**Study Sheet 23**

Name:  
Vocabulary Words

1. activation energy
2. catalyst
3. equilibrium constant
4. inhibitor
5. rate constant
6. reaction rate
7. reversible reaction

1. For the reaction A + B 🡪 C, we’ve determined the following data:

**Trial [A] (M) [B] (M) Initial rate (M/s)**

1 0.0100 0.0100 3.00 x 10-5

2 0.0200 0.0100 6.00 x 10-5

3 0.0100 0.0200 6.00 x 10-5

Using this information, determine the rate law for this reaction, find the reaction order for A and B, and find the overall reaction order.

2. When I did the chemical reaction A + B 🡪 C, I found that the reaction rate was first order in A and second order in B. Using this information, write the rate law for this reaction and determine the overall reaction order.

3. In the reaction A + 2B 🡪 2C, we found the following rate data:

**Trial [A] (M) [B] (M) Initial rate (M/s)**

1 0.0150 0.0150 2.00 x 10-3

2 0.0300 0.0150 4.00 x 10-3

3 0.0300 0.0300 16.0 x 10-3

Using this information, find the overall rate law for this reaction; find the order of the reaction for each reactant, and the overall reaction order.

4. What is the overall reaction order for the reaction with the following rate law: rate = k[Ca(NO3)2][(NH4)2O]2?

5. What are the FIVE major factors that affect reaction rate?

6. Why would a mixture of gases react faster when the volume they occupy is decreased?

7. Why would iron filings rust faster than an iron nail?

9. What is the effect of a catalyst on the required energy to achieve effective collisions?

10. Write the expression for the equilibrium constant, K, for the reactions below.

a. N2(g) + 3H2(g) 2NH3(g)

b. 2KClO3(s) 2KCl(s) + 3O2(g)

11. Determine the value of the equilibrium constant for the following three reactions, using the given equilibrium concentrations. Remember [X] implies a concentration in moles per liter.

A + B ⮀ C

[A] = 2.0 [B] = 3.0 [C] = 4.0

D + 2E ⮀ F + 3G

[D] = 1.5; [E] = 2.0; [F] = 1.8; [G] = 1.2

N2(*g*) + 3H2(*g*) ⮀ 2NH3(*g*)

[N2] = 0.45; [H2] = 0.14; [NH3] = 0.62

13. In a 10.0L vessel at 1000K, 0.250 mol SO2(g) and 0.200 mol O2(g) react to form 0.162 mol SO3(g) at equilibrium. What is the Kc at 1000K for this reaction?  
Balanced equation: \_\_\_ SO2(g) + \_\_\_\_ O2(g) **↔** \_\_ SO3 (g)

14. An aqueous solution of 0.00325M Fe 3+ was reacted with 0.0020M SCN – at 25oC. Calculate the value of the equilibrium constant for this reaction when the equilibrium concentration of FeSCN 2+ was determined to be 0.000667M

Fe 3+ **+** SCN- **↔**FeSCN2+

15. At a certain temperature, 2.0 mole NH3 is introduced into a 2.0 L container, and the NH3 partially dissociates into by the following reaction:

2NH3 (g) **↔** N2(g) + 3 H2(g)  
At equilibrium, 1.0 mol NH3 remains, what is the value of K for this reaction?

16. Calculate the concentrations at equilibrium if the initial concentration of iodine is 0.200 M and the initial concentration of hydrogen is 0.200 M and the equilibrium constant is 2.4 x 10-5.

H2 + I2 ↔ 2 HI

17. Calculate the concentration of each of the substances at equilibrium if the initial concentration of H2S is 0.100 M and the equilibrium constant is 8.90 E-8.

H2S ↔ H+ + HS-