

CHEM 1422 - Homework # 4

Equilibrium

Due Tuesday, March 3, 2009 (2 PM)

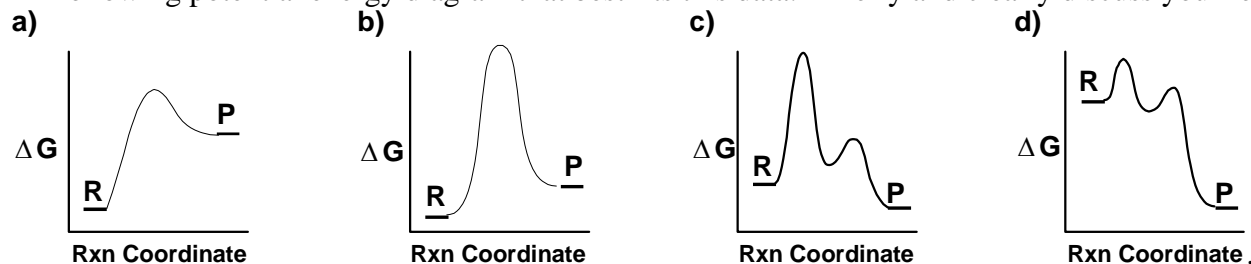
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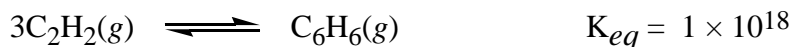
Group Name: _____

Check the box to the right if you want your graded homework to be placed out in the public rack outside Prof. Stanley's office. Otherwise you will have to pick up your homework from Prof. Stanley in person:

1. (3 pts) A reaction has an equilibrium constant of 1×10^{-6} and reaches equilibrium very slowly. Circle the following potential energy diagram that best fits this data. Briefly and clearly discuss your reasoning.



2. (3 pts) Consider the following equilibrium:



If one starts with 6 M acetylene (C_2H_2) and lets the reaction reach equilibrium, what will be the equilibrium concentration of benzene (C_6H_6)? Circle the answer and clearly discuss your reasoning.

- a) 0 M b) 0.6 M c) 1 M d) 2 M e) 6 M

3. (3 pts) The *initial* concentrations of reactants and products are all 2 M. What is the concentration of methanol (CH_3OH) at equilibrium for the following reaction? $K_{eq} = 25$ Circle the answer and clearly show your work!!



- a) 0 M b) 0.33 M c) 0.66 M d) 1.00 M e) 1.33 M f) 2.66 M

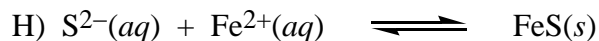
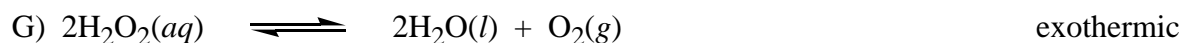
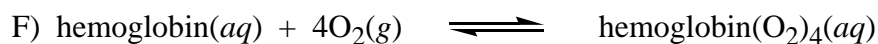
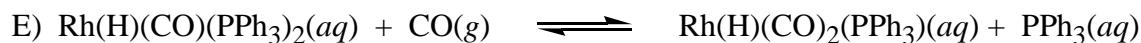
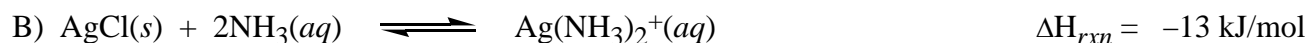
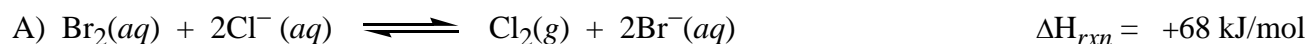
4. (4 pts) Calculate the concentrations for all species at equilibrium for the following reaction. The initial concentrations are $[H_2] = [I_2] = 0 M$, $[HI] = 4 M$. Clearly show your work.

Initial:



@ eq:

5. (6 pts) Consider the following reactions:



Based on the information above, which of the equilibria will:

- produce more products when heated? _____
- produce more products when the pressure is raised? _____
- be unaffected by adding or subtracting some product (so long as some remains)? _____
- produce more reactants when heated? _____
- produce more reactants when the pressure is raised? _____
- be unaffected by temperature? _____
- be unaffected by pressure? _____

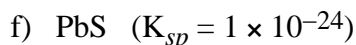
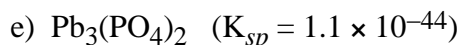
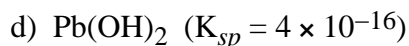
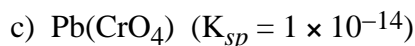
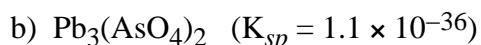
6. (4 pts) The *initial* concentrations for the following reaction are $[\text{CH}_3\text{I}] = [\text{F}^-] = 1 \text{ M}$, and $[\text{CH}_3\text{F}] = [\text{I}^-] = 9 \text{ M}$. What will be the concentrations of each species at equilibrium? Clearly show all your work.

Initial:



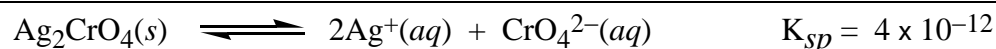
@Eq:

7. (4 pts) Which of the following salts is the least soluble (i.e., will give the lowest $\text{Pb}^{2+}(aq)$ concentration)? Circle your answer. Calculate the concentration of $[\text{Pb}^{2+}]$ for the answer and put it and the calculation details below.



8. (3 pts) What is the equilibrium concentration of $\text{Ag}^+(aq)$ in the presence of $1 \text{ M CrO}_4^{2-}(aq)$? Clearly show all your work.

Initial: excess



@Equilibrium: