CH 223
Sample Quiz #4 Name: _____ Lab Section: _____

Be sure to show all work, use the correct number of significant figures, circle final answers and use correct units in all problems.

Question #1: 10 points

a. Write the balanced equation for the equilibrium of copper(II) hydroxide, $Cu(OH)_2$, in water and the K_{sp} expression. $K_{sp} = 2.2*10^{-20}$ at 25 ˚C.

b. What is the solubility of copper(II) hydroxide at 25 ˚C?

c. What is the solubility of copper(II) hydroxide at 25 ˚C if the initial $[Cu^{+2}] = 0.010$ M?

d. Will a precipitate form when 10.0 mL of 0.0015 M copper(II) nitrate is mixed with 10. mL of 0.015 M sodium hydroxide?

Question #2: 4 points

Given the following reactions,

$AgBr(s) \rightleftharpoons Ag^+(aq) + Br^{-1}(aq)$ $\quad K_{sp} = 5.4 \times 10^{-13}$

$Ag^+(aq) + 2\ CN^-(aq) \rightleftharpoons Ag(CN)_2^-(aq)$ $\quad K_f = 1.2 \times 10^{21}$

determine the equilibrium constant for the reaction below.

$AgBr(s) + 2\ CN^-(aq) \rightleftharpoons Ag(CN)_2^-(aq) + Br^{-1}(aq)$

Question #3: 6 points

a. A solution of Na_2SO_4 is added dropwise to a solution that is 0.010 M Ba^{2+} and 0.010 M Ag^{+1}. Neglecting volume changes, which salt precipitates first, $BaSO_4$ ($K_{sp} = 1.1*10^{-10}$) or Ag_2SO_4 ($K_{sp} = 1.7*10^{-5}$)?

b. What is the concentration of the cation that precipitates first when the second cation begins to precipitate?

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Sample Quiz #4 Name: _____ Lab Section: _____
Answers

Question #1: 10 points

a. Write the balanced equation for the equilibrium of copper(II) hydroxide, $Cu(OH)_2$, in water and the K_{sp} expression. K_{sp} = $2.2*10^{-20}$ at 25 ˚C.

$Cu(OH)_2(s) \rightleftharpoons Cu^{2+}(aq) + 2\ OH^{-1}(aq)$
$K_{sp} = [Cu^{2+}][OH^{-1}]^2$

b. What is the solubility of copper(II) hydroxide at 25 ˚C?

x = 1.8 x 10^{-7} M

c. What is the solubility of copper(II) hydroxide at 25 ˚C if the initial $[Cu^{+2}]$ = 0.010 M?

x = 7.5 x 10^{-10} M *(7.4 x 10^{-10} ok)*

d. Will a precipitate form when 10.0 mL of 0.0015 M copper(II) nitrate is mixed with 10. mL of 0.015 M sodium hydroxide?

Yes, solid forms

Question #2: 4 points

Given the following reactions,

$AgBr(s) \rightleftharpoons Ag^+(aq) + Br^{-1}(aq)$ $K_{sp} = 5.4 \times 10^{-13}$

$Ag^+(aq) + 2\ CN^-(aq) \rightleftharpoons Ag(CN)_2^-(aq)$ $K_f = 1.2 \times 10^{21}$

determine the equilibrium constant for the reaction below.

$AgBr(s) + 2\ CN^-(aq) \rightleftharpoons Ag(CN)_2^-(aq) + Br^{-1}(aq)$

K_{net} = 6.5 x 10^8

Question #3: 6 points

a. A solution of Na_2SO_4 is added dropwise to a solution that is 0.010 M Ba^{2+} and 0.010 M Ag^{+1}. Neglecting volume changes, which salt precipitates first, $BaSO_4$ ($K_{sp} = 1.1*10^{-10}$) or Ag_2SO_4 ($K_{sp} = 1.7*10^{-5}$)?

$BaSO_4$ precipitates first

b. What is the concentration of the cation that precipitates first when the second cation begins to precipitate?

6.5 x 10^{-10} M