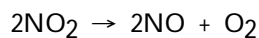


Name \_\_\_\_\_

1) Nitrogen dioxide decomposes to nitric oxide and oxygen via the reaction:

1) \_\_\_\_\_



In a particular experiment at 300°C,  $[\text{NO}_2]$  drops from 0.0100 to 0.00650 M in 100 s. The rate of appearance of  $\text{O}_2$  for this period is \_\_\_\_\_ M/s.

- A)  $3.5 \times 10^{-5}$       B)  $3.5 \times 10^{-3}$       C)  $1.8 \times 10^{-5}$       D)  $7.0 \times 10^{-3}$       E)  $7.0 \times 10^{-5}$

2) The instantaneous rate of a reaction can be determined from the graph of molarity versus time at any point on the graph.

2) \_\_\_\_\_

3) The overall reaction order is the sum of the orders of each reactant in the rate law.

3) \_\_\_\_\_

4) Units of the rate constant of a reaction are independent of the overall reaction order.

4) \_\_\_\_\_

5) The concentration of reactants or products at any time during the reaction can be calculated from the integrated rate law.

5) \_\_\_\_\_

6) The rate of a second order reaction can depend on the concentrations of more than one reactant .

6) \_\_\_\_\_

7) The half life for a first order rate law depends on the starting concentration.

7) \_\_\_\_\_

8) The rate limiting step in a reaction is the slowest step in the reaction sequence.

8) \_\_\_\_\_

9) Heterogeneous catalysts have different phases from reactants.

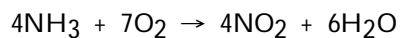
9) \_\_\_\_\_

10) Rates of reaction can be positive or negative.

10) \_\_\_\_\_

11) Which substance in the reaction below either appears or disappears the fastest?

11) \_\_\_\_\_

A)  $\text{NH}_3$ B)  $\text{NO}_2$ C)  $\text{H}_2\text{O}$ D)  $\text{O}_2$ 

E) The rates of appearance/disappearance are the same for all of these.

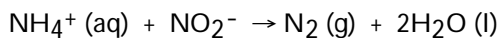
A flask is charged with 0.124 mol of A and allowed to react to form B according to the reaction  $A(g) \rightarrow B(g)$ . The following data are obtained for [A] as the reaction proceeds:

Time (s)	1	10	20	30	40
Moles of A	0.124	0.110	0.088	0.073	0.054

- 12) How many moles of B are present at 30 s? 12) \_\_\_\_\_  
 A) 0.15                      B) 0.073                      C)  $1.7 \times 10^{-3}$                       D)  $2.4 \times 10^{-3}$                       E) 0.051
- 13) A reaction was found to be second order in carbon monoxide concentration. The rate of the reaction 13) \_\_\_\_\_  
 \_\_\_\_\_ if the [CO] is doubled, with everything else kept the same.  
 A) is reduced by a factor of 2.  
 B) triples  
 C) remains unchanged  
 D) increases by a factor of 4  
 E) doubles
- 14) If the rate law for the reaction 14) \_\_\_\_\_  
 $2A + 3B \rightarrow \text{products}$   
 is first order in A and second order in B, then the rate law is rate = \_\_\_\_\_.  
 A)  $k[A]^2[B]^3$                       B)  $k[A][B]$                       C)  $k[A][B]^2$                       D)  $k[A]^2[B]^2$                       E)  $k[A]^2[B]$
- 15) A reaction was found to be third order in A. Increasing the concentration of A by a factor of 3 will 15) \_\_\_\_\_  
 cause the reaction rate to \_\_\_\_\_.  
 A) increase by a factor of 9  
 B) decrease by a factor of the cube root of 3  
 C) increase by a factor of 27  
 D) remain constant  
 E) triple
- 16) A reaction was found to be zero order in A. Increasing the concentration of A by a factor of 3 will 16) \_\_\_\_\_  
 cause the reaction rate to \_\_\_\_\_.  
 A) triple  
 B) decrease by a factor of the cube root of 3  
 C) remain constant  
 D) increase by a factor of 9  
 E) increase by a factor of 27

17) The following reaction occurs in aqueous solution:

17) \_\_\_\_\_



The data below is obtained at 25°C.

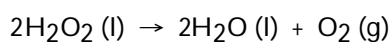
$[\text{NH}_4^+] (\text{M})$	$[\text{NO}_2^-] (\text{M})$	Initial rate (M/s)
0.0100	0.200	$3.2 \times 10^{-3}$
0.0200	0.200	$6.4 \times 10^{-3}$

The order of the reaction in  $\text{NH}_4^+$  is \_\_\_\_\_.

- A) +2                      B) +1                      C) 0                      D) -1                      E) -2

18) The reaction below is first order in  $[\text{H}_2\text{O}_2]$ :

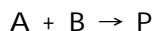
18) \_\_\_\_\_



A solution originally at 0.600 M  $\text{H}_2\text{O}_2$  is found to be 0.075 M after 54 min. The half-life for this reaction is \_\_\_\_\_ min.

- A) 6.8                      B) 54                      C) 28                      D) 18                      E) 14

The data in the table below were obtained for the reaction:



Experiment Number	$[\text{A}] (\text{M})$	$[\text{B}] (\text{M})$	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

19) The magnitude of the rate constant is \_\_\_\_\_.

19) \_\_\_\_\_

- A) 38.0                      B) 0.278                      C) 42.0                      D) 2.21                      E) 13.2

20) The half-life of a first-order reaction \_\_\_\_\_.

20) \_\_\_\_\_

- A) is constant  
B) can be calculated from the reaction rate constant  
C) does not depend on the initial reactant concentration  
D) is the time necessary for the reactant concentration to drop to half its original value  
E) All of the above are correct.