(14.38) $\ln[A_t] = -Kt + \ln[A_0]$

$\ln[A_t] = -(0.271\ sec^{-1})(5.12\ sec) + \ln(0.05)$

Inv $\ln x = e^x$

$\boxed{2^{nd}}$

$\frac{1}{sec} \cdot \frac{sec}{1}$

$e^{\ln[A_t]} = e^{-4.383252273555}$

$[A_t] = 0.0125M$

Feb 8-7:39 AM

14.40 $K = 6.82 \times 10^{-3}\ sec^{-1}$ $\frac{1}{M^0 \cdot sec}$

1st order rxn

$\frac{0.025\,mole}{2\,l} = \boxed{0.0125\,M}$ $[A_0]$

a) # moles after 5 min (300 sec)

$60 \times 5 = 300$

$\ln A_t = -Kt + \ln A_0$

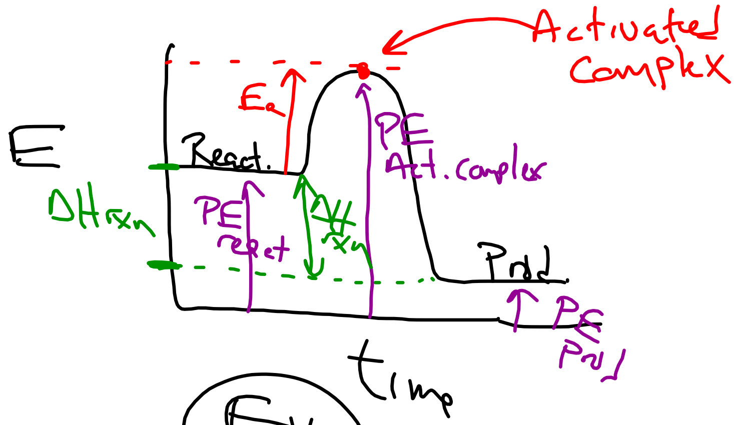
$\ln A_t = -(6.82\times10^{-3})(300) + \ln(0.0125)$

$[A_t] = 0.0016\,M \times 2\,l = 0.0032\,Mol$

$\frac{M}{1} = \frac{Moles}{l}$

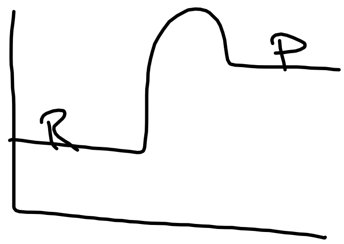
Moles = M × l

Activation Energy



EXO

Spont.



ENDO

Ryn Rate

① Need effective collisions

→ Catalyst

→ ↑T

→ ↑[React]

→ ↑P gas

React → Prod.

$C_3H_8 + O_2 \rightarrow CO_2 + H_2O$

Break Bonds — Form bonds.

ΔH = Bonds broken − Bonds formed

Feb 8-8:09 AM

① Arrhenius Eqn

Activation Energy (J)

$$K = A e^{-\frac{E_a}{RT}}$$

Temp KELVIN

rate constant

sec^{-1}

time^{-1}

(Frequency Factor)

factors that effect rate.

$8.314 \frac{J}{Mole \cdot K}$

$8.314 \times 10^{-3} \frac{KJ}{Mole \cdot K}$

$R = \frac{PV}{nT}$

$PV = nRT$

$0.08206 \frac{l \cdot atm}{Mol \cdot K}$

Feb 8-8:18 AM

$$K = A e^{-\frac{E_a}{RT}}$$

$$\ln K = \ln \underline{A}\, \underline{e}^{-\frac{E_a}{RT}}$$

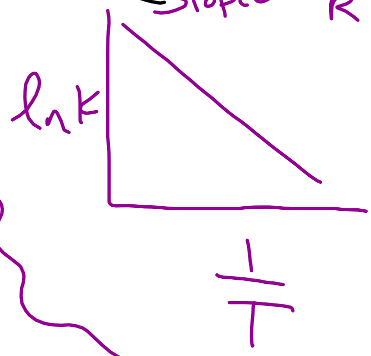
$$\ln K = \ln A + \ln e^{-\frac{E_a}{RT}}$$

$$\ln K = \frac{-E_a}{RT} + \ln A$$

$$y = m x + b$$

$\frac{\Delta y}{\Delta x}$ = Rate of change

Slope = $-\frac{E_a}{R}$



$$\ln K = \frac{-Ea}{RT} + \ln A$$ (Compare Rate and TEMP)

$\boxed{\Delta T \text{ effect } K \text{ values}}$

$T_1 = K_1$

$T_2 = K_2$

If ΔT then ΔK

Feb 8-8:39 AM

$$\left[\ln K_1 = \frac{-E_a}{RT_1} + \ln A\right] - \left[\ln K_2 = \frac{-E_a}{RT_2} + \ln A\right]$$

Find the difference.

$$(\ln K_1 - \ln K_2) = \left(\frac{-E_a}{RT_1} + \ln A\right) - \left(\frac{-E_a}{RT_2} + \ln A\right)$$

$$(\ln K_1 - \ln K_2) = \left(\frac{-E_a}{RT_1} - \frac{-E_a}{RT_2}\right)$$

$$\ln \frac{K_1}{K_2} = \frac{-E_a}{R}\left(\frac{1}{T_1} - \frac{1}{T_2}\right)$$

distribute $\ominus$ sign

$$\ln \frac{K_1}{K_2} = \frac{E_a}{R}\left(-\frac{1}{T_1} + \frac{1}{T_2}\right)$$

$$\boxed{\ln \frac{K_1}{K_2} = \frac{E_a}{R}\left(\frac{1}{T_2} - \frac{1}{T_1}\right)}$$

Find new K with ΔT

Feb 8-8:44 AM

14.55

$K_1 = 2.75 \times 10^{-2}\ sec^{-1}$ at 20°C T_1

$\downarrow$

$\boxed{E_a = \frac{75.5\ KJ}{Mole}}$ $K_2 =$? 60°C T_2

$$\ln \frac{K_1}{K_2} = \frac{E_a}{R}\left(\frac{1}{T_2} - \frac{1}{T_1}\right)$$

$$\ln(2.75 \times 10^{-2}) - \ln K_2 = \frac{75.5}{8.314 \times 10^{-3}}\left(\frac{1}{333} - \frac{1}{293}\right)$$

$$\ln(2.75 \times 10^{-2}) - \ln K_2 = -3.723$$

$$-\ln K_2 = -0.1294$$

$$K_2 = 1.138\ sec^{-1}$$

Feb 8-8:54 AM

$14 / 32 + 56$

Feb 8-9:07 AM

$$\ln \frac{K_1}{K_2} = \frac{Ea}{R}\left(\frac{1}{T_2} - \frac{1}{T_1}\right)$$

Feb 8-9:13 AM