**Oral Dosage Forms**

1st order absorption + elimination

\[
\text{Body} \quad \begin{array}{c}
\downarrow \text{ka} \\
X
\end{array} \quad \text{\begin{array}{c}
\downarrow \text{ke} \\
A_1
\end{array}} \quad \begin{array}{c}
\downarrow \text{ka} \\
X
\end{array} \quad \begin{array}{c}
\downarrow \text{ke} \\
A_1
\end{array}
\]

\[k_a = 2 \text{ h}^{-1}\]

\[k_{el} = 0.15 \text{ h}^{-1}\]

\[
\frac{dA_1}{dt} = k_a X - k_{el} A_1
\]

**Case 1 - Immediate dissolution of tablet**

so that at \( t=0 \quad X = D = 10 \text{ mg} \) excreted after 8 h

\[
\frac{dx}{dt} = -k_a X
\]

**Case 2 - Zero order dissolution**

\[
\frac{dx}{dt} = k_0 - k_a X \quad \text{with} \quad x(0) = 0
\]

\[k_0 = 1 \frac{\text{mg}}{\text{h}}\]

Assume excreted after 8 h
Case 2

Higuchi dissolution

\[
\begin{align*}
Higuchi & \rightarrow [x] \rightarrow \mathcal{D} \\
\frac{dx}{dt} &= \frac{\sqrt{Dc_s c_t}}{2\sqrt{t}} - k_a x \text{ with } x(0) = 0 \\
\frac{dx}{dt} &= \frac{2}{\sqrt{t}} \text{ mg} \cdot h^{1/2} - k_a x
\end{align*}
\]
Case 1 - repeat dose after 8h

at 8h \( a_1 = 3.256 \text{ mg} \)
at 16h \( a_1 = 4.24 \text{ mg} \)
at 24h \( a_1 = 4.53 \text{ mg} \)
at 32h \( a_1 = 4.55 \text{ mg} \)

max \( = 8.086 \text{ mg at } t = 1.53 \text{ h} \)
max \( = 10.8 \text{ mg at } t = 9.49 \text{ h} \)
max \( = 11.55 \text{ mg at } t = 17.37 \text{ h} \)
max \( = 11.555 \text{ at } t = 25.37 \text{ h} \)

Toxic after 1st dose.

Case 2

at 8h \( a_1 = 4.49 \text{ mg} \)
at 16h \( a_1 = 5.84 \text{ mg} \)
at 24h \( a_1 = 6.255 \text{ mg} \)
at 32h \( a_1 = 6.379 \text{ mg} \)
Case 3  Higuchi

\[
\frac{dx}{dt} = \frac{0.9491}{\sqrt{t}}
\]

\[t = 8 \quad a1 = 5.357\]
\[t = 10 \quad a1 = \]