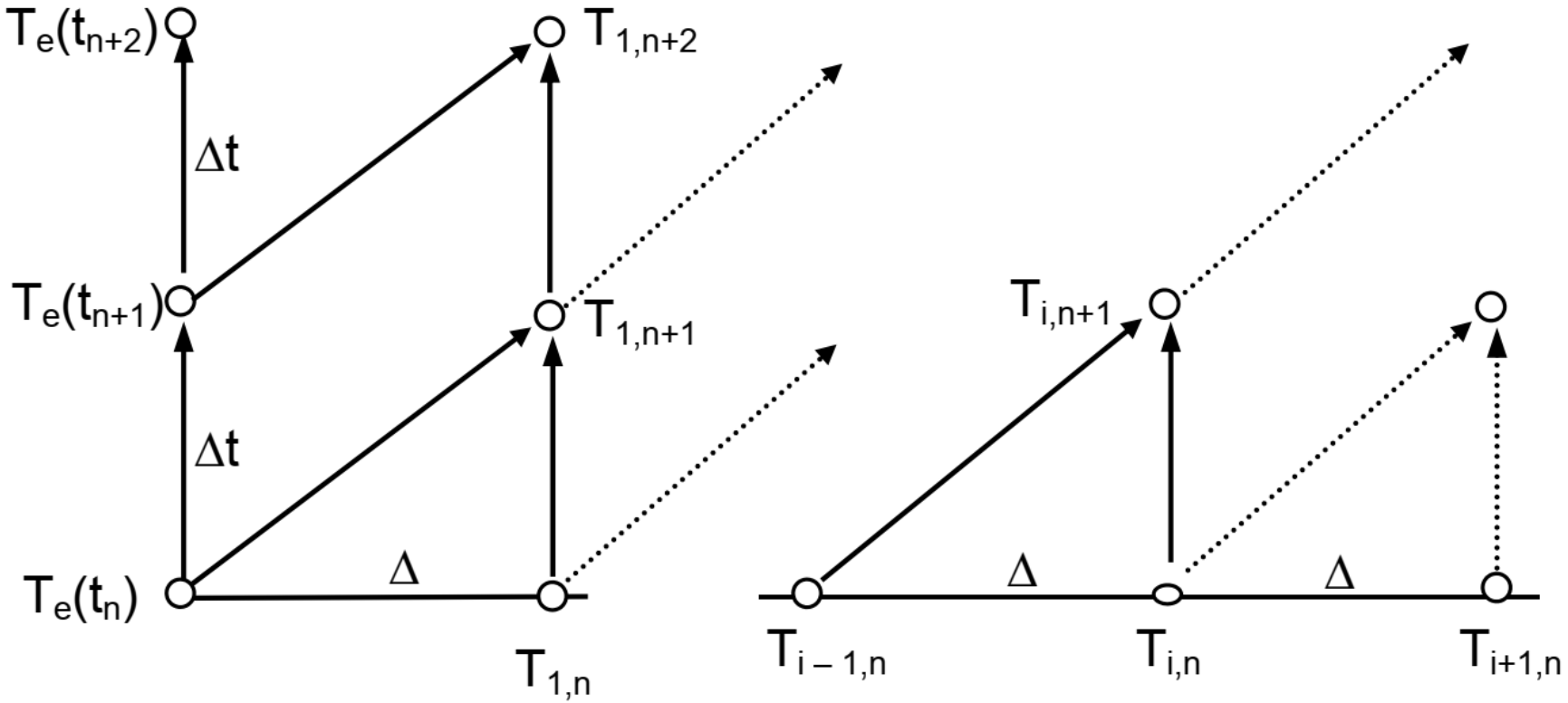
Reactor tubular

- Perfil inicial, en $t = 0$:
  - $C_{\mathrm{A}}(z, 0) = C_{\mathrm{A0}}(z)$
- Condición de contorno, $z = 0$:
  - $C_{\mathrm{A}}(0, t) = C_{\mathrm{A}e}(t)$



$$\frac{\partial C_A}{\partial t} = -v\frac{\partial C_A}{\partial z} - k_A C_A$$

Discretización



Reactor tubular

PDEs

$$\frac{\partial C_A}{\partial t} = -v\frac{\partial C_A}{\partial z} - k_A C_A$$

Diferencias finitas

$$\frac{C_{i,n+1} - C_{i,n}}{\Delta t} = -v\frac{C_{i,n} - C_{i-1,n}}{\Delta z} - k_A C_{i,n}$$

adelante atrás

Reactor tubular

Diferencias finitas

$$\frac{C_{i,n+1} - C_{i,n}}{\Delta t} = -v\frac{C_{i,n} - C_{i-1,n}}{\Delta z} - k_A C_{i,n}$$

Solución

$$C_{i,n+1} = \left(v\frac{\Delta t}{\Delta z}\right)C_{i-1,n} + \left(1 - \left(k_A + \frac{v}{\Delta z}\right)\Delta t\right)C_{i,n}$$

Reactor tubular

Condición de estabilidad

$$C_{i,n+1} = \left(v \frac{\Delta t}{\Delta z} \right) C_{i-1,n} + \left(1 - \left(k_A + \frac{v}{\Delta z} \right) \Delta t \right) C_{i,n}$$

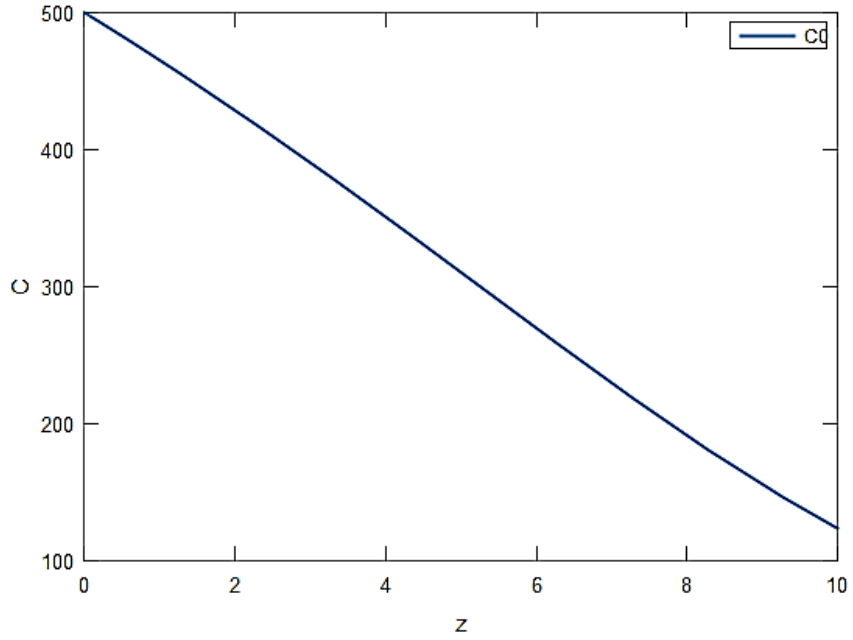
$$>= 0$$

Paso máximo

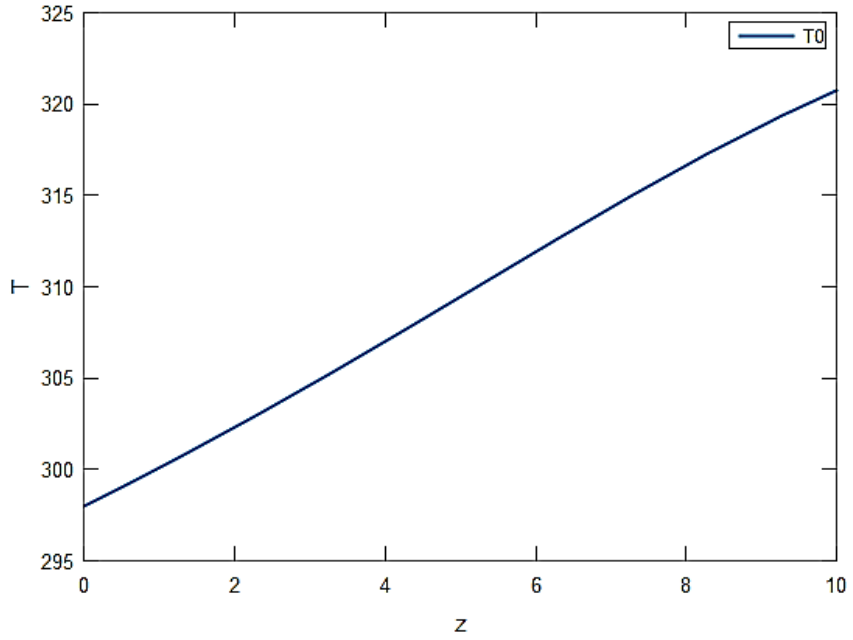
$$\Delta t_{max} = \frac{1}{k_A + \frac{v}{\Delta z}}$$

GNU Octave

Perfil inicial de *C*

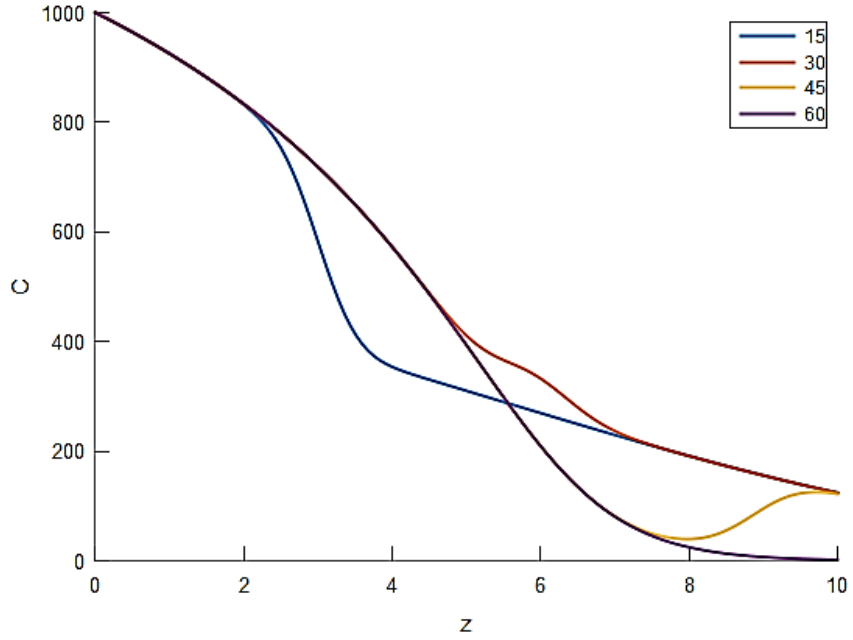


Perfil inicial de *T*

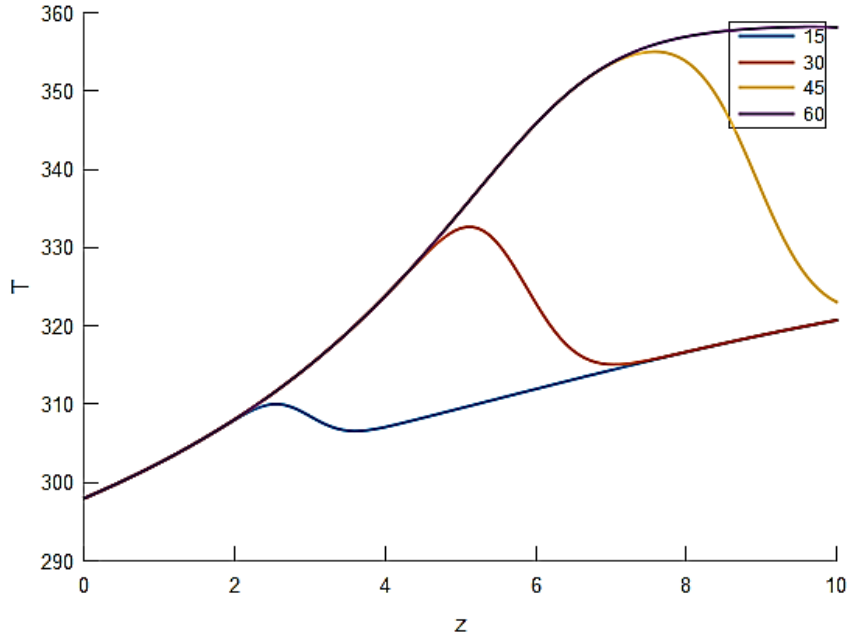


GNU Octave

C en el tiempo



T en el tiempo



reactor_tubular_Octave.m