Name: _____ Date: _____

Unit 5 - Topic 2

Rate and Equilibrium

Describe the effect each of these will have on Reaction RATE and Reaction TIME, and explain why this effect occurs based on particle behavior and collision theory.

1. Increase the temperature.

Rate will _____. Reaction time will _____

Explain in terms of *particle behavior AND collision theory.*

_____

_____

_____

2. Decrease the concentration.

Rate will _____. Reaction time will _____

Explain in terms of *particle behavior AND collision theory.*

_____

_____

_____

3. Increase the surface area of reactants.

Rate will _____. Reaction time will _____

Explain in terms of *particle behavior AND collision theory.*

_____

_____

_____

4. Add a catalyst.

Rate will _____. Reaction time will _____

Explain in terms of *particle behavior AND collision theory.*

_____

_____

_____

5. Using a solution of an ionic compound instead of a solution of a covalent compound (Nature of reactants)

Rate will _____. Reaction time will _____

Explain in terms of *particle behavior AND collision theory.*

_____

_____

_____

Name: _____ *Date:* _____

If you leave a closed, partly filled bottle of water in the sunlight, before long you will observe water droplets near the top of the bottle and in the neck. How did they get there? As the sun shines on the bottle, the water begins to evaporate. As the number of vapor molecules increases, so does the chance they will interact with each other and reconvenes to form liquid water. This is how the water droplets get to the top of the bottle.

Changing phase is a reversible process. In a closed container, as the amount of vapor increases and the amount of liquid decreases, the rate of condensation increases and the rate of vaporization decreases. Eventually the two rates become equal. When the rate of vaporization is equal to the rate of condensation, the amount of vapor and the amount of liquid stops changing. This is called **equilibrium**. Just because the rate of vaporization and condensation is equal at equilibrium, it doesn't mean that the amount of vapor and the amount of liquid is equal. For example, the amount of gas at equilibrium will be greater at a high temperature than at a low temperature.

There are other kinds of equilibrium besides phase equilibrium. Some chemical reactions are reversible and reach equilibrium, too. When undissolved solid sits at the bottom of a saturated solution, there is solution equilibrium. It may look like the same undissolved solid at the bottom of the container the entire time, but dissolved material comes out of solution and new material dissolved continuously. Only the amount of undissolved material remains the same. This is often called **dynamic equilibrium** because there is constant activity although there is no real change.

Answer the following questions based on the reading and your knowledge of chemistry.

1. What is a reversible reaction? _____
   _____
2. What is equilibrium? _____
   _____
3. Liquid water and water vapor reach equilibrium only in a closed container. Why?
   _____
   _____
4. A glass of ice water is at equilibrium.
   (a) What is its temperature? _____
   (b) What is happening to the amount of ice in the ice-water mixture? _____
   (c) What is happening to the amount of water in the ice-water mixture? _____