



$$C_1 = E(t) = rac{\sqrt{Pe}}{2\,\sqrt{\pi\,(t/lpha\, au)^3}}\,\exp\left(-rac{Pe\,lpha\, au}{4\,t}\left(rac{t}{lpha\, au}-1
ight)^2
ight)$$



$$C_{out,i+1} = C_{out,i} + rac{C_{1,i} - C_{out,i}}{\left(1 - lpha
ight) au} \; \Delta t \; .$$

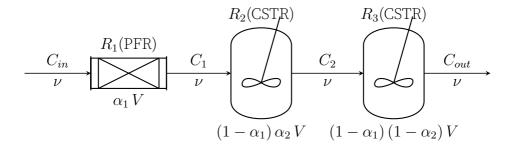
$$\nu C_1 = \nu C_{out} + (1 - \alpha) V \frac{dC_{out}}{dt} \Longrightarrow$$

$$\frac{dC_{out}}{dt} \Longrightarrow C_1 = C_{out} + (1 - \alpha) V \frac{dC_{out}}{dt} \Longrightarrow C_1 = C_{out} + (1 - \alpha) \tau \frac{dC_{out}}{dt} \Longrightarrow$$

 $\implies \frac{\Delta C_{out}}{\Delta t} = \frac{C_{out,i+1} - C_{out,i}}{\Delta t} = \frac{C_1 - C_{out}}{(1 - \alpha)\tau} \implies$

 $\implies C_{out,i+1} = C_{out,i} + \frac{C_1 - C_{out}}{(1-\alpha)\tau} \Delta t$







$$C_{2,i+1} = C_{2,i} + rac{C_{1,i} - C_{2,i}}{\left(1 - lpha_1
ight)lpha_2 au} \; \Delta t$$

$$\nu C_1 = \nu C_2 + (1 - \alpha_1) \alpha_2 V \frac{dC_2}{dt} \Longrightarrow$$

$$\Longrightarrow C_1 = C_2 + (1 - \alpha_1) \alpha_2 \tau \frac{dC_2}{dt} \Longrightarrow$$

$$\Rightarrow C_1 = C_2 + (1 - \alpha_1) \alpha_2 \tau \frac{dC_2}{dt} \Rightarrow$$

$$\Rightarrow \frac{dC_2}{dt} = \frac{C_1 - C_2}{(1 - \alpha_1) \alpha_2 \tau} \Rightarrow$$

$$\Rightarrow \frac{\Delta C_2}{\Delta t} = \frac{C_{2,i+1} - C_{2,i}}{\Delta t} = \frac{C_{1,i} - C_{2,i}}{(1 - \alpha_1) \alpha_2 \tau} \Rightarrow$$

$$\Rightarrow \frac{dC_2}{dt} = \frac{C_1 - C_2}{(1 - \alpha_1) \alpha_2 \tau} \Rightarrow$$

$$\Rightarrow \frac{\Delta C_2}{\Delta t} = \frac{C_{2,i+1} - C_{2,i}}{\Delta t} = \frac{C_{1,i} - C_{2,i}}{(1 - \alpha_1) \alpha_2 \tau} \Rightarrow$$

 $\implies C_{2,i+1} = C_{2,i} + \frac{C_{1,i} - C_{2,i}}{(1 - \alpha_1) \alpha_2 \tau} \Delta t$



$$C_{out,i+1} = C_{out,i} + rac{C_{2,i} - C_{out,i}}{(1 - lpha_1)(1 - lpha_2)\, au}\;\Delta t$$

$$(1 - \alpha_1)(1 - \alpha_2) \tau$$

$$\nu C_2 = \nu C_{out} + (1 - \alpha_1)(1 - \alpha_2) V \frac{dC_{out}}{dt} \Longrightarrow$$

$$\Longrightarrow C_2 = C_{out} + (1 - \alpha_1)(1 - \alpha_2) \tau \frac{dC_{out}}{dt} \Longrightarrow$$

$$\Rightarrow C_2 = C_{out} + (1 - \alpha_1)(1 - \alpha_2) V \xrightarrow{dt} \Rightarrow$$

$$\Rightarrow C_2 = C_{out} + (1 - \alpha_1)(1 - \alpha_2) \tau \xrightarrow{dC_{out}} \Rightarrow$$

$$\Rightarrow \frac{dC_{out}}{dt} = \frac{C_2 - C_{out}}{(1 - \alpha_1)(1 - \alpha_2) \tau} \Rightarrow$$

$$\Rightarrow C_2 = C_{out} + (1 - \alpha_1)(1 - \alpha_2)\tau \xrightarrow{dt} \Rightarrow$$

$$\Rightarrow \frac{dC_{out}}{dt} = \frac{C_2 - C_{out}}{(1 - \alpha_1)(1 - \alpha_2)\tau} \Rightarrow$$

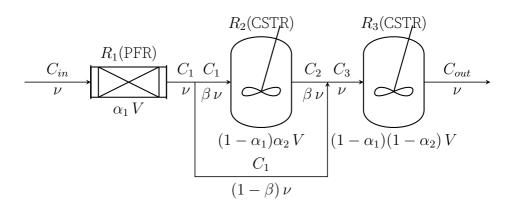
$$\Rightarrow \frac{\Delta C_{out}}{\Delta t} = \frac{C_{out,i+1} - C_{out,i}}{\Delta t} = \frac{C_{2,i} - C_{out,i}}{(1 - \alpha_1)(1 - \alpha_2)\tau} \Rightarrow$$

$$\Rightarrow \frac{\mathrm{d}C_{out}}{\mathrm{d}t} = \frac{C_2 - C_{out}}{(1 - \alpha_1)(1 - \alpha_2)\tau} \Rightarrow$$

$$\Rightarrow \frac{\Delta C_{out}}{\Delta t} = \frac{C_{out,i+1} - C_{out,i}}{\Delta t} = \frac{C_{2,i} - C_{out,i}}{(1 - \alpha_2)\tau} \Rightarrow$$

 $\implies C_{out,i+1} = C_{out,i} + \frac{C_{2,i} - C_{out,i}}{(1 - \alpha_1)(1 - \alpha_2)\tau} \Delta t$







$$C_{2,i+1} = C_{2,i} + rac{C_{1,i} - C_{2,i}}{ au} rac{eta}{\left(1 - lpha_1
ight)\left(1 - lpha_1
ight)lpha_2} \; \Delta t$$

$$\beta \nu C_1 = \beta \nu C_2 + (1 - \alpha_1) \alpha_2 V \frac{dC_2}{dt} \Longrightarrow$$

$$\Longrightarrow \beta C_1 = \beta C_2 + (1 - \alpha_1) \alpha_2 \tau \frac{dC_2}{dt} \Longrightarrow$$

$$\Longrightarrow \frac{dC_2}{dt} = \frac{C_1 - C_2}{(1 - \alpha_1) \alpha_2 \tau} \beta \Longrightarrow$$

$$\Rightarrow \frac{\mathrm{d}C_2}{\mathrm{d}t} = \frac{C_1 - C_2}{(1 - \alpha_1) \alpha_2 \tau} \beta \implies \frac{\Delta C_2}{\Delta C_2} = \frac{C_{2,i+1} - C_{2,i}}{C_{2,i}} = \frac{C_{1,i} - C_{2,i}}{C_{2,i}} \beta \implies 0$$

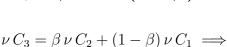
$$\Rightarrow \frac{dt}{dt} = \frac{1}{(1 - \alpha_1) \alpha_2 \tau} \beta \implies \frac{\Delta C_2}{\Delta t} = \frac{C_{2,i+1} - C_{2,i}}{\Delta t} = \frac{C_{1,i} - C_{2,i}}{(1 - \alpha_1) \alpha_2 \tau} \beta \implies \frac{\Delta C_2}{\Delta t} = \frac{C_{2,i+1} - C_{2,i}}{\Delta t} = \frac{C_{2,i+1} - C_{2,i}}{(1 - \alpha_1) \alpha_2 \tau} \beta \implies \frac{\Delta C_2}{\Delta t} = \frac{C_{2,i+1} - C_{2,i}}{\Delta t} = \frac{C_{2,i+1} - C_{2,i}}{(1 - \alpha_1) \alpha_2 \tau} \beta \implies \frac{\Delta C_2}{\Delta t} = \frac{C_{2,i+1} - C_{2,i}}{\Delta t} = \frac{C_{2,i+1} - C_{2,i}}{(1 - \alpha_1) \alpha_2 \tau} \beta \implies \frac{\Delta C_2}{\Delta t} = \frac{C_{2,i+1} - C_{2,i}}{\Delta t} = \frac{C_{2,i+1} - C_{2,i}}{(1 - \alpha_1) \alpha_2 \tau} \beta \implies \frac{\Delta C_2}{\Delta t} = \frac{C_{2,i+1} - C_{2,i}}{\Delta t} = \frac{C_{2,i+1} - C_{2,i}}{(1 - \alpha_1) \alpha_2 \tau} \beta \implies \frac{\Delta C_2}{\Delta t} = \frac{C_{2,i+1} - C_{2,i}}{\Delta t} = \frac{C_{2,i+1} - C_{2,i}}{(1 - \alpha_1) \alpha_2 \tau} \beta \implies \frac{\Delta C_2}{\Delta t} = \frac{C_{2,i+1} - C_{2,i}}{\Delta t} = \frac{C_{2,i+1} - C_{2,i}}{(1 - \alpha_1) \alpha_2 \tau} \beta \implies \frac{C_{2,i+1} - C_{2,i}}{\Delta t} = \frac{C_{2,i+1} - C_{2,i}}{\Delta t} = \frac{C_{2,i+1} - C_{2,i}}{(1 - \alpha_1) \alpha_2 \tau} \beta \implies \frac{C_{2,i+1} - C_{2,i}}{\Delta t} = \frac{C_{2,i+1} - C_{2,i}}{\Delta t} \beta \implies \frac{C_{2,i+1} - C_{2,i}}{\Delta t} = \frac{C_{2,i+1} - C_{2,i}}{\Delta t} \beta \implies \frac{C_{2,i+1} - C_{2,i}}{\Delta t} = \frac{C_{2,i+1} - C_{2,i}}{\Delta t} \beta \implies \frac{C_{2,i+1} - C_{2,i}}{\Delta t} = \frac{C_{2,i+1} - C_{2,i}}{\Delta t} \beta \implies \frac{C_{2,i+1} - C_{2,i}}{\Delta t} = \frac{C_{2,i+1} - C_{2,i}}{\Delta t} \beta \implies \frac{C_{2,i+1} - C_{2,i}}{\Delta t} = \frac{C_{2,i+1} - C_{2,i}}{\Delta t} \beta \implies \frac{C_{2,i+1} - C_{2,i}}{\Delta t} \Rightarrow \frac{C_{2,i+1} - C_{2,i}}{\Delta t} \Rightarrow$$

$$\Rightarrow \frac{\Delta C_2}{\Delta t} = \frac{C_{2,i+1} - C_{2,i}}{\Delta t} = \frac{C_{1,i} - C_{2,i}}{(1 - \alpha_1) \alpha_2 \tau} \beta \implies$$

$$\Rightarrow C_{2,i+1} = C_{2,i} + \frac{C_{1,i} - C_{2,i}}{(1 - \alpha_1) \alpha_2 \tau} \beta \Delta t$$



$$C_3 = \beta C_2 + (1 - \beta) C_1$$



 $\implies C_3 = \beta C_2 + (1 - \beta) C_1$



$$C_{out,i+1} = C_{out,i} + rac{C_{out,i} - C_{3,i}}{(1 - lpha_1)(1 - lpha_2)\, au} \,\, \Delta t$$

$$(\mathbf{I} - \boldsymbol{\alpha}_1)(\mathbf{I} - \boldsymbol{\alpha}_2) \tau$$

$$\nu C_{out} = \nu C_3 + (1 - \alpha_1)(1 - \alpha_2) V \frac{\mathrm{d}C_{out}}{\mathrm{d}t} \Longrightarrow$$

$$\Longrightarrow C_{out} = C_3 + (1 - \alpha_1)(1 - \alpha_2) \tau \frac{\mathrm{d}C_{out}}{\mathrm{d}t} \Longrightarrow$$

$$\implies C_{out} = C_3 + (1 - \alpha_1)(1 - \alpha_2) \tau \frac{\mathrm{d}C_{out}}{\mathrm{d}t} \implies$$

$$\stackrel{}{\longrightarrow} C_{out} - C_3$$

$$\Rightarrow \frac{dC_{out}}{dt} = \frac{C_{out} - C_3}{(1 - \alpha_1)(1 - \alpha_2)\tau} \Rightarrow \\ \Delta C_{out} = C_{out,i+1} - C_{out,i} \qquad C_{out,i} - C_{3,i}$$

 $\implies C_{out,i+1} = C_{out,i} + \frac{C_{out,i} - C_{3,i}}{(1 - \alpha_1)(1 - \alpha_2)\tau} \Delta t$

$$\Rightarrow \frac{dC_{out}}{dt} = \frac{C_{out} - C_3}{(1 - \alpha_1)(1 - \alpha_2)\tau} \Rightarrow$$

$$\Rightarrow \frac{\Delta C_{out}}{\Delta t} = \frac{C_{out,i+1} - C_{out,i}}{\Delta t} = \frac{C_{out,i} - C_{3,i}}{(1 - \alpha_2)(1 - \alpha_3)} = \frac{C_{out,i} - C_{3,i}}{(1 - \alpha_3)(1 - \alpha_3)} = \frac{C_{0ut,i} - C_{3,i}}{(1 - \alpha_3)(1 -$$

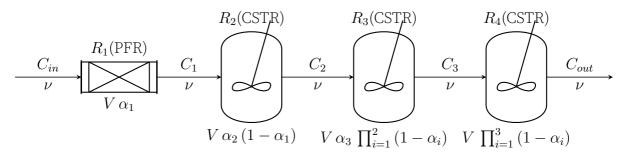
$$\Rightarrow \frac{\mathrm{d}C_{out}}{\mathrm{d}t} = \frac{C_{out} - C_3}{(1 - \alpha_1)(1 - \alpha_2)\tau} \Rightarrow$$

$$\Rightarrow \frac{\Delta C_{out}}{\Delta t} = \frac{C_{out,i+1} - C_{out,i}}{\Delta t} = \frac{C_{out,i} - C_{3,i}}{(1 - \alpha_2)(1 - \alpha_2)\tau} \Rightarrow$$

$$\Rightarrow \frac{\Delta C_{out}}{dt} = \frac{C_{out,i+1} - C_{out,i}}{(1 - \alpha_1)(1 - \alpha_2)\tau} \Rightarrow$$

$$\Rightarrow \frac{\Delta C_{out}}{\Delta t} = \frac{C_{out,i+1} - C_{out,i}}{\Delta t} = \frac{C_{out,i} - C_{3,i}}{(1 - \alpha_1)(1 - \alpha_2)\tau} \Rightarrow$$







$$C_{2,i+1} = C_{2,i} + rac{C_{1,i} - C_{2,i}}{\left(1 - lpha_1
ight) lpha_2 au} \; \Delta t$$

$$\nu C_1 = \nu C_2 + (1 - \alpha_1) \alpha_2 V \frac{\mathrm{d}C_2}{\mathrm{d}t} \Longrightarrow$$

$$\frac{dC_1}{dt} = \nu C_2 + (1 - \alpha_1) \alpha_2 V \frac{dC_2}{dt} \implies \\
\Rightarrow C_1 = C_2 + (1 - \alpha_1) \alpha_2 \tau \frac{dC_2}{dt} \implies \\
\Rightarrow \frac{dC_2}{dt} = \frac{C_1 - C_2}{(1 - \alpha_1) \alpha_2 \tau} \implies \\$$

$$\implies C_1 = C_2 + (1 - \alpha_1) \alpha_2 \tau \frac{dC_2}{dt} \implies$$

$$\implies \frac{dC_2}{dt} = \frac{C_1 - C_2}{(1 - \alpha_1) \alpha_2 \tau} \implies$$

$$\implies \frac{\Delta C_2}{\Delta t} = \frac{C_{2,i+1} - C_{2,i}}{\Delta t} = \frac{C_{1,i} - C_{2,i}}{(1 - \alpha_1) \alpha_2 \tau} \implies$$

 $\implies C_{2,i+1} = C_{2,i} + \frac{C_{1,i} - C_{2,i}}{(1 - \alpha_1) \alpha_2 \tau} \Delta t$

$$\implies C_1 = C_2 + (1 - \alpha_1) \alpha_2 \tau \frac{dC_2}{dt} \implies$$

$$\implies \frac{dC_2}{dt} = \frac{C_1 - C_2}{(1 - \alpha_1) \alpha_2 \tau} \implies$$



$$C_{3,i+1} = C_{3,i} + rac{C_{2,i} - C_{3,i}}{ au \, lpha_3 \, \prod_{i=1}^2 \left(1 - lpha_i
ight)} \, \Delta t$$

$$\tau \alpha_3 \prod_{i=1} (1 - \alpha_i)$$

$$\nu C_2 = \nu C_3 + \frac{dC_2}{dt} V \alpha_3 \prod_{i=1}^2 (1 - \alpha_i) \implies$$

$$\implies C_2 = C_3 + \frac{dC_3}{dt} \tau \alpha_3 \prod_{i=1}^2 (1 - \alpha_i) \implies$$

 $\implies \frac{\mathrm{d}C_3}{\mathrm{d}t} = \frac{C_2 - C_3}{\tau \,\alpha_3 \,\prod_{i=1}^2 (1 - \alpha_i)} \implies$

 $\implies C_{3,i+1} = C_{3,i} + \frac{C_{2,i} - C_{3,i}}{\tau \alpha_3 \prod_{i=1}^2 (1 - \alpha_i)} \Delta t$

$$\nu C_2 = \nu C_3 + \frac{\mathrm{d}C_2}{\mathrm{d}t} V \alpha_3 \prod_{i=1}^2 (1 - \alpha_i) \implies$$

 $\implies \frac{\Delta C_3}{\Delta t} = \frac{C_{3,i+1} - C_{3,i}}{\Delta t} = \frac{C_{2,i} - C_{3,i}}{\tau \alpha_3 \prod_{i=1}^2 (1 - \alpha_i)} \implies$

$$C_2 = \nu C_3 + \frac{\mathrm{d}C_2}{\mathrm{d}t} V \alpha_3 \prod_{i=1}^2 (1 - \alpha_i) \implies$$



$$C_{out,i+1} = C_{out,i} + rac{C_{3,i} - C_{out,i}}{ au \prod_{i=1}^3 \left(1 - lpha_i
ight)} \ \Delta t$$

$$u C_3 =
u C_{out} + \frac{\mathrm{d}C_{out}}{\mathrm{d}t} V \prod_{i=1}^3 (1 - \alpha_i)$$

$$u C_3 =
u C_{out} + \frac{\mathrm{d}C_{out}}{\mathrm{d}t} V \prod_{i=1}^3 (1 - \alpha_i) \implies$$

$$\implies C_3 = C_{out} + \frac{\mathrm{d}C_{out}}{\mathrm{d}t} \tau \prod_{i=1}^3 (1 - \alpha_i) \implies$$

$$\mathrm{d}C_{out} \qquad C_3 = C_{out}$$

$$\Rightarrow \frac{dC_{out}}{dt} = \frac{C_3 - C_{out}}{\tau \prod_{i=1}^3 (1 - \alpha_i)} \Rightarrow$$

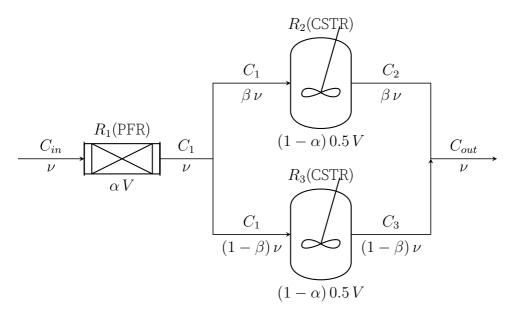
$$\Rightarrow \frac{\Delta C_{out}}{\Delta t} = \frac{C_{out,i+1} - C_{out,i}}{\Delta t} = \frac{C_{3,i} - C_{out,i}}{\Pi^3} \Rightarrow$$

$$\Rightarrow \frac{dC_{out}}{dt} = \frac{C_3 - C_{out}}{\tau \prod_{i=1}^3 (1 - \alpha_i)} \Rightarrow$$

$$\Rightarrow \frac{\Delta C_{out}}{\Delta t} = \frac{C_{out,i+1} - C_{out,i}}{\Delta t} = \frac{C_{3,i} - C_{out,i}}{\tau \prod_{i=1}^3 (1 - \alpha_i)} \Rightarrow$$

$$\Rightarrow C_{out,i+1} = C_{out,i} + \frac{C_{3,i} - C_{out,i}}{\tau \prod_{i=1}^3 (1 - \alpha_i)} \Delta t$$







$$egin{aligned} C_{2,i+1} &= C_{2,i} + rac{C_{1,i} - C_{2,i}}{ au} rac{eta}{(1-lpha)\,0.5} \; \Delta t \ &
u\,eta\,C_1 =
u\,eta\,C_2 + (1-lpha)\,0.5\,V\,rac{\mathrm{d}C_2}{\mathrm{d}t} \implies \end{aligned}$$

$$\Rightarrow \beta C_1 = \beta C_2 + (1 - \alpha) 0.5 \tau \frac{dC_2}{dt} \Rightarrow$$

$$\Rightarrow \frac{dC_2}{dt} = \frac{C_1 - C_2}{\tau} \frac{\beta}{(1 - \alpha) 0.5} \Rightarrow$$

$$\Rightarrow \frac{\Delta C_2}{\Delta t} = \frac{C_{2,i+1} - C_{2,i}}{\Delta t} = \frac{C_{1,i} - C_{2,i}}{(1 - \alpha) 0.5 \tau} \beta \Rightarrow$$

 $\implies C_{2,i+1} = C_{2,i} + \frac{C_{1,i} - C_{2,i}}{\tau} \frac{\beta}{(1-\alpha) \ 0.5} \ \Delta t$



$$C_{3,i+1} = C_{3,i} + rac{C_{1,i} - C_{3,i}}{ au} rac{1 - eta}{(1 - lpha)\, 0.5} \; \Delta t$$

$$(1 - \beta) \nu C_1 = (1 - \beta) \nu C_3 + (1 - \alpha) 0.5 V \frac{dC_3}{dt} \Longrightarrow$$

$$\Longrightarrow (1 - \beta) C_1 = (1 - \beta) C_3 + (1 - \alpha) 0.5 \tau \frac{dC_3}{dt} \Longrightarrow$$

$$\implies (1 - \beta) C_1 = (1 - \beta) C_3 + (1 - \alpha) 0.5 \tau \frac{dC_3}{dt} \implies$$

$$\implies \frac{dC_3}{dt} = \frac{C_1 - C_3}{\tau} \frac{1 - \beta}{(1 - \alpha) 0.5} \implies$$

$$\Rightarrow \frac{\mathrm{d}C_3}{\mathrm{d}t} = \frac{C_1 - C_3}{\tau} \frac{1 - \beta}{(1 - \alpha) \, 0.5} \Rightarrow$$

$$\Rightarrow \frac{\Delta C_3}{\Delta t} = \frac{C_{3,i+1} - C_{3,i}}{\Delta t} = \frac{C_{1,i} - C_{3,i}}{\tau} \frac{1 - \beta}{(1 - \alpha) \, 0.5} \Rightarrow$$

$$\Rightarrow \frac{dC_3}{dt} = \frac{C_1 - C_3}{\tau} \frac{1 - \beta}{(1 - \alpha) \cdot 0.5} \Rightarrow$$

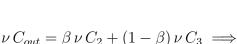
$$\Rightarrow \frac{\Delta C_3}{\Delta t} = \frac{C_{3,i+1} - C_{3,i}}{\Delta t} = \frac{C_{1,i} - C_{3,i}}{\tau} \frac{1 - \beta}{(1 - \alpha) \cdot 0.5} \Rightarrow$$

$$\Rightarrow \frac{\Delta C_3}{\Delta t} = \frac{C_{3,i+1} - C_{3,i}}{\Delta t} = \frac{C_{1,i} - C_{3,i}}{\tau} \frac{1 - \beta}{(1 - \alpha) \, 0.5} \Rightarrow$$

$$\Rightarrow C_{3,i+1} = C_{3,i} + \frac{C_{1,i} - C_{3,i}}{\tau} \frac{1 - \beta}{(1 - \alpha) \, 0.5} \, \Delta t$$

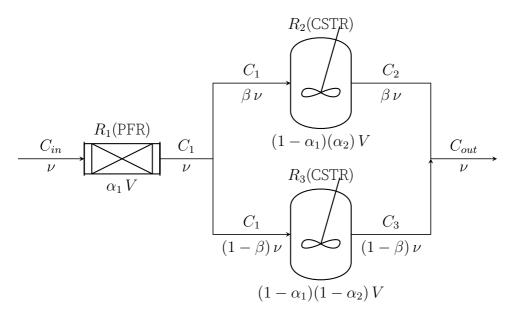


$C_{out} = \beta C_2 + (1 - \beta) C_3$



 $\implies C_{out} = \beta C_2 + (1 - \beta) C_3$







$$C_{2,i+1} = C_{2,i} + rac{C_{1,i} - C_{2,i}}{ au} rac{eta}{(1 - lpha_1)(lpha_2)} \; \Delta t$$

$$C_1 \beta \nu = C_2 \beta \nu + (1 - \alpha_1)(\alpha_2) V \frac{dC_2}{dt} \Longrightarrow$$

$$\Longrightarrow C_1 \beta = C_2 \beta + (1 - \alpha_1)(\alpha_2) \tau \frac{dC_2}{dt} \Longrightarrow$$

$$dC_2 \qquad C_1 - C_2 \qquad \beta$$

$$\implies C_1 \beta = C_2 \beta + (1 - \alpha_1)(\alpha_2) \tau \frac{dC_2}{dt} \implies$$

$$\implies \frac{dC_2}{dt} = \frac{C_1 - C_2}{\tau} \frac{\beta}{(1 - \alpha_1)(\alpha_2)} \implies$$

$$\Delta C_2 \qquad C_{2i+1} - C_{2i} \qquad C_{1i} - C_{2i} \qquad \beta$$

$$\Rightarrow \frac{dC_2}{dt} = \frac{C_1 - C_2}{\tau} \frac{\beta}{(1 - \alpha_1)(\alpha_2)} \Rightarrow$$

$$\Rightarrow \frac{\Delta C_2}{\Delta t} = \frac{C_{2,i+1} - C_{2,i}}{\Delta t} = \frac{C_{1,i} - C_{2,i}}{\tau} \frac{\beta}{(1 - \alpha_1)(\alpha_2)} \Rightarrow$$

$$\Rightarrow \frac{1}{dt} = \frac{1}{\tau} \frac{1}{(1 - \alpha_1)(\alpha_2)} \Rightarrow$$

$$\Rightarrow \frac{\Delta C_2}{\Delta t} = \frac{C_{2,i+1} - C_{2,i}}{\Delta t} = \frac{C_{1,i} - C_{2,i}}{\tau} \frac{\beta}{(1 - \alpha_1)(\alpha_2)} =$$

$$\Rightarrow \frac{\Delta C_2}{\Delta t} = \frac{\tau}{\Delta t} \frac{(1 - \alpha_1)(\alpha_2)}{\Delta t} = \frac{C_{2,i+1} - C_{2,i}}{\tau} = \frac{C_{1,i} - C_{2,i}}{\tau} \frac{\beta}{(1 - \alpha_1)(\alpha_2)} \Rightarrow$$

$$\Rightarrow \frac{\Delta C_2}{\Delta t} = \frac{C_{2,i+1} - C_{2,i}}{\Delta t} = \frac{C_{1,i} - C_{2,i}}{\tau} \frac{\beta}{(1 - \alpha_1)(\alpha_2)} \Rightarrow$$
$$\Rightarrow = C_{2,i+1} = C_{2,i} + \frac{C_{1,i} - C_{2,i}}{\tau} \frac{\beta}{(1 - \alpha_1)(\alpha_2)} \Delta t$$



$$C_{3,i+1} = C_{3,i} + rac{C_1 - C_3}{ au} rac{1 - eta}{(1 - lpha_1)(1 - lpha_2)} \; \Delta t$$

$$C_1(1-\beta)\nu = C_3(1-\beta)\nu + (1-\alpha_1)(1-\alpha_2)V\frac{\mathrm{d}C_3}{\mathrm{d}t} \Longrightarrow$$

$$\Longrightarrow C_1(1-\beta) = C_3(1-\beta) + (1-\alpha_1)(1-\alpha_2)\tau\frac{\mathrm{d}C_3}{\mathrm{d}t} \Longrightarrow$$

$$\implies C_1 (1 - \beta) = C_3 (1 - \beta) + (1 - \alpha_1)(1 - \alpha_2) \tau \frac{\mathrm{d}C_3}{\mathrm{d}t} \implies$$

$$\implies \frac{\mathrm{d}C_3}{\mathrm{d}t} = \frac{C_1 - C_3}{\tau} \frac{1 - \beta}{(1 - \alpha_1)(1 - \alpha_2)} \implies$$

$$\implies \frac{\Delta C_3}{\Delta C_3} = \frac{C_{3,i+1} - C_{3,i}}{C_{3,i+1} - C_{3,i}} = \frac{C_1 - C_3}{\Delta C_3} = \frac{1 - \beta}{\Delta C_3} \implies$$

$$\Rightarrow \frac{dC_3}{dt} = \frac{C_1 - C_3}{\tau} \frac{1 - \beta}{(1 - \alpha_1)(1 - \alpha_2)} \Rightarrow$$

$$\Rightarrow \frac{\Delta C_3}{\Delta t} = \frac{C_{3,i+1} - C_{3,i}}{\Delta t} = \frac{C_1 - C_3}{\tau} \frac{1 - \beta}{(1 - \alpha_1)(1 - \alpha_2)} \Rightarrow$$

$$\Rightarrow \frac{dt}{dt} = \frac{\tau}{\tau} \frac{(1 - \alpha_1)(1 - \alpha_2)}{(1 - \alpha_1)(1 - \alpha_2)} \Rightarrow$$

$$\Rightarrow \frac{\Delta C_3}{\Delta t} = \frac{C_{3,i+1} - C_{3,i}}{\Delta t} = \frac{C_1 - C_3}{\tau} \frac{1 - \beta}{(1 - \alpha_1)(1 - \alpha_2)} \Rightarrow$$

$$\Rightarrow \frac{\Delta C_3}{\Delta t} = \frac{C_{3,i+1} - C_{3,i}}{\Delta t} = \frac{C_1 - C_3}{\tau} \frac{1 - \beta}{(1 - \alpha_1)(1 - \alpha_2)} \Rightarrow$$

$$\Rightarrow C_{3,i+1} = C_{3,i} + \frac{C_1 - C_3}{\tau} \frac{1 - \beta}{(1 - \alpha_1)(1 - \alpha_2)} \Delta t$$

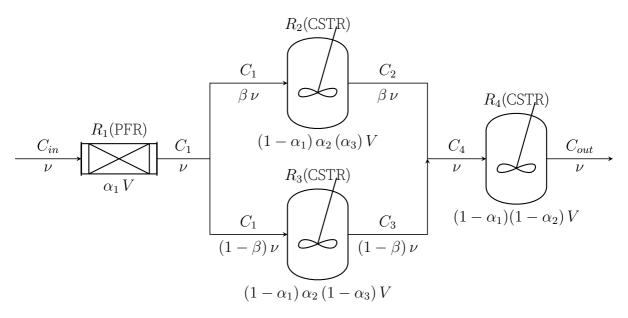


$$C_{out} = C_2(\beta) + C_3(1 - \beta)$$

$$C_{out} \nu = C_2(\beta) \nu + C_3(1-\beta) \nu \implies$$

 $\implies C_{out} = C_2(\beta) + C_3(1-\beta)$







$$C_{2,i+1} = C_{2,i} + rac{C_{1,i} - C_{2,i}}{ au} rac{eta}{\left(1 - lpha_1
ight)lpha_2\left(lpha_3
ight)} \; \Delta$$

$$C_{1} \beta \nu = C_{2} \beta \nu + (1 - \alpha_{1}) \alpha_{2} (\alpha_{3}) V \frac{dC_{2}}{dt} \Longrightarrow$$

$$\Longrightarrow C_{1} \beta = C_{2} \beta + (1 - \alpha_{1}) \alpha_{2} (\alpha_{3}) \tau \frac{dC_{2}}{dt} \Longrightarrow$$

$$\Longrightarrow \frac{dC_{2}}{dt} = \frac{C_{1} - C_{2}}{dt} \Longrightarrow \Longrightarrow$$

$$\Rightarrow C_1 \beta = C_2 \beta + (1 - \alpha_1) \alpha_2 (\alpha_3) \tau \frac{dC_2}{dt} \Rightarrow$$

$$\Rightarrow \frac{dC_2}{dt} = \frac{C_1 - C_2}{\tau} \frac{\beta}{(1 - \alpha_1) \alpha_2 (\alpha_3)} \Rightarrow$$

$$\Rightarrow \frac{\Delta C_2}{\Delta C_2} = \frac{C_{2,i+1} - C_{2,i}}{\Delta C_{2,i}} = \frac{C_{1,i} - C_{2,i}}{\Delta C_{2,i}} \Rightarrow 0$$

$$\Rightarrow \frac{dC_2}{dt} = \frac{C_1 - C_2}{\tau} \frac{\beta}{(1 - \alpha_1) \alpha_2(\alpha_3)} \Rightarrow$$

$$\Rightarrow \frac{\Delta C_2}{\Delta t} = \frac{C_{2,i+1} - C_{2,i}}{\Delta t} = \frac{C_{1,i} - C_{2,i}}{\tau} \frac{\beta}{(1 - \alpha_1) \alpha_2(\alpha_3)} \Rightarrow$$

 $\implies C_{2,i+1} = C_{2,i} + \frac{C_{1,i} - C_{2,i}}{\tau} \frac{\beta}{(1 - \alpha_1) \alpha_2(\alpha_3)} \Delta t$



$$C_{3,i+1} = C_{3,i} + rac{C_1 - C_3}{ au} rac{1 - eta}{\left(1 - lpha_1
ight)lpha_2\left(1 - lpha_3
ight)} \Delta t$$

$$C_1(1-\beta)\nu = C_3(1-\beta)\nu + (1-\alpha_1)\alpha_2(1-\alpha_3)V\frac{dC_3}{dt} \Longrightarrow$$

$$\Longrightarrow C_1(1-\beta) = C_3(1-\beta) + (1-\alpha_1)\alpha_2(1-\alpha_3)\tau\frac{dC_3}{dt} \Longrightarrow$$

$$(1-\beta)\nu - C_3(1-\beta)\nu + (1-\alpha_1)\alpha_2(1-\alpha_3)\nu \xrightarrow{\overline{dt}} \longrightarrow$$

$$\Rightarrow C_1(1-\beta) = C_3(1-\beta) + (1-\alpha_1)\alpha_2(1-\alpha_3)\tau \xrightarrow{\overline{dC_3}} \xrightarrow{\overline{dt}} \Longrightarrow$$

$$\Rightarrow \frac{dC_3}{dt} = \frac{C_1 - C_3}{\tau} \frac{1-\beta}{(1-\alpha_1)\alpha_2(1-\alpha_3)} \Longrightarrow$$

$$AC_2 = C_2 : +1 - C_2 : C_1 : -C_2 : 1-\beta$$

$$\Rightarrow \frac{\mathrm{d}C_3}{\mathrm{d}t} = \frac{C_1 - C_3}{\tau} \frac{1 - \beta}{(1 - \alpha_1)\alpha_2(1 - \alpha_3)} \Rightarrow$$

$$\Rightarrow \frac{\Delta C_3}{\Delta t} = \frac{C_{3,i+1} - C_{3,i}}{\Delta t} = \frac{C_{1,i} - C_{3,i}}{\tau} \frac{1 - \beta}{(1 - \alpha_1)\alpha_2(1 - \alpha_2)} \Rightarrow$$

$$\Rightarrow \frac{\Delta C_3}{\Delta t} = \frac{C_{3,i+1} - C_{3,i}}{\Delta t} = \frac{C_{1,i} - C_{3,i}}{\tau} \frac{1 - \beta}{(1 - \alpha_1)\alpha_2(1 - \alpha_3)} \Longrightarrow$$

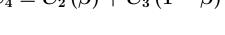
$$\Rightarrow \frac{\Delta C_3}{\Delta t} = \frac{C_{3,i+1} - C_{3,i}}{\Delta t} = \frac{C_{1,i} - C_{3,i}}{\tau} \frac{1 - \beta}{(1 - \alpha_1) \alpha_2 (1 - \alpha_3)} \Rightarrow$$

$$\Rightarrow \frac{\Delta C_3}{\Delta t} = \frac{C_{3,i+1} + C_{3,i}}{\Delta t} = \frac{C_{1,i} + C_{3,i}}{\tau} \frac{1 + \beta}{(1 - \alpha_1) \alpha_2 (1 - \alpha_3)} \Rightarrow$$

$$\Rightarrow C_{3,i+1} = C_{3,i} + \frac{C_{1,i} - C_{3,i}}{\tau} \frac{1 - \beta}{(1 - \alpha_1) \alpha_2 (1 - \alpha_3)} \Delta t$$



$$C_4 = C_2(\beta) + C_3(1-\beta)$$



 $C_4 \nu = C_2(\beta) \nu + C_3(1-\beta) \nu \Longrightarrow$ $\Longrightarrow C_4 = C_2(\beta) + C_3(1-\beta)$



$$C_{out,i+1} = C_{out,i} + rac{C_{4,i} - C_{out,i}}{\left(1 - lpha_1
ight)\left(1 - lpha_2
ight) au} \; \Delta t$$

$$(1 - \alpha_1)(1 - \alpha_2) T$$

$$C_4 \nu = C_{out} \nu + (1 - \alpha_1)(1 - \alpha_2) V \frac{dC_{out}}{dt} \Longrightarrow$$

$$C_4 \nu = C_{out} \nu + (1 - \alpha_1)(1 - \alpha_2) V \frac{dC_{out}}{dt} \Longrightarrow$$

$$\Longrightarrow C_4 = C_{out} + (1 - \alpha_1)(1 - \alpha_2) \tau \frac{dC_{out}}{dt} \Longrightarrow$$

$$\Rightarrow \frac{\mathrm{d}C_{out}}{\mathrm{d}t} = \frac{C_4 - C_{out}}{(1 - \alpha_1)(1 - \alpha_2)\tau} \Rightarrow dt$$

 $\implies C_{out,i+1} = C_{out,i} + \frac{C_{4,i} - C_{out,i}}{(1 - \alpha_1)(1 - \alpha_2)\tau} \Delta t$

$$\Rightarrow \frac{dC_{out}}{dt} = \frac{C_4 - C_{out}}{(1 - \alpha_1)(1 - \alpha_2)\tau} \Rightarrow$$

$$\Rightarrow \frac{\Delta C_{out}}{\Delta t} = \frac{C_{out,i+1} - C_{out,i}}{\Delta t} = \frac{C_{4,i} - C_{out,i}}{(1 - \alpha_1)(1 - \alpha_2)\tau} \Rightarrow$$



