

$$\begin{aligned} &> \text{int}(k \cdot Ca^2 - k \cdot Cao \cdot Ca + k \cdot Cbo \cdot Ca, Ca) \\ &\quad k \left( \frac{Ca^3}{3} + \frac{(-Cao + Cbo) Ca^2}{2} \right) \end{aligned} \quad (1)$$

$$\begin{aligned} & \textcolor{red}{> \textit{eqn1}} := t = k \left( \frac{Ca^3}{3} + \frac{(-Cao + Cbo) Ca^2}{2} \right) \\ & \textcolor{blue}{\textit{eqn1}} := t = k \left( \frac{Ca^3}{3} + \frac{(-Cao + Cbo) Ca^2}{2} \right) \end{aligned} \quad \textcolor{black}{(2)}$$

> ?isolate

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> isolate(eqn1, Ca)
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$$C_a = \frac{1}{2k} \left( \left( C_{ao}^3 k - 3 C_{ao}^2 C_{bo} k + 3 C_{ao} C_{bo}^2 k - C_{bo}^3 k \right. \right. \\ \left. \left. + 2 \sqrt{6} \sqrt{t \left( C_{ao}^3 k - 3 C_{ao}^2 C_{bo} k + 3 C_{ao} C_{bo}^2 k - C_{bo}^3 k + 6 t \right)} + 12 t \right) k^2 \right)^{1/3} \\ + \left( (C_{ao} - C_{bo})^2 k \right) / \left( 2 \left( \left( C_{ao}^3 k - 3 C_{ao}^2 C_{bo} k + 3 C_{ao} C_{bo}^2 k - C_{bo}^3 k + 2 \sqrt{6} \sqrt{t \left( C_{ao}^3 k - 3 C_{ao}^2 C_{bo} k + 3 C_{ao} C_{bo}^2 k - C_{bo}^3 k + 6 t \right)} \right. \right. \right. \\ \left. \left. \left. + 12 t \right) k^2 \right) \right) + \frac{C_{ao}}{2} - \frac{C_{bo}}{2}$$

> ?isolate

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$$C a = \frac{1}{2 k} \left( \left( C a o^3 k - 3 C a o^2 C b o k + 3 C a o C b o^2 k - C b o^3 k \right. \right. \\ \left. \left. + 2 \sqrt{6} \sqrt{t \left( C a o^3 k - 3 C a o^2 C b o k + 3 C a o C b o^2 k - C b o^3 k + 6 t \right)} + 12 t \right) k^2 \right)^{1/3} \\ + \left( (C a o - C b o)^2 k \right) / \left( 2 \left( \left( C a o^3 k - 3 C a o^2 C b o k + 3 C a o C b o^2 k - C b o^3 k + 2 \sqrt{6} \sqrt{t \left( C a o^3 k - 3 \right.} \right. \right. \right. \\ \left. \left. \left. C a o^2 C b o k + 3 C a o C b o^2 k - C b o^3 k + 6 t \right)} + 12 t \right) k^2 \right)^{1/3} \right) + \frac{C a o}{2} - \frac{C b o}{2}$$

$$\triangleright \text{con\_}A := rhs(\%)$$

$$\begin{aligned} con\_A := & \frac{1}{2k} \left( \left( Cao^3 k - 3 Cao^2 Cbo k + 3 Cao Cbo^2 k - Cbo^3 k \right. \right. \\ & + 2 \sqrt{6} \sqrt{t \left( Cao^3 k - 3 Cao^2 Cbo k + 3 Cao Cbo^2 k - Cbo^3 k + 6 t \right)} + 12 t \Big) k^2 \Big)^{1/3} \\ & + \left( (Cao - Cbo)^2 k \right) / \left( 2 \left( \left( Cao^3 k - 3 Cao^2 Cbo k + 3 Cao Cbo^2 k - Cbo^3 k + 2 \sqrt{6} \sqrt{t \left( Cao^3 k - 3 \right.} \right. \right. \right. \\ & \left. \left. \left. Cao^2 Cbo k + 3 Cao Cbo^2 k - Cbo^3 k + 6 t \right) \right) + 12 t \right) \right) + \frac{Cao}{2} - \frac{Cbo}{2} \end{aligned}$$

$$X := 1 - \frac{con\_A}{C_{AO}}$$

$$\begin{aligned}
X &:= 1 - \frac{1}{Cao} \left( \frac{1}{2k} \left( (Cao^3 k - 3 Cao^2 Cbo k + 3 Cao Cbo^2 k - Cbo^3 k \right. \right. \\
&\quad \left. \left. + 2 \sqrt{6} \sqrt{t (Cao^3 k - 3 Cao^2 Cbo k + 3 Cao Cbo^2 k - Cbo^3 k + 6 t)} + 12 t \right) k^2 \right)^{1/3} \\
&\quad + \left( (Cao - Cbo)^2 k \right) / \left( 2 \left( (Cao^3 k - 3 Cao^2 Cbo k + 3 Cao Cbo^2 k - Cbo^3 k + 2 \sqrt{6} \sqrt{t (Cao^3 k - 3 \right. \right. \\
&\quad \left. \left. + 6 t)} + 12 t \right) k^2 \right)^{1/3} + \frac{Cao}{2} - \frac{Cbo}{2} \Big) \\
> E &:= \frac{\tau^2}{2 \cdot \tau^3} \\
E &:= \frac{1}{2 \tau} \tag{7} \\
> \text{int} \left( X \cdot E, t = \frac{\tau}{2} .. \text{inf} \right) \\
&\int_{\frac{\tau}{2}}^{\text{inf}} \frac{1}{2 \tau} \left( 1 - \frac{1}{Cao} \left( \frac{1}{2k} \left( (Cao^3 k - 3 Cao^2 Cbo k + 3 Cao Cbo^2 k - Cbo^3 k \right. \right. \right. \\
&\quad \left. \left. + 2 \sqrt{6} \sqrt{t (Cao^3 k - 3 Cao^2 Cbo k + 3 Cao Cbo^2 k - Cbo^3 k + 6 t)} + 12 t \right) k^2 \right)^{1/3} \\
&\quad \left. + \left( (Cao - Cbo)^2 k \right) / \left( 2 \left( (Cao^3 k - 3 Cao^2 Cbo k + 3 Cao Cbo^2 k - Cbo^3 k + 2 \sqrt{6} \sqrt{t (Cao^3 k - 3 \right. \right. \right. \right. \\
&\quad \left. \left. + 6 t)} + 12 t \right) k^2 \right)^{1/3} + \frac{Cao}{2} - \frac{Cbo}{2} \Big) \right) dt \\
>
\end{aligned}$$