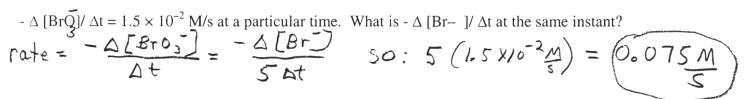
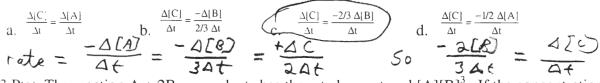
CHM 152/54	Quiz #2a	25 Pts	Fall 05	Name:_	Key
------------	----------	--------	---------	--------	-----

1. (4 Pts) For the reaction: $BrO_3^- + 5Br^- + 6H^+ \rightarrow 3Br_2 + 3H_2O$



2. (4 Pts) For the hypothetical reaction A + 3B \rightarrow 2C, the rate of appearance of C given by (Δ [C]/ Δ t) may also be expressed as



3. (3 Pts) The reaction A + 2B \rightarrow products has the rate law, rate = k[A][B]³. If the concentration of B is doubled while that of A is unchanged, by what factor will the rate of reaction increase?

4. (4 Pts) At 25°C, the rate constant for the first-order decomposition of a pesticide solution is 6.40 x 10⁻³ min⁻¹. If the starting concentration of pesticide is 0.0314 M, what concentration will remain after 62.0

$$\lim_{A \to \infty} A = -kt + \ln (A)_{0}$$

$$= -6.40 \times 10^{-3} (62) + \ln [0.0314]$$

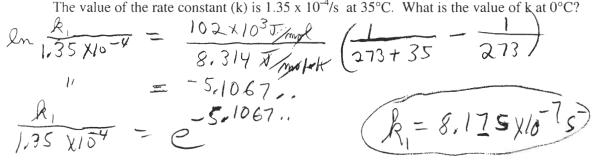
$$\ln (A)_{t} = -3.8577...$$

$$[A]_{t} = e^{-3.8577...} = 0.02112 M$$

5. (4 Pts) The reaction $2NO_2(g) \rightarrow 2NO(g) + O_2(g)$ is suspected to be second order in NO_2 . Which of the following kinetic plots would be the most useful to prove whether or not the reaction is second order?

6. (6 Pts) The activation energy for the following first-order reaction is 102 kJ/mol. $N_2O_5(g) \rightarrow 2NO_2(g) + 1/2O_2(g)$

The value of the rate constant (k) is 1.35×10^{-4} /s at 35° C. What is the value of k at 0° C?



CHM 152/54	Quiz #2b	25 Pts	Fall 05	Name:_	Key

$$rate = k$$

$$rate = k[A$$

$$rate = k[A$$

$$[A]_t = -kt + [A]_t$$

$$rate = k[A] \qquad rate = k[A]^2 \qquad [A]_t = -kt + [A]_0 \qquad ln[A]_t = -kt + ln[A]_0 \qquad R = 8.314 \ J/(mol \bullet K)$$

$$1/[A]_t = kt + 1/[A]_0$$

$$t_{1/2} = [A]_0/2$$

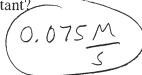
$$t_{1/2} = 0.693/k$$

$$t_{1/2} = 1/k[A]$$

$$1/[A]_1 = kt - 1/[A]_0$$
 $t_{1/2} = [A]_0/2k$ $t_{1/2} = 0.693/k$ $t_{1/2} = 1/k[A]_0$ $ln\frac{k_1}{k_2} = \frac{E_a}{R}(\frac{1}{T_2} - \frac{1}{T_1})$ $e=mc^2$

1. (4 Pts) For the reaction:
$$BrO_3^- + 5Br^- + 6H^+ \rightarrow 3Br_2 + 3H_2O$$

 $-\Delta \left[BrQ \right] / \Delta t = 1.5 \times 10^{-2} \text{ M/s at a particular time. What is } -\Delta \left[Br_{\bullet} \right] / \Delta t \text{ at the same instant?}$ $\int ate = -\Delta \left[\frac{e_{0}Q_{0}}{h} \right] = \frac{-\Delta \left[\frac{Br}{h} \right]}{5\Delta t} \qquad \text{So : } 5 \left(\frac{l}{h}, \frac{5}{h} \right) = \left(\frac{0.075 \text{ M}}{5} \right)$



2. (4 Pts) For the hypothetical reaction A + 3B \rightarrow 2C, the rate of appearance of C given by (Δ [C]/ Δ t) may also be expressed as

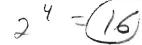
$$\frac{\Delta_1 C^2}{2\pi} = \frac{\Delta_1 A}{2\pi}$$

$$\frac{\Delta[C]}{\Delta t} = \frac{-\Delta[B]}{2/3 \Delta t}$$

$$C. \frac{\Delta[C]}{\Delta t} = \frac{-2/3 \Delta[B]}{\Delta t}$$

$$\frac{\Delta[C]}{\Delta t} = \frac{-1/2 \Delta[A]}{\Delta t}$$

3. (3 Pts) The reaction $A + 2B \rightarrow \text{products has the rate law, rate} = k[A][B]^3$. If the concentration of B is doubled while that of A is doubled, by what factor will the rate of reaction increase?



4. (4 Pts) At 25°C, the rate constant for the first-order decomposition of a pesticide solution is 6.40 x 10⁻³ min⁻¹. If the starting concentration of pesticide is 0.0314 M, what concentration will remain after 82.0 min at 25° C? in [A] = - let + ln [A].

$$= (-6.40 \times 10^{-3})(82) + Lr \left[0.0314\right]$$

$$= (-3.9857...)$$

$$[A]_{L} = 0.01857 M$$

5. 4 Pts: The reaction $2NO_2(g) \rightarrow 2NO(g) + O_2(g)$ is suspected to be second order in NO_2 . Which of the following kinetic plots would be the most useful to prove whether or not the reaction is second order?

A. a plot of $[NO_2]^2$ vs. t B. a plot of $[NO_2]$ vs. t C. a plot of $[NO_2]$ vs. t D. a plot of $[NO_2]^{-1}$ vs. t

6. (6 Pts) The activation energy for the following first-order reaction is 202 kJ/mol.

$$N_2O_5(g) \to 2NO_2(g) + 1/2O_2(g)$$

The value of the rate constant (k) is 1.35×10^{-4} /s at 45° C. What is the value of k at 0° C?

$$\lambda_{1} \frac{\lambda_{1}}{1.35 \times 10^{-4}} = \frac{202 \times 10^{3}}{8.314} \frac{\lambda_{1}}{\lambda_{1}} \left(\frac{1}{45 + 273} - \frac{1}{273}\right)$$

$$= -12.594...$$

$$\frac{\lambda_{1}}{1.35 \times 10^{-4}} = \frac{1}{2}.594...$$

$$\frac{\lambda_{1}}{1.35 \times 10^{-4}} = \frac{44.58}{4.58} \times 10^{-10}$$