

(11.32) a) Rate = $k [NO]^2 [O_2]$ } Rate = $k [A]^3$
 b) 3rd order $k \frac{1}{M^2 \cdot sec}$ } $\frac{1 M}{sec} = k (M^3) \frac{1}{M^3}$
 c) Rate = $k [NO]^2 [O_2]$
 $1.41 \times 10^{-2} = k [0.0125]^2 [0.0125]$
 $k = 7105 \frac{1}{M^2 \cdot sec}$
 d) Rate = $k [NO]^2 [O_2]$
 $= 0.4 \frac{M}{sec} NO$
 $2NO + O_2 \rightarrow 2NO_2$
 $-\frac{1}{2} \frac{d[NO]}{dt} = -\frac{d[O_2]}{dt} = \frac{1}{2} \frac{d[NO_2]}{dt}$

Feb 2-7:45 AM

(38) I_2 , First order, $k = 0.271 \frac{1}{sec}$
625 Kelvin $I_2 \rightarrow 2I^-$
 a) $t_{1/2} = \frac{0.693}{k} = \frac{0.693}{0.271} = 2.56 \text{ sec}$
 b) $\ln A_t = -kt + \ln A_0$
 $\ln A_t = -0.271 \left(\frac{5}{2} \right) + \ln(0.05)$
 $\ln A_t = -4.38$
 $A_t = 0.0125 M$

Feb 2-7:56 AM

Half Life Derivation

$$t_{1/2} = \frac{1}{2} A_0 = A_{t_{1/2}}$$

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

$$\ln\left(\frac{1}{2}A_0\right) = -Kt_{1/2} + \ln A_0$$

$$\frac{\ln\left(\frac{1}{2}A_0\right) - \ln A_0}{-\ln A_0} = \frac{-Kt_{1/2} + \ln A_0 - \ln A_0}{-\ln A_0}$$

$$\ln\left(\frac{1}{2}A_0\right) - \ln A_0 = -Kt_{1/2}$$

$$\ln \frac{\cancel{\frac{1}{2}A_0}}{A_0} = -Kt_{1/2}$$

$$\ln \frac{1}{2} = -Kt_{1/2}$$

$$\frac{-0.693}{-K} = \frac{-Kt_{1/2}}{-K}$$

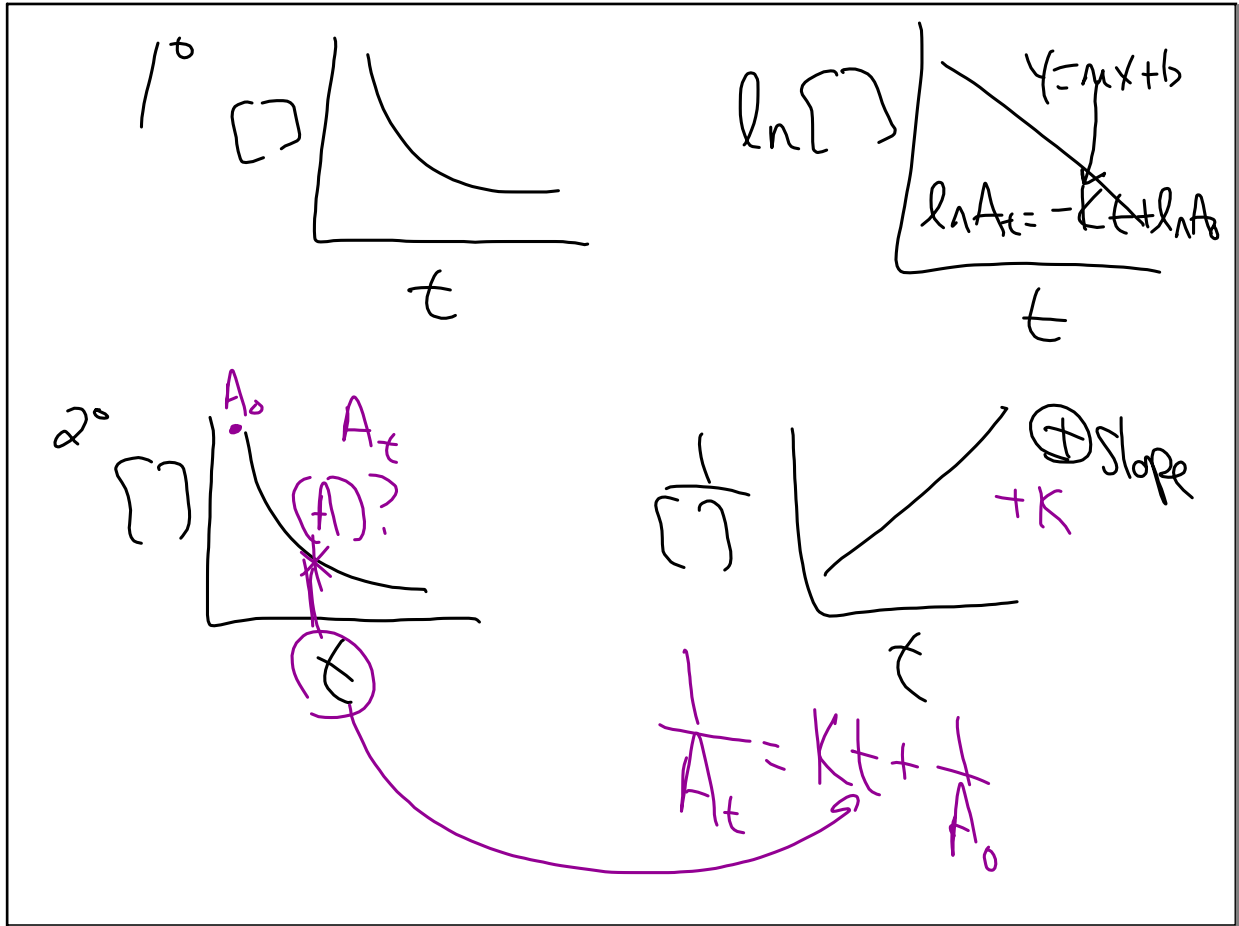
$$t_{1/2} = \frac{0.693}{K}$$

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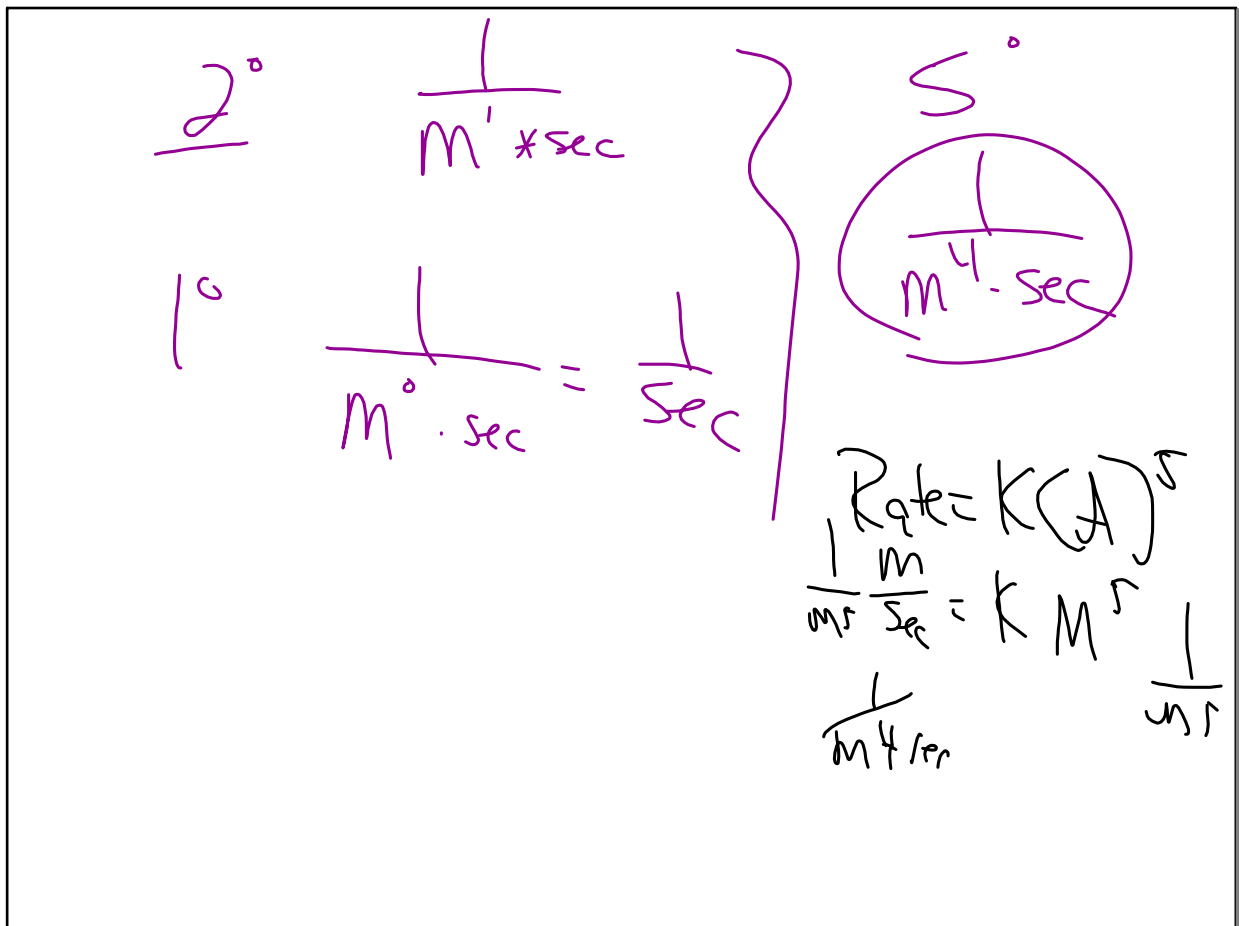
LOG/LN Rules

- ① $\ln A - \ln B = \ln \frac{A}{B}$
- ② $\ln A + \ln B = \ln(AB)$
- ③ $\ln(A^2) = 2 \ln A$

Feb 2-8:10 AM



Feb 2-8:15 AM



Feb 2-8:22 AM

$$14 / 40 + 44$$

Feb 2-8:28 AM