Part A: Understanding Equilibrium

True or False with Discussion

____ The Equilibrium constant (K) tells us whether reactants or products are favored in a reaction.

____ Equilibrium implies that both the reactants and products are at equal concentrations.

____ Equilibrium is static (nothing happens at equilibrium).

If False, what is happening then at Equilibrium?

_____

_____

____ To complete an equilibrium problem, the reaction must be balanced.

Why?

_____

____ Solids and liquids are NOT included in the equilibrium constant expression.

Why?

_____

_____

____ K_c is used for molar concentrations and K_p is used when partial pressures are given.

Are they equal? Discuss your answer.

_____

Part B: Writing Equilibrium Constant Expressions and Calculating K

1. An aqueous solution of ammonium chloride and sodium hydroxide are mixed together and allowed to equilibrate. Predict the products, write the net ionic equation, and write the K expression for the reaction.

2. Calculate the value of K_c for the reaction below

$$2\ N_2O(g) + 3\ O_2(g) \rightleftharpoons 2\ N_2O_4(g) \quad K_c = ?$$

using the following information.

(1) $N_2O_4(g) \rightleftharpoons 2\ NO_2(g)$ $K_1 = 4.6 \times 10^{-3}$
(2) $\frac{1}{2}\ N_2(g) + O_2(g) \rightleftharpoons NO_2(g)$ $K_2 = 4.1 \times 10^{-9}$
(3) $2\ N_2(g) + O_2(g) \rightleftharpoons 2\ N_2O(g)$ $K_3 = 1.2 \times 10^{-35}$

These three equations (1-3) can be combined (after multiplication or reversing) to get the desired reaction. Use the spaces below.

(1)

(2)

(3)

$2\ N_2O(g) + 3\ O_2(g) \leftrightarrow 2\ N_2O_4(g)$ $K_c =$

Part C: Calculating Concentration when the Equilibrium Constant is known

3. The reaction below is ran in a 1.0L flask.

$$SO_2(g) + NO_2(g) \rightleftharpoons SO_3(g) + NO(g) \quad K_c = 2.9$$

a) Write the equilibrium constant expression for the reaction.

b) Given the K_c above, what does that tell you about the reaction at equilibrium? Reactant favored or product favored?

c) Find the amount of NO_2 that must be added to 5.0mol of SO_2 in order to form 2.6 mol of SO_3 at equilibrium. Fill out the shaded boxes and then solve for the amount of NO_2 initially present. Some of the ICE table has been filled out for you already.

$$SO_2(g) + NO_2(g) \rightleftharpoons SO_3(g) + NO(g) \quad K_c = 2.9$$

I(M)	5.0	**? (we are trying to solve for this)**	0	0
C(M)				
E(M)			2.6	