

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?

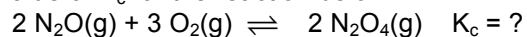
____ K_c is used for molar concentrations and K_p is used when partial pressures are given.

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



using the following information.

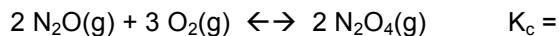
- (1) $\text{N}_2\text{O}_4(\text{g}) \rightleftharpoons 2 \text{NO}_2(\text{g}) \quad K_1 = 4.6 \times 10^{-3}$
(2) $\frac{1}{2} \text{N}_2(\text{g}) + \text{O}_2(\text{g}) \rightleftharpoons \text{NO}_2(\text{g}) \quad K_2 = 4.1 \times 10^{-9}$
(3) $2 \text{N}_2(\text{g}) + \text{O}_2(\text{g}) \rightleftharpoons 2 \text{N}_2\text{O}(\text{g}) \quad K_3 = 1.2 \times 10^{-35}$

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

(1)

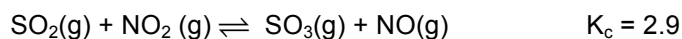
(2)

(3)



Part C: Calculating Concentration when the Equilibrium Constant is known

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



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.



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