B3-2

$$V(c_0 - c) = m(q_m - q_0)$$

よって: $V(c_0 - c_m) = m(q_m - q_0)$ //

$$\frac{dq_m}{dt} = k_{FS} \times (c - c^*)$$

$$= -\frac{V}{m}\frac{dc}{dt}$$

$$-\frac{dc}{c - c^*} = \frac{m}{V} k_{FS} \times dt$$

積分して

$$\int_{c_f}^{c_0} \frac{dc}{c - c^*} = \frac{m}{V} k_{FS}\, t$$

よって $t = \dfrac{V}{m S k_{FS}} \displaystyle\int_{c_f}^{c_0} \frac{dc}{c - c^*}$

$V(c_0 - c_m) = m(q_m - q_0)$

$= 2 \times 5 c_m = 10 c_m$

$c_m = \dfrac{1}{11} c_0$ //

$\dfrac{c_0 - c_{f95}}{c_0 - c_m} = 0.95$

$c_0 - c_{f95} = \dfrac{10}{11} \times 0.95 c_0$

$c_{f95} = c_0\left(1 - \dfrac{10}{11} \times \dfrac{95}{100}\right)$

$= c_0\left(1 - \dfrac{19}{22}\right)$

$= \dfrac{3}{22} c_0$ //

→ $q_m = 5c^* = \dfrac{V}{m}(c_0 - c)$

$= \dfrac{1}{2}(c_0 - c)$

$c^* = \dfrac{c_0 - c}{10}$ //

よって

$$t = \frac{V}{k_{FS} m} \int_{c_f}^{c_0} \frac{dc}{c - \frac{c_0 - c}{10}}$$

$$= \frac{1}{k_{FS}} \times \frac{1}{2} \times \int_{c_f}^{c_0} \frac{dc}{\frac{11}{10}c - \frac{c_0}{10}}$$

$$= \frac{1}{2 k_{FS}} \times \frac{10}{11} \times \left[\ln\left(\frac{11}{10}c - \frac{c_0}{10}\right)\right]_{c_f}^{c_0}$$

$$= \frac{1}{k_{FS}} \times \frac{5}{11} \times \left\{\ln(c_0) - \ln\left(\frac{11}{10}c_f - \frac{c_0}{10}\right)\right\}$$

$$= \frac{1}{k_{FS}} \times \frac{5}{11} \ln 20$$

よって $k_{FS} = \dfrac{5}{11} \ln 20$ //