CHM 2046 Worksheet 2

1. The two main **Equilibrium** **<u>Problems Types</u>**:

- Given one equation ($K = \frac{[P]}{[R]}$) solve this for <u>any one</u> unknown.

- Given one equation, solve this for <u>more than one</u> unknown.

2. For the reaction indicated below, initially P_{cis} = 1.00 atm and P_{trans} = 0 atm. What should be the partial pressures of each after the system reaches equilibrium?

<u>cis</u>-2-butene ↔ <u>trans</u>-2-butene **Kp = 3.4**

$\mathbf{P_{cis}}$ = ________________ $\mathbf{P_{trans}}$ = _________________

Note: The <u>clue</u> as to the problem type is in the wording:

3. For the reaction shown (at T = 2000 °C) initially:

$P_{N_2} = P_{O_2} = 1.00$ atm and $P_{NO} = 0$ atm

Find all partial pressures after the system reacts to equilibrium.

N_2 + O_2 ↔ 2 NO **Kp = 0.10**

$P_{N_2} = P_{O_2}$ = ____________ **P_{NO} = _______________**

4. **Predicting Equilibrium Shifts (when conditions change).**

Example: $Co(OH_2)_6^{+2}$ + n(acetone) ↔ $Co(acetone)_n^{+2}$ + $6H_2O(\ell)$

Add acetone, the reaction shifts _______
Add water, the reaction shifts ________

Reasoning: Think about the reaction rates, or use:

Le Chatelier's Principle:

Concentration changes:

Changing n:

Changing V:

Changing T:

5. Equilibrium Shift Problems. For each reaction, how will the change cause the equilibrium to shift? What will be the overall effect on the […] and in values?

Equation for Reaction	Change Applied	Shift (R, L, or None)	Effects (I, D, or Same)	
(Example) $A(g) \leftrightarrow B(g)$	add A	R	[A] = I	[B] = I
$Fe^{+3}(aq) + SCN^{-}(aq) \leftrightarrow Fe(SCN)^{+2}(aq)$	**add Fe^{+3}**	___	**$[Fe^{+3}]$ = _____**	**$[SCN^{-}]$ = _____**
			$[Fe(SCN)^{+2}]$ = _____	
$2\ ICl(g) \leftrightarrow I_2(g) + Cl_2(g)$	**add $I_2(g)$**	___	**[ICI] = _____**	
			$[I_2]$ = _____	**$[Cl_2]$ = _____**
$2\ ICl(g) \leftrightarrow I_2(s) + Cl_2(g)$	**add $I_2(g)$**	___	**[ICI] = _____**	
			$[I_2]$ = _____	**$[Cl_2]$ = _____**
$CaCO_3(s) \leftrightarrow CaO(s) + CO_2(g)$	**add $CaCO_3$**	___	**[CaO] = _____**	**$[CO_2]$ = _____**