

Chemistry - Equilibrium HW1 - Kinetics

Name: _____ Date: _____ Per: _____

1. The _____ model explains why a reaction proceeds faster if the concentrations of the reacting molecules are increased.
2. True or false? A catalyst is a substance that speeds up a reaction without being consumed.
A) True B) False
3. True or false? A minimum energy called the activation energy is needed for a reaction to occur.
A) True B) False
4. True or false? At equilibrium, the concentrations of all reactants and products are constant.
A) True B) False
5. True or false? At equilibrium, the concentrations of all reactants and products are equal.
A) True B) False
6. Collisions need to have _____ and _____ for a reaction to occur.
7. Reaction rates can measure the disappearance of reactants and are stoichiometrically proportional.
A) True B) False
8. All of the following are factors affecting the rate of a chemical reaction except _____.
A) temperature D) concentration
B) surface area E) volume
C) presence of a catalyst
9. Increasing the surface area _____ the rate of a chemical reaction because it _____.
10. Reaction rates depend on factors such as _____, _____, and _____.

Bank: pressure, increases, collision, temperature, concentration

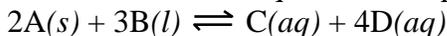
Chemistry - Equilibrium HW2 - Keq

Name: _____ Date: _____ Per: _____

1. Consider the general reaction: $jA + kB \rightleftharpoons lC + mD$

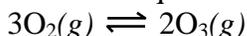
Write the correct equilibrium expression below.

2. Choose the correct equilibrium expression for the following reaction.



- A) $\frac{[A]^2[B]^3}{[C][D]^4}$ B) $[C][D]^4$ C) $\frac{[C][4D]^4}{[2A]^2[3B]^3}$ D) $\frac{[C][D]^4}{[A]^2[B]^3}$ E) none of these

3. Write the equilibrium expression for the reaction



4. For the reaction: $F_2(g) \rightleftharpoons 2F(g)$

at a particular temperature, the concentrations at equilibrium were observed to be $[F_2] = 1.6 \times 10^{-2}$ mol/L and $[F] = 2.0 \times 10^{-4}$ mol/L. Calculate the value of the equilibrium constant (K_{eq}) from these data. (The units are deleted.)

5. For the reaction: $2NO(g) + O_2(g) \rightleftharpoons 2NO_2(g)$

at a certain temperature, the equilibrium concentrations were found to be $[NO_2] = 2.8 \times 10^{-3} M$, $[O_2] = 1.0 \times 10^{-2} M$, and $[NO] = 2.0 \times 10^{-3} M$. Calculate the value of the equilibrium constant (K_{eq}) from these data (delete units).

6. For the reaction: $CO(g) + H_2O(g) \rightleftharpoons CO_2(g) + H_2(g)$

$K = 3.88$ at a certain temperature. If at this temperature in a certain experiment the equilibrium concentrations are $[H_2] = 1.4 M$, $[CO_2] = 1.8 M$, and $[H_2O] = 0.26 M$, calculate $[CO]$.

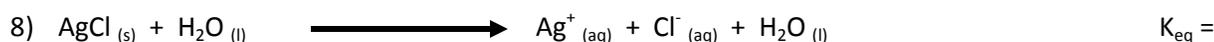
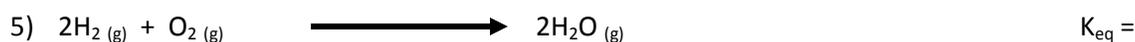
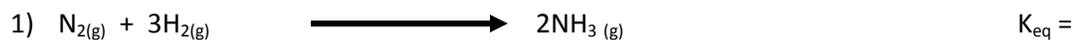
7. For the reaction: $2SO_2(g) + O_2(g) \rightleftharpoons 2SO_3(g)$

at a certain temperature, the equilibrium concentrations were observed to be $[SO_2] = 0.581 M$, $[O_2] = 7.50 \times 10^{-2} M$, and $[SO_3] = 0.650 M$. Calculate the value of K for this system at this temperature.

Equilibrium Constant Worksheet

Name: _____ Per: _____

Part 1: Write out the expression for the equilibrium constants of these reactions:



Part 2: Use some of the equilibrium expressions you wrote above to calculate the equilibrium constants using the concentrations given.



If at equilibrium and 25°C, you have $[\text{FeSCN}^{2+}] = 0.25 \text{ M}$, $[\text{Fe}^{3+}] = 0.046 \text{ M}$, and $[\text{SCN}^{-}] = 0.046 \text{ M}$, what is the equilibrium constant, K_{eq} ?

Using the equilibrium constant you just calculated, calculate the concentration of FeSCN^{2+} ions if the concentrations of Fe^{3+} and SCN^{-} are 0.096M each:

10) Equilibrium constants change with the temperature. If, for the same reaction in #9, at 200°C, $[\text{Fe}^{3+}] = 0.076 \text{ M}$, $[\text{SCN}^{-}] = 0.056 \text{ M}$, and $[\text{FeSCN}^{2+}] = 6.3 \text{ M}$. What is the new K_{eq} ?



At 300°C, you have a 2.00L balloon filled, at equilibrium, with 0.0023 moles of N_2 , 0.0050 mol of H_2 , and 0.00042 mol of NH_3 . What is the equilibrium constant?

Chemistry - Equilibrium HW3 - Le Chatelier and Ksp

Name: _____ Date: _____ Per: _____

Use the following to answer questions 1-4:

Consider the reaction $2\text{H}_2(g) + \text{O}_2(g) \rightleftharpoons 2\text{H}_2\text{O}(g)$ at some equilibrium position. Using the following choices, indicate what will happen if the changes below are made.

- a. shifts to the left
- b. shifts to the right
- c. no change

1. Additional $\text{H}_2\text{O}(g)$ is injected into the reaction vessel.
2. Some $\text{H}_2(g)$ is removed from the reaction vessel.
3. The size of the reaction vessel is decreased.
4. Some $\text{He}(g)$ is injected into the reaction vessel.

Use the following to answer questions 5-9:

Consider the reaction system $\text{CH}_4(g) + 2\text{O}_2(g) \rightleftharpoons \text{CO}_2(g) + 2\text{H}_2\text{O}(g) + \text{energy}$, and use the following choices to describe what happens when the changes below are made to the system at equilibrium.

- a. shifts to the left
- b. shifts to the right
- c. no change

5. $\text{O}_2(g)$ is removed from the reaction vessel.
6. $\text{CO}_2(g)$ is removed from the reaction vessel.
7. $\text{He}(g)$ is added to the reaction vessel.
8. The temperature is increased.
9. $\text{CH}_4(g)$ is added to the reaction vessel.

Use the following to answer questions 10-12:

Given the equation $A(g) \rightleftharpoons B(g) + 2C(g)$. At a particular temperature, $K = 1.4 \times 10^5$.

10. Addition of chemical B to an equilibrium mixture of the above
- A) will cause [A] to increase
 - B) will cause [C] to increase
 - C) will have no effect
 - D) cannot be determined
 - E) none of the above
11. Placing the equilibrium mixture in an ice bath (thus lowering the temperature)
- A) will cause [A] to increase
 - B) will cause [B] to increase
 - C) will have no effect
 - D) cannot be determined
 - E) none of the above
12. Raising the pressure by decreasing the volume of the container
- A) will cause [A] to increase
 - B) will cause [B] to increase
 - C) will have no effect
 - D) cannot be determined
 - E) none of the above

13. Given the solubility products (K_{sp})

BaSO ₄	1.5×10^{-9}
CoS	5.0×10^{-22}
PbSO ₄	1.3×10^{-2}
AgBr	5.0×10^{-13}

which of the following compounds is the most soluble (in mol/L)?

- A) BaSO₄ B) CoS C) PbSO₄ D) AgBr E) BaCO₃
14. Write the balanced equation for the dissolving of Ag₂S(*s*) in water.