Chem 1 Quiz Chapter 18 **Version C – Makeup** Name: Answer Key
Chemical Equilibrium Date: _____
Dr. Casagrande / Mrs. Rinaldi _____ / 16 pts Period: ____

Multiple Choice

[2 pts each] *Identify the letter of the choice that best completes the statement or answers the question.*

D 1. For a reaction at equilibrium,…
- A. the forward reaction rate is higher than the reverse reaction rate.
- B. the forward reaction rate is lower than the reverse reaction rate.
- C. no reactions take place.
- D. the forward reaction rate is equal to the reverse reaction rate.

C 2. For a reaction at equilibrium, the total concentration of the products…
- A. are always greater than the total concentration of the reactants.
- B. are always equal to the total concentration of the reactants.
- C. are constant.
- D. are always less than the total concentration of the reactants.

D 3. A very high value of K_{eq} ($K_{eq} >> 1$) indicates that…
- A. reactants are favored.
- B. equilibrium is reached quickly.
- C. equilibrium has been reached.
- D. products are favored.

Problems

Use the formulas on the information sheet to perform the following calculations.

4. Determine the equilibrium constant *expressions* for the following reactions.

a. [4 pts] $N_2\,(g) + 3\,Cl_2\,(g) \rightleftharpoons 2\,NCl_3\,(g)$.

$$K_{eq} = \frac{[NCl_3]^2}{[N_2][Cl_2]^3}$$

b. [4 pts] $2\,Pb(NO_3)_2\,(s) \rightleftharpoons 2\,PbO\,(s) + 4\,NO_2\,(g) + O_2\,(g)$

$$K_{eq} = \frac{[NO_2]^4[O_2]}{1} = [NO_2]^4[O_2]$$

5. [2 pts] Given $[N_2] = 0.0014$ M, $[Cl_2] = 0.00043$ M, and $[NCl_3] = 0.19$ M, calculate the value for K_{eq} for the reaction in part 4a. ***Show your work and use the correct sig figs!***

$$K_{eq} = \frac{[NCl_3]^2}{[N_2][Cl_2]^3} = \frac{(0.19)^2}{(0.0014)(0.00043)^3} = 3.2 \times 10^{11}$$

6. [5 pts] Given the balanced reaction and a system in equilibrium,

$$CO\,(g) + 2\,H_2\,(g) \rightleftharpoons CH_3OH\,(g) + \Delta H$$

in what direction (*left, right, no change*) will the system shift in response to the following stresses?

a. Adding more CO — Right
b. Increasing the pressure — Right
c. Heating the mixture — Left
d. Adding a catalyst — No Change

Extra Credit (1 point)

D 7. The best thing about learning about equilibrium is
- A. saying "Le Châtelier".
- B. it makes chemistry class really easy!
- C. never having to worry about products!
- D. that nothing ever changes.