Name: _____ Date: _____

1. What is the rate law that corresponds to the data shown for the reaction $2A + B \rightarrow C$?

Exp.	Initial [A]	Initial [B]	Initial rate
1	0.015	0.022	0.125
2	0.030	0.044	0.500
3	0.060	0.044	0.500
4	0.060	0.066	1.125

2. The rate constant for a certain first-order reaction is 0.40/min. What is the initial rate in mole/L·min, if the initial concentration of the compound involved is 0.50 mol/L?

3. Nitrogen pentoxide decomposes by a first-order process yielding N_2O_4 and oxygen.

   $2N_2O_5 \rightarrow 2N_2O_4 + O_2$

   At a given temperature, the half-life of N_2O_5 is 0.90 hr. What is the first-order rate constant for N_2O_5 decomposition?

4. The rate constant for the first-order decomposition of C_4H_8 at 500°C is 9.2×10^{-3} s^{-1}. How long will it take for 10.0% of a 0.100 M sample of C_4H_8 to decompose at 500°C?

5. The reaction $2A + B \rightarrow$ *products* is second order with respect to A and zero-order with respect to B. Starting with 0.135 M of A, what is the concentration of A after 35 min if the rate constant is 0.11 $M^{-1}s^{-1}$?

6. The reaction $2A \rightarrow$ *products* is second order with respect to A. If the concentration of A drops from 1.05 M to 0.815 M in a time of 15.0 min, what is the rate constant for this reaction (the same time units may be used)?

7. It is possible for the following overall reaction to consist of a one step mechanism:

   $2A + B + C \rightarrow$ *products*

   A) True
   B) False

8. The rate law predicted by the following two-step mechanism is rate = k[A][B]. (true or false)

   $A \rightarrow C + B$ *slow*
   $A + B \rightarrow C + E$ *fast*

   A) True
   B) False

9. The rate determining step in the following mechanism is bimolecular (true or false)

   $A \rightarrow C + B$ *slow*

   $A + B \rightarrow C + E$ *fast*

   A) True
   B) False

10. B is a catalyst in the following mechanism: (true or false)

    $A \rightarrow C + B$ *slow*

    $A + B \rightarrow C + E$ *fast*

    A) True
    B) False

Answer Key

1. Rate = $k[B]^2$
2. 0.20
3. 0.77 hr^{-1}
4. 11 s
5. 4.2 x 10^{-3} M
6. 1.83 x 10^{-2} $M^{-1}min^{-1}$
7. B
8. B
9. B
10. B

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