Advanced Chemistry
Rate Law (Completion)

Instructions: Complete the following problems. SHOW ALL WORK in the empty space below the questions. Remembers the units. Round to the correct number of significant figures.

Concept Questions

1. A reaction was found to be second order in carbon monoxide concentration. The rate of the reaction _____ if the [CO] is doubled, with everything else kept the same.
   a) Doubles
   b) Remains unchanged
   c) Triples
   d) Increases by a factor of 4
   e) Is reduced by a factor of 2

2. If the rate law for the reaction (2A + 3B → products) is first order in A and second order in B, then the rate law is rate = _____.
   a) $k[A][B]$
   b) $k[A]^2[B]^3$
   c) $k[A][B]^2$
   d) $k[A]^2[B]$
   e) $k[A]^2[B]^2$

3. If the rate law for the reaction (2A + 3B → products) is first order in A and zero order in B, then the rate law is rate = _____.
   a) $k[A]$
   b) $k[A]^2[B]^3$
   c) $k[B]^2$
   d) $k[A]^2[B]$
   e) $k[A][B]$

4. If the rate law for the reaction (2A + 3B → products) is second order in A and second order in B, then the rate law is rate = _____.
   a) $k[A][B]$
   b) $k[A]^2[B]^3$
   c) $k[A][B]^2$
   d) $k[A]^2[B]$
   e) $k[A]^2[B]^2$

5. The kinetics of a reaction was studied and it was determined that the reaction rate increased by a factor of 9 when the concentration of B was tripled. The reaction is _____ order in B.
   a) zero
   b) third
   c) one-half
   d) first
   e) second

6. The kinetics of a reaction was studied and it was determined that the reaction rate did not change when the concentration of B was tripled. The reaction is _____ order in B.
   a) zero
   b) third
   c) one-half
   d) first
   e) second

7. A reaction was found to be second order in A. Increasing the concentration of A by a factor of 3 will cause the reaction rate to _____.
   a) Remain the same
   b) Increase by a factor of 27
   c) Increase by a factor of 9
   d) Triple
   e) Decrease by a factor of the cube root of 3

8. A reaction was found to be zero order in A. Increasing the concentration of A by a factor of 3 will cause the reaction rate to _____.
   a) Remain the same
   b) Increase by a factor of 27
   c) Increase by a factor of 9
   d) Triple
   e) Decrease by a factor of the cube root of 3

9. The overall order of a reaction is 1. The units of the rate constant for the reaction is
   a) M/s
   b) Ms^{-1}
   c) s^{-1}
   d) $M^{-1}s^{-1}$
   e) $M^{-2}s^{-1}$

10. The overall order of a reaction is 3. The units of the rate constant for the reaction is
   a) M/s
   b) Ms^{-1}
   c) s^{-1}
   d) $M^{-1}s^{-1}$
   e) $M^{-2}s^{-1}$

Problems

10. The following data in the table was obtained for the reaction A + B → P

Experiment Number	[A] (M)	[B] (M)	Initial Rate (M/s)
1	0.273	0.763	2.83
2	0.273	1.526	2.83
3	0.819	0.763	25.47

a) What is the rate law for the reaction?

b) What is the overall order of the reaction?

c) What is rate constant?

d) What is the rate of the reaction when [A] = 0.350 M and [B] = 0.150 M.

11. The following data in the table was obtained for the reaction:
   2 ClO2 (aq) + 2 OH- (aq) → ClO3- (aq) + ClO2- (aq) + H2O (1)

Experiment Number	$[ClO_2]$ (M)	$[OH^-]$ (M)	Initial Rate (M/s)
1	0.060	0.030	0.0248
2	0.020	0.030	0.00276
3	0.020	0.090	0.00828

a) What is the rate law for the reaction?

b) What is the overall order of the reaction?

c) What is rate constant?

d) What is the rate of the reaction when [A] = 0.050 M and [B] = 0.150 M.

12. The following data in the table was obtained for the reaction: A + P → P

Experiment Number	[A] (M)	[B] (M)	Initial Rate (M/s)
1	0.300	0.430	0.340
2	0.300	1.720	1.360
3	0.150	0.430	0.340

a) What is the rate law for the reaction?

b) What is the overall order of the reaction?

c) What is rate constant?

d) What is the rate of the reaction when [A] = 0.550 M and [B] = 0.350 M.