Dougherty Valley HS AP Chemistry
Equilibrium – Chemical Equilibrium
Problem Set 2

WORKSHEET #4

Name: **Date:** **Period:** **Seat #:**

1. Consider the equilibrium: $2\ SO_2(g) + O_2(g) \leftrightarrows 2\ SO_3(g)$ $K_c = 4.36\ \underline{M}^{-1}$
Calculate the value of "Q" for a situation in which the concentrations are $[SO_2] = 2.00\ \underline{M}$, $[O_2] = 1.50\ \underline{M}$, and $[SO_3] = 1.25\ \underline{M}$.

Does this mixture shift toward the reactants or products to reach equilibrium? _____

2. Study the discussion in your textbook about converting K_c and K_p. Write the K_p expression for the reaction in question 1 and calculate its value at 0°C. Remember, R = 0.0821 L·atm/mol·K.

3. Consider the equilibrium $PCl_3(g) + Cl_2(g) \rightleftharpoons PCl_5(g)$.
How would the following changes affect the partial pressures of each gas at equilibrium?

		$PCl_3(g)$	$Cl_2(g)$	$PCl_5(g)$
a)	addition of PCl_3	____	____	____
b)	removal of Cl_2	____	____	____
c)	removal of PCl_5	____	____	____
d)	decrease in the volume of the container	____	____	____
e)	addition of He without change in volume	____	____	____

4. How will each of the changes in question 3 affect the K_{eq}? (↑=increase; ↓=decrease; — = unchanged)

a ___ b ___ c ___ d ___ e ___

5. Indicate how each of the following changes affects the amount of each gas in the system below, for which $\Delta H_{reaction} = +9.9$ kcal.

		$H_2(g)$	$CO_2(g)$	$H_2O(g)$	$CO(g)$
a)	addition of CO_2	___	___	___	___
b)	addition of H_2O	___	___	___	___
c)	addition of a catalyst	___	___	___	___
d)	increase in temperature	___	___	___	___
e)	decrease in the volume of the container	___	___	___	___

6. How will each of the changes in question 5 affect the equilibrium constant?
a ___ b ___ c ___ d ___ e ___

7. Consider the equilibrium: $2N_2O(g) + O_2(g) \rightleftharpoons 4NO(g)$
How will the amount of chemicals at equilibrium be affected by
$2N_2O(g) + O_2(g) \rightleftharpoons 4NO(g)$

a) adding N_2O ___ ___ ___
b) removing O_2 ___ ___ ___
c) increasing the volume of the container ___ ___ ___
d) adding a catalyst ___ ___ ___

8. For the reaction, $4NH_3(g) + 3O_2(g) \rightleftharpoons 2N_2(g) + 6H_2O(l)$
How will the concentration of each chemical be affected by
a) adding O_2 to the system ___ ___ ___ ___
b) adding N_2 to the system ___ ___ ___ ___
c) removing H_2O from the system ___ ___ ___ ___
d) decreasing the volume of the container ___ ___ ___ ___

9. Consider the equilibrium: $2N_2O(g) + O_2(g) \rightleftharpoons 4NO(g)$
3.00 moles of NO(g) are introduced into a 1.00-Liter evacuated flask. When the system comes to equilibrium, 1.00 mole of $N_2O(g)$ has formed. Determine the equilibrium concentrations of each substance. Calculate the K_c for the reaction based on these data.

	$2\ N_2O$	O_2	$4\ NO$
initial			
change			
equilibrium			

Remember: The "ice" box may be used with moles, molarity, or Liters (for gaseous equilibria)… never grams.