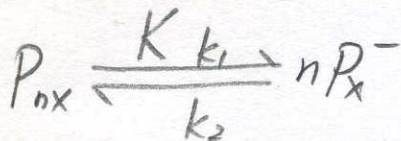


$$1. a) K \gg 1.$$

Quiz 5



at equilibrium

$$k_1 [P_{nx}] = k_2 [P_x^-]^n$$

$$\Rightarrow \frac{k_1}{k_2} = K = \frac{[P_x^-]^n}{[P_{nx}]}$$

$$\Rightarrow [P_x^-] = (K [P_{nx}])^{1/n} \quad \because K \gg 1 \Rightarrow [P_{nx}] \ll [P_x^-]$$

n initiator molecules make 1 inactive P_{nx}

$$[P_x^-] + n [P_{nx}] = [I]_0 \Rightarrow [P_x^-] = [I]_0$$

$$v_p = -\frac{1}{V} \frac{dM}{dt} = k_p [M] [P_x^-]^1$$

$$= k_p [M] [I]_0$$

$$b) M = M_0 (1 - 2x)$$

$$dM = M_0 (-2) dx = -2 M_0 dx$$

$$\Rightarrow -\frac{1}{V} \frac{M_0 (-2) dx}{dt} = k_p \frac{M_0 (1 - 2x)}{V} [I]_0$$

$$\Rightarrow \frac{dx}{1 - 2x} = k_p [I]_0 dt$$

$$\Rightarrow -\frac{1}{2} \ln(1 - 2x) = k_p [I]_0 t + C \quad , \quad \text{at } t=0 \quad x=0 \Rightarrow C=0$$

$$\Rightarrow \ln(1 - 2x) = -2 k_p [I]_0 t$$

$$\Rightarrow 1 - 2x = \exp(-2 k_p [I]_0 t)$$

$$\Rightarrow x = \frac{1}{2} (1 - \exp(-2 k_p [I]_0 t))$$