CHM 152/54 Quiz #2a 25 Pts Fall 08 Name:_____

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

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

SHOW ALL WORK TO RECEIVE CREDIT

1. (5 Pts) The half-life of a first-order decomposition reaction is 188 seconds. If the initial concentration of reactant is 0.524 M, what is the concentration of reactant after 752 seconds?

2. (5 Pts) Calculate the activation energy, E_a for $N_2O_5(g) \rightarrow 2\ NO_2(g) + 1/2\ O_2(g)$ given k (at 25ºC) = $3.46 \times 10^{-5}\ s^{-1}$ and k (at 35ºC) = $1.48 \times 10^{-4}\ s^{-1}$.

3. (5 Pts) The elementary steps for the catalyzed decomposition of dinitrogen monoxide are shown below. Identify the catalyst in the reaction.

$N_2O(g) + NO(g) \rightarrow N_2(g) + NO_2(g)$
$2\ NO_2(g) \rightarrow 2\ NO(g) + O_2(g)$

****** There are more question on the back**********

4. (3 Pts) In basic solution, $(CH_3)_3CCl$ reacts according to the equation below.
$(CH_3)_3CCl + OH^- \rightarrow (CH_3)_3COH + Cl^-$
The accepted mechanism for the reaction is

$(CH_3)_3CCl \rightarrow (CH_3)_3C^+ + Cl^-$ (slow)
$(CH_3)_3C^+ + OH^- \rightarrow (CH_3)_3COH$ (fast)

What is the rate law for the reaction?

5. (7 Pts) Determine the value of the rate constant at 230°C for the reaction: $2NO_2(g) \rightarrow 2NO(g) + O_2(g)$. The reaction has an activation energy of 121 kJ/mol and at 400°C the rate constant has a value of 7.8 $L \cdot mol^{-1} \cdot s^{-1}$.

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