Name _____ Period _____

Honors Chemistry
Equilibrium Practice Test

Form P

Part I: Equilibrium Constants Write equilibrium constant expressions for the following reactions:

1. $SO_3(g) + H_2(g) \leftrightarrows SO_2(g) + H_2O(g)$ K=

2. $4NH_3(g) + 5O_2(g) \leftrightarrows 4NO(g) + 6H_2O(g)$ K=

3. $6CO_2(g) + 6H_2O(l) \leftrightarrows C_6H_{12}O_6(s) + 6O_2(g)$ K=

4. $SO_2(g) + H_2O(l) \leftrightarrows H_2SO_3(l)$ K=

5. $MgSO_4(s) \leftrightarrows Mg^{2+}(aq) + SO_4^{2-}(aq)$ K=

Part II: What direction will the equilibrium shift towards when the following stresses are added to this system at equilibrium.

$$4NH_3(g) + 5O_2(g) \leftrightarrows 4NO(g) + 6H_2O(g) + \text{heat}$$

NH_3 is removed	
It is placed in boiling water	
NO is added	
It is placed in an ice bath	
O_2 is removed	

In this unit you did a lab that dealt with the following equilibrium:

$$Fe^{3+}(aq) + SCN^{-}(aq) \leftrightarrows FeSCN^{2+}(aq)$$

Fill in the following table based upon what you observed during the lab.

Solution Added	What two ions are in this solution?	Will it get darker or lighter?	How will the $[FeSCN^{2+}]$ Change?
Potassium carbonate			
Calcium thiocyanate			
Sodium bromide			
Potassium hydroxide			
Potassium nitrate			
Iron (III) bromide			
Ammonium bromide			

Part III: Math Problems. Solve the following equilibrium problems using math. Show all work!

1) This equation:

$$I_2(g) + H_2(g) \leftrightarrows 2HI(g)$$

describes a reaction that was carried out at 460 Celsius with the following results:

Concentrations in moles per liter:

Trial	H_2	I_2	HI
1	0.00647	0.000594	0.0137
2	0.00384	0.00152	0.0169
3	0.00143	0.00143	0.0100

A. Write the equilibrium expression for this reaction

B. Verify that the constant for this expression is constant by calculating the value for all three trials.

2) For the acid reaction:

$$HC_2H_3O_2(aq) \leftrightarrows H^+(aq) + C_2H_3O_2^-(aq)$$

the K is equal to 1.75×10^{-5}. What is the concentration of H^+ at equilibrium if you start with 0.30 Molar $HC_2H_3O_2$?

3) For the reaction:

$$C_6H_5NH_2(aq) + H_2O(l) \leftrightarrows C_6H_5NH_3^+(aq) + OH^-(aq)$$

$K = 3.8 \times 10^{-10}$. Calculate the concentration of all species at equilibrium if you initially have 0.200 M $C_6H_5NH_2(aq)$.

4) K for the reaction of:

$$2NO_2(g) \leftrightarrows N_2O_4(g)$$

is 6.67. What is the concentration of both species at equilibrium if you start with 0.300 M nitrogen dioxide?