**Regarding Equilibrium**

**SWBAT:**

* **explain, in terms of rates of the forward and reverse reactions,**
* **what is meant by a**reversible reaction **and**dynamic equilibrium
* **state Le Chatelier’s Principle and apply it to deduce qualitatively** **(from appropriate information) the effects of changes in temperature, concentration or pressure, on a system at equilibrium**
* **deduce whether changes in concentration, pressure or temperature or the presence of a catalyst affect the value of the equilibrium constant for a reaction**
* **deduce expressions for equilibrium constants in terms of concentrations,**Kc**, and partial pressures,**Kp
* **calculate the values of equilibrium constants in terms of concentrations or partial pressures from appropriate data**
* **calculate the quantities present at equilibrium, given appropriate data**
* **describe and explain the conditions used in the Haber process and the Contact process, as examples of the importance of an understanding of chemical equilibrium in the chemical industry**

 **Definitions**

**Forward reaction**

* **one where the reactants yields products and it is irreversible.**

**Reversible reaction**

* **one where the products can react together to reform the reactants.**

**Dynamic equilibrium**

* **molecules of reactants are being converted to products at the same rate as products are being converted to reactants.**

**Closed system**

* **none of the reactants or products can escape into the surroundings.**

**Open system**

* **reactants or products can escape into the surroundings**

**Le Chatelier’s principle**

* **when any of the conditions affecting the position of equilibrium are changed, the position of that equilibrium shifts to minimize the change.**
* **If reactants are increased the equilibrium moves to the right and more products are formed until equilibrium is again reached**
* **If products are increased the equilibrium moves to the left and more reactants are formed until equilibrium is again reached**
* **Change in pressure would affect gases only.  By increasing pressure a shift would occur in the direction of less gas molecules. By decreasing pressure a shift would occur in the direction of more gas molecules. If there are equal molecules of gases on both sides then pressure would not be affected by a change in pressure.**
* **Endothermic reactions are favored with an increase in temperature and the reaction shifts to the right. Decreasing temperature would shift it to the left.**
* **Exothermic reactions are favored with a decrease in temperature and the reaction shifts to the right. Increasing temperatures would shift it to the left.**
* **Catalysts speed up the time taken to reach equilibrium but have no effect on the position of equilibrium once it is reached.**

**Kc or Keq or Ksp**

* **Does not include solids or pure water in its liquid state.**
* **A change in temperature would affect the equilibrium constant based on whether it is an endo or exothermic reactions.**
* **However, changes in concentration, pressure of presence of a catalyst do not affect the value of the constant.**

**Partial pressure**

* **the pressure exerted by any one gas in a mixture.**
* **In other words the total pressure of a gas equals the sum of the partial pressures of all the gases present.**
* **Units of pressure are in pascals.**