

HW07 - 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 ?

- $3\text{Cu}^{2+} + 2\text{PO}_4^{3-} \longrightarrow \text{Cu}_3(\text{PO}_4)_2$
- $2\text{Na}^+ + \text{SO}_4^{2-} \longrightarrow \text{Na}_2\text{SO}_4$
- No reaction occurs since no precipitate is formed.
- $\text{Cu}^{2+} + \text{PO}_4^{3-} \longrightarrow \text{CuPO}_4$

Question 2

2 pts

What ions are present in solution after aqueous solutions of $\text{Cu}(\text{NO}_3)_2$ 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:

- $K_{\text{sp}} = [\text{Na}^+][\text{HCO}_3^-]$
- $K_{\text{sp}} = [\text{Na}^+][\text{H}^+][\text{C}^{4+}][\text{O}^{2-}]^3$
- $K_{\text{sp}} = [\text{Na}^+][\text{H}^+][\text{CO}_3^{2-}]$
- $K_{\text{sp}} = [\text{NaH}^{2+}][\text{CO}_3^{2-}]$

Question 5

2 pts

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

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

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 4.04×10^{-20} mol/L. What is the value of the solubility-product constant?

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

Question 7

2 pts

The value of K_{sp} for SrSO_4 is 2.8×10^{-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 $K_{\text{sp}} = 2.56 \times 10^2$.

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

Question 9

2 pts

Rank the following salts from least to most molar solubility:

BiI_3 $K_{\text{sp}} = 7.7 \times 10^{-19}$

$\text{Cd}_3(\text{AsO}_4)_2$ $K_{\text{sp}} = 2.2 \times 10^{-33}$

AlPO_4 $K_{\text{sp}} = 9.8 \times 10^{-21}$

CaSO_4 $K_{\text{sp}} = 4.9 \times 10^{-5}$

- $\text{AlPO}_4 < \text{BiI}_3 < \text{Cd}_3(\text{AsO}_4)_2 < \text{CaSO}_4$
- $\text{Cd}_3(\text{AsO}_4)_2 < \text{AlPO}_4 < \text{BiI}_3 < \text{CaSO}_4$
- $\text{Cd}_3(\text{AsO}_4)_2 < \text{BiI}_3 < \text{AlPO}_4 < \text{CaSO}_4$
- $\text{CaSO}_4 < \text{BiI}_3 < \text{AlPO}_4 < \text{Cd}_3(\text{AsO}_4)_2$

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 , $K_{\text{sp}} = 2.8 \times 10^{-9}$).

- 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 $K_{\text{sp}} = 3 \times 10^{-5}$. In which of the following would CaSO_4 be the most soluble?

- 1.0 M $\text{CaCl}_2(\text{aq})$
- CaSO_4 would have the same solubility in all three of these solutions
- 0.5 M $\text{K}_2\text{SO}_4(\text{aq})$
- 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?

- 1.6×10^{-16} M
- 4.4×10^{-17} M
- 1.9 M
- 8.3×10^{-17} M

Question 14

3 pts

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

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