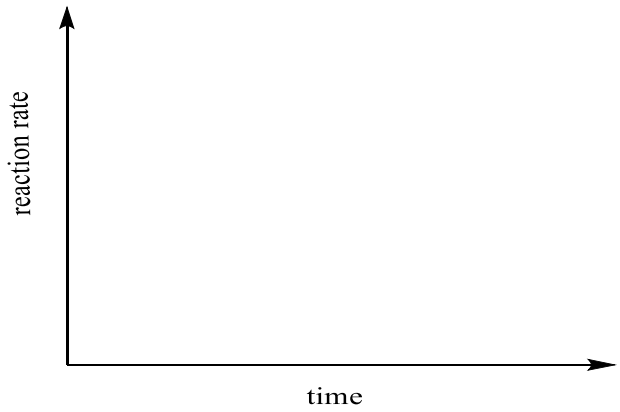
CHM 1220-Dang **Chapter 15 -Reading Questions** **Name** _____

1. At equilibrium, the rate of the _____ process equals the rate of the _____process
2. The equilibrium position is a _____dependent
3. The equilibrium system is a _____ _____ because even though it looks like nothing is happening or changing. However, on the microscopic level, reactant species continue to convert to products and vice versa.
4. Using the example of the reaction $A_2 + B_2 \rightleftharpoons A_2B_2$, draw a rate reaction rate vs. time graph below. Use red line for the forward reaction rate and a blue line for the reverse reaction rate?



Why does the rate forward decrease as time goes on?

5. When a reaction is in equilibrium:
   the _____are equal for the forward and reverse reactions
   the _____products and reactants remain constant
   This does NOT mean that the concentration of reactants and products are equal to one another at equilibrium.
6. Define equilibrium constant, K_c and K_p

7. Define reaction quotient, Q_c and Q_p

8. Write the equilibrium K_p and K'_p for the reaction below

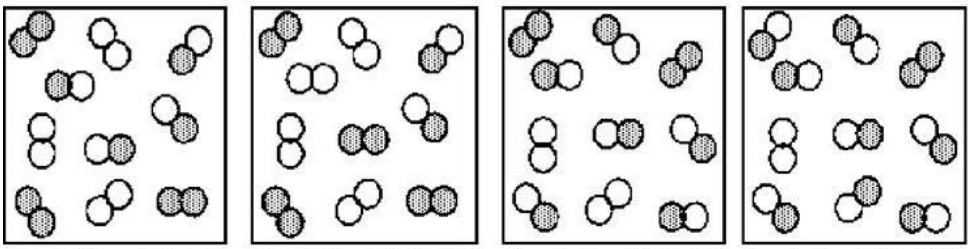
$$2\ H_2S(g) \rightleftharpoons 2\ H_2(g) + S_2(g)$$

9. If the value of K is large, this means at equilibrium there is a high concentration of (products/reactants) and a low concentration of (products/reactants)
10. By considering the numerical value we obtain for Q, we can determine whether the reaction is still proceeding toward products or shifting back toward reactants to reach equilibrium:
    Reaction is at equilibrium, Q _____ K (=, <, or >)
    Reaction is proceeding to the left (to make more reactants), Q _____K (<, = or >)
11. To convert from K_c to K_p (and vice versa), use the following equation:

    Where Δn is

    When will $K_c = K_p$

12. The following pictures represent the equilibrium state for four different reactions of the type $A_2 + X_2 \rightleftharpoons 2\,AX$ (X = B, C, D, E). A atoms are unshaded. X atoms are shaded.



Which reaction has the largest equilibrium constant? Show all setup to solve for K_c values.

13. Define Le Chatelier's principle

14. What are the stresses discussed in class that can disturb a system at equilibrium?

15. For an endothermic reaction, increasing temperature, _____the value of K (increasing or decreasing)