HW06 - Solubility Equilibria

Question 1 2 pts

What is the net ionic equation for the reaction between aqueous solutions of Na_3PO_4 and $CuSO_4$?

- $3Cu^{2+} + 2PO_4^{3-} \longrightarrow Cu_3(PO_4)_2$
- $2Na^{+} + SO_4^{2-} \longrightarrow Na_2SO_4$
- No reaction occurs since no precipitate is formed.
- $Cu^{2+} + PO_4^{3-} \longrightarrow CuPO_4$

Question 2 2 pts

What ions are present in solution after aqueous solutions of $Cu(NO_3)_2$ and K_2S are mixed? Assume we mixed stoichiometric equivalent amounts of both reactants and 100% reaction.

- Cu^{2+}, S^{2-}
- No ions are present as both products form precipitates.
- Cu^{2+}, NO_3^-, K^+, S^{2-}
- K^+, NO_3^-

Question 3 2 pts

Molar solubility is...

- the number of moles that dissolve to give one liter of super-saturated solution.
- the total molarity of the solution.
- the number of moles that dissolve to give one liter of saturated solution.
- equal to the K_{sp}.

Question 4 2 pts

The K_{sp} equation for sodium bicarbonate ($NaHCO_3$) should be written as:

- $K_{sp} = [Na^+][HCO_3^-]$
- $K_{sp} = [Na^+][H^+][C^{4+}][O^{2-}]^3$
- $K_{sp} = [Na^+][H^+][CO_3^{2-}]$
- $K_{sp} = [NaH^{2+}][CO_3^{2-}]$

Question 5 2 pts

Pure water is saturated with $PbCl_2$. In this saturated solution, which of the following is true?

- $K_{sp} = [Pb^{2+}][Cl^-]$
- $K_{sp} = [Pb^{2+}]^2[Cl^-]$
- $[Pb^{2+}] = 0.5[Cl^-]$
- $[Pb^{2+}] = [Cl^-]$

Question 6 2 pts

A hypothetical ionic substance T_3U_2 ionizes to form T^{2+} and U^{3-} ions. The solubility of T_3U_2 is $4.04x10^{-20}$ mol/L. What is the value of the solubility-product constant?

- $9.79x10^{-39}$
- 1.16×10^{-95}
- $1.08x10^{-97}$
- $1.63x10^{-39}$

Question 7 2 pts

The value of K_{sp} for $SrSO_4$ is $2.8x10^{-7}$. What is the solubility of $SrSO_4$ in moles per liter?

- 5.3×10^{-4}
- 2.8×10^{-7}
- 7.6×10^{-7}
- 1.4×10^{-7}

Question 8 2 pts

Determine the molar solubility of some salt with the generic formula AB_2 if $K_{sp} = 2.56x10^2$.

- 1 M
- 4 M
- 10 M
- 0.1 M

Question 9 2 pts

Rank the following salts from least to most molar solubility:

BiI	$K_{sp} = 7.7x10^{-19}$
$Cd_3(AsO_4)_2$	$K_{sp} = 2.2x10^{-33}$
$AlPO_4$	$K_{sp} = 9.8x10^{-21}$
$CaSO_4$	$K_{sp} = 4.9x10^{-5}$

- $AlPO_4 < BiI < Cd_3(AsO_4)_2 < CaSO_4$
- $Cd_3(AsO_4)_2 < AlPO_4 < BiI < CaSO_4$
- $Cd_3(AsO_4)_2 < BiI < AlPO_4 < CaSO_4$
- $CaSO_4 < BiI < AlPO_4 < Cd_3(AsO_4)_2$

Question 10 3 pts

A hypothetical compound MX_3 has a molar solubility of 0.00562 M. What is the value of K_{sp} for MX_3?

- 2.69×10^{-8}
- 3.16×10^{-5}
- 9.48×10^{-5}
- 2.99×10^{-9}

Question 11 2 pts

Determine if a precipitate will form when 0.96g Na_2CO_3 is combined with 0.2g $BaBr_2$ in a 10L solution. (For $BaCO_3$, $K_{sp} = 2.8x10^{-9}$).

- $BaCO_3$ precipitates
- $BaBr_2$ will remain in solid form as it is insoluble in water.
- $BaCO_3$ does not precipitate
- It is impossible to know if any $BaCO_3$ will precipitate with the information given.

Question 12 2 pts

$CaSO_4$ has a $K_{sp} = 3x10^{-5}$. In which of the following would $CaSO_4$ be the most soluble?

- 1.0 M $CaCl_2$(aq)
- $CaSO_4$ would have the same solubility in all three of these solutions
- 0.5 M K_2SO_4(aq)
- pure water

Question 13 2 pts

A solution of AgI contains 1.9 M Ag^+. K_{sp} of AgI is 8.3×10^{-17}. What is the maximum I^- concentration that can exist in this solution?

- $1.6x10^{-16}$ M
- $4.4x10^{-17}$ M
- 1.9 M
- $8.3x10^{-17}$ M

Question 14 3 pts

What would be the molar solubility of Li_3PO_4 ($K_{sp} = 2.37 \times 10^{-4}$) in a 1M LiCl solution?

- 5.44×10^{-2}
- 2.37×10^{-4}
- 1.54×10^{-2}
- 1.24×10^{-1}