39. a) 1st order rxn → $\ln[A]$ vs time is straight line

b) k = − slope

$$\ln[A]_t - \ln[A]_0 = -kt$$

$$\ln[A]_t = -kt + \ln[A]_0$$

$$y = mx + b$$

m ↓ slope

41) $SO_2Cl_2 \rightarrow SO_2 + Cl_2$

$t_{1/2} = 2.3 \times 10^5 s$ $\quad k$?

T = 600K a) $t_{1/2} = \dfrac{.693}{k}$

$$k = \frac{.693}{2.3 \times 10^5 s} = \boxed{3.0 \times 10^{-6} s^{-1}}$$

T = 593K b) $t_{1/2} = \dfrac{.693}{2.2 \times 10^{-5} s^{-1}} = \boxed{3.2 \times 10^4 s}$

at

$t_{1/2}$ at 600 $= 2.3 \times 10^5 s$

$t_{1/2}$ at 593 $= 3.2 \times 10^4 s$

} ↓T, ↓$t_{1/2}$

rxn faster at lower T

43) $\ln(P_A)_t - \ln(P_A)_0 = -kt$

a) $\ln(P_A)_t - \ln 450 = (-4.5 \times 10^{-2}\ s^{-1})(60\ s)$

$\ln(P_A)_t = 5.8$

P_A after 60 s = 30.24 torr

30 torr

b) $\ln .1 - \ln 1 = (-4.5 \times 10^{-2}\ s^{-1})(t)$

$t = 51\ s$

44) $k = 6.82 \times 10^{-3}\ s^{-1}$

$[N_2O_5]_0 = \frac{.0250\ mol}{2.0\ L}$

a) $\ln A_t - \ln(.0250) = (-6.82 \times 10^{-3}\ s^{-1})(300\ s)$

$\ln A_t = -5.73$

$A_t = .0032$ moles

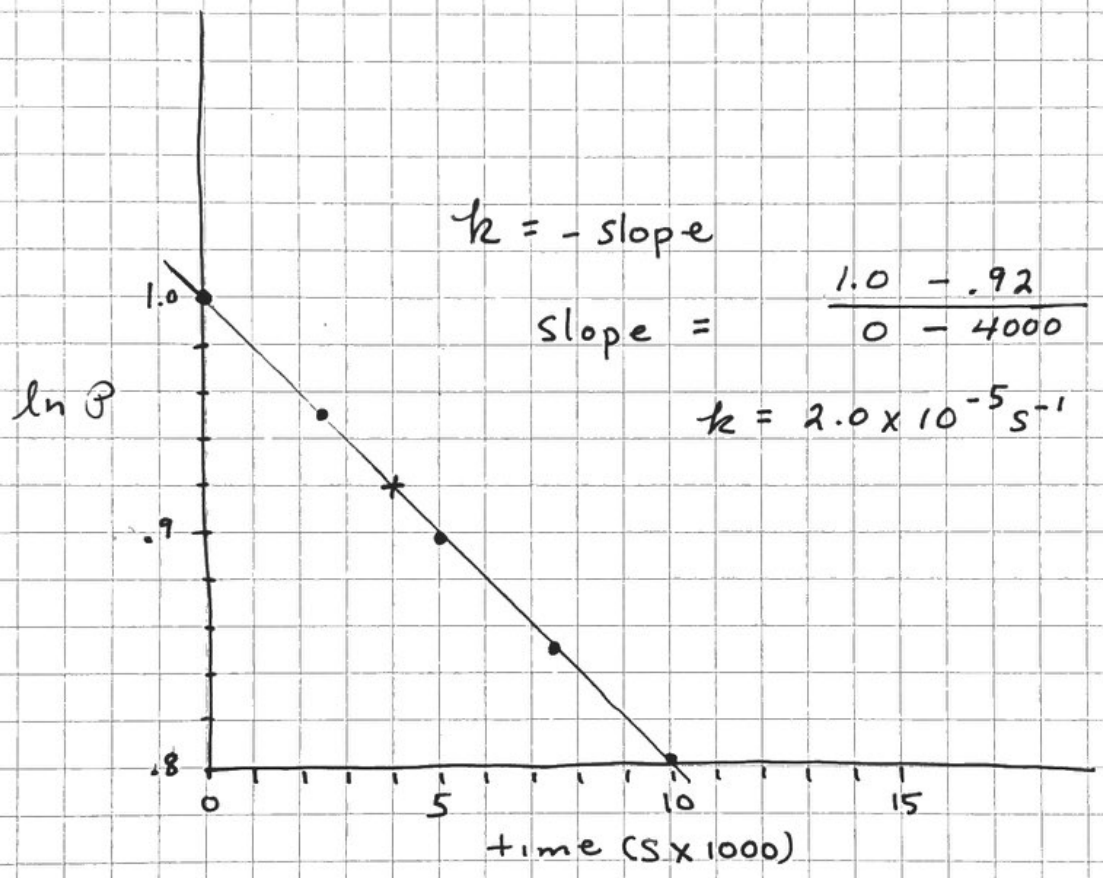
b) $\ln .010 - \ln .0250 = (-6.82 \times 10^{-3}\ s^{-1})(t)$

$t = 134\ s = 2.24$ min

2.2 min

c) $t_{1/2} = \frac{.693}{6.82 \times 10^{-3}\ s^{-1}} =$ 102 s

45)



$k = -\text{slope}$

$$\text{slope} = \frac{1.0 - .92}{0 - 4000} = -2.0 \times 10^{-5}\ s^{-1}$$

$$k = 2.0 \times 10^{-5}\ s^{-1}$$