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Unit 5 Hand In Assignment #2

This assignment covers sections 5.4 and 5.5

For all K_{sp} calculations, the dissociation equation with states and charges must be shown. You do not have to show calculations to find the concentrations of ions; however, you may want to.

1. Write the dissociation equation and the solubility product expression for the following:
   a) $LiBr_{(s)}$ (2 marks)

   b) Magnesium Phosphate (2 marks)

2. At a certain temperature a saturated solution of BaF_2 has a concentration of 4.59×10^{-2} M. What is the K_{sp} for BaF_2 at this temperature? (3 marks)

3. What is the concentration of the ions present in a saturated $Cd(OH)_2$ solution? $K_{sp} = 5.3 \times 10^{-15}$. (4 marks)

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4. What mass of CuI is present in a 1.2 L saturated solution at 25°C? Ksp = 1.3×10^{-12} (5 marks)

5. Will a precipitate form when 125 mL of 4.0×10^{-2} M of $CaCl_2$ is added to 175 mL of 2.9×10^{-2} M of NaOH? K_{sp} of $Ca(OH)_2 = 4.8 \times 10^{-6}$. Show the dissociation equation for the possible precipitate and all formulas. (10 marks)

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6. The pressure on each of the following systems is increased by decreasing the volume of the container. Explain whether each system would shift left, right, or stay the same.

a. $2\ SO_{2\,(g)} + O_{2\,(g)} \leftrightarrow 2\ SO_{3\,(g)}$ (1 mark)

b. $H_{2\,(g)} + I_{2\,(g)} \leftrightarrow 2\ HI_{(g)}$ (1 mark)

c. $CaCO_{3\,(s)} \leftrightarrow CaO_{(s)} + CO_{2\,(g)}$ (1 mark)

d. $AgCl_{(s)} \leftrightarrow Ag^{1+}_{(aq)} + Cl^{1-}_{(aq)}$ (1 mark)

7. How could you alter the following to make the equilibrium below shift to the left:

$$2CO_{(g)} + O_{2(g)} \longleftrightarrow 2CO_{2(g)} + 566\ kJ$$

a) [CO] (1 mark)

b) pressure(1 mark)

c) temperature(1 mark)

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8. Given the following equilibrium reaction:

$2\ C_{(s)} + O_{2\,(g)} \leftrightarrow 2\ CO_{(g)}$

what will be the effect of the following disturbances to the system? That is, will it shift to the left or the right? Also mention the effect on the **other participants** in the reaction for a, b, and c.

a. adding CO (2 marks)

b. addition of O_2(2 marks)

c. addition of $C_{(s)}$ (2 marks)

9. Use Le Châtelier's Principle to predict how the changes listed will affect the following equilibrium reaction:

$$2\ HI(g) + 9.4\ kJ \leftrightarrow H_2\ (g) + I_2\ (g)$$

a. Will the concentration of HI increase, decrease, or remain the same if more H_2 is added? (1 mark)

b. What is the effect on the concentration of HI if the pressure of the system is increased? (1 mark)

c. What is the effect on the concentration of HI if the temperature of the system is increased? (1 mark)

d. What is the effect on the concentration of HI if a catalyst is added to the system? (1 mark)

e. Write the equilibrium constant expression for this reaction. (1 mark)

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10. Changing the volume of the system alters the equilibrium position of this equilibrium:

$N_{2(g)} + 3H_{2(g)} \quad 2NH_{3(g)}$

But a similar change has no effect on this equilibrium:

$H_{2(g)} + Cl_{2(g)} \quad 2HCl_{(g)}$

Explain. (2 marks)