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

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

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

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

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

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