14.40 $2N_2O_5 \rightarrow 4NO_2 + O_2$ 70°C

$A_0 = 0.025$ moles / 2L

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

$A_t =$ ____ Moles at 5 Min (300 sec)

$\ln[A_t] = -kt + \ln[A_0]$

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

$\ln A_t = -(6.82\times10^{-3})(300) + \ln(0.025)$

$\ln A_t = -5.735$

$A_t = 3.23 \times 10^{-3}$ Moles

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(b) $0.025 \rightarrow 0.01$ moles $t = ?$

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

$\ln 0.01 = -(6.82\times10^{-3})t + \ln(0.025)$

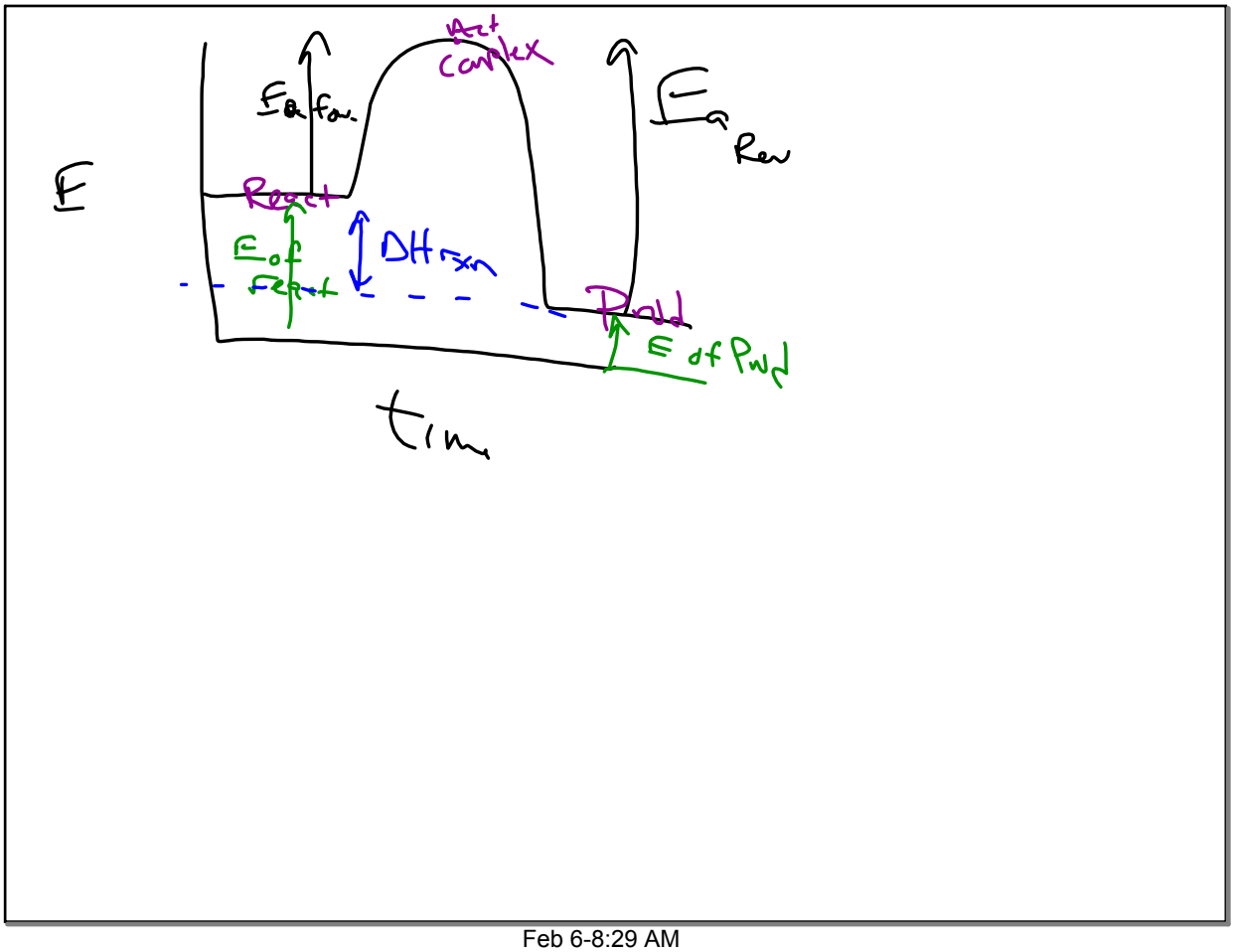
$t = 134.35$ sec.

(c) $t_{1/2} = \frac{0.693}{6.82\times10^{-3}} = 101.61$ sec

1.69 min

0.028 hr

Feb 6-8:19 AM



Feb 6-8:29 AM

Arrhenius Eqn

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

$\ln x \Leftrightarrow e^x$

$\log x \Leftrightarrow 10^x$

E_a ← Act. energy

A: Const. Frequency factor

R: Univ. Gas Const. $8.314 \frac{J}{Mole \cdot K}$ or $0.08206 \frac{L \cdot atm}{Mole \cdot K}$

T: Temp. KELVIN

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$$\ln(K) = \ln\left(A\, e^{-\frac{E_a}{RT}}\right)$$

$$\ln K = \ln\left(A\, e^{-\frac{E_a}{RT}}\right)$$

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

$$\ln K_1 = \ln A + \frac{-E_a}{RT_1}$$

CRP1

T_1	K_1
T_2	K_2

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$$\ln K_1 = \ln A + \frac{-E_a}{RT_1} \qquad \ln K_2 = \ln A + \frac{-E_a}{RT_2}$$

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

$$\ln \frac{K_1}{K_2} = \frac{-E_a}{RT_1} - \frac{-E_a}{RT_2}$$

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

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

$R = 8.314\ \text{J/mole·K}$

$R = 8.314 \times 10^{-3}\ \text{KJ/mole K}$

KELVIN

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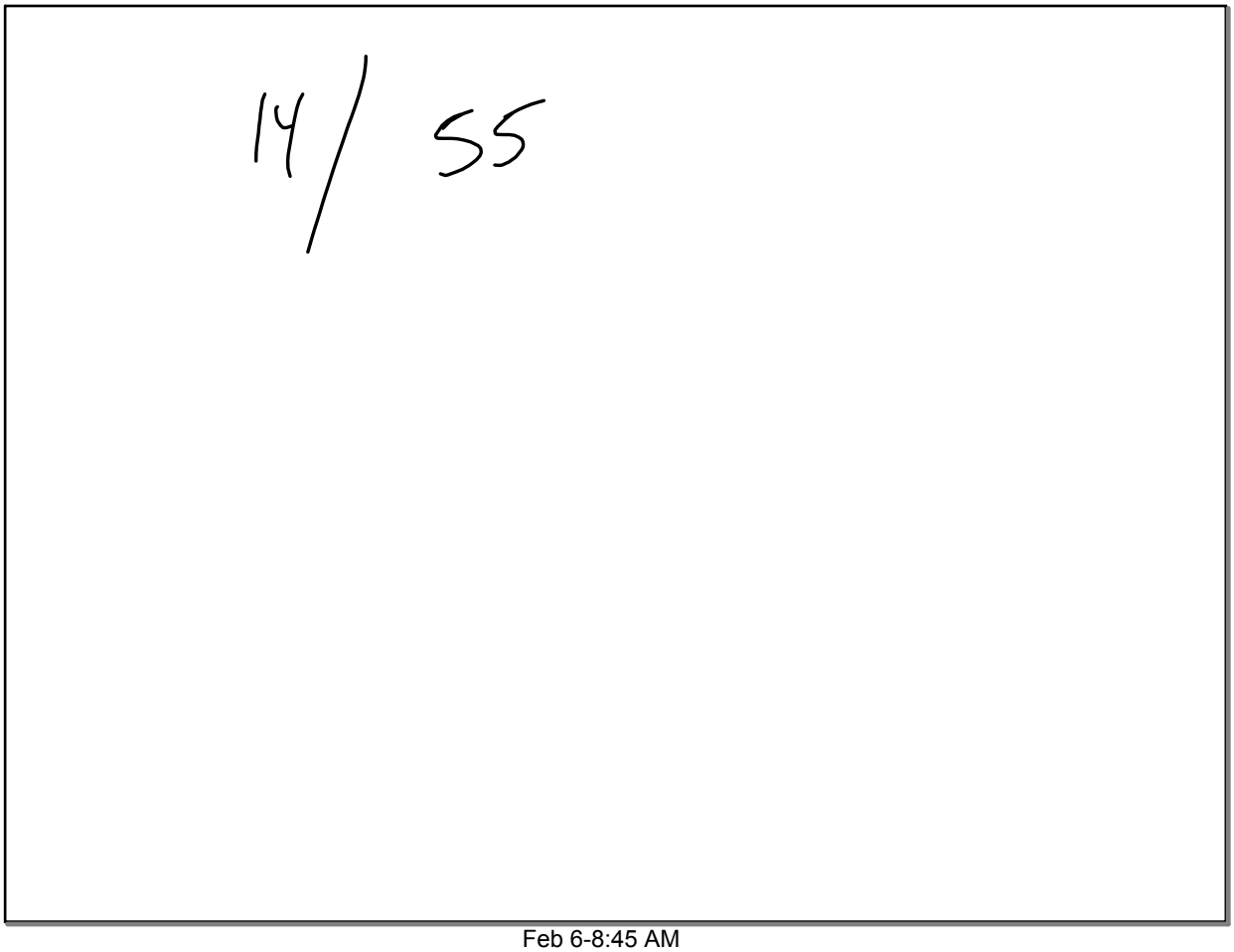

Feb 6-8:45 AM