



# HW07 - Solubility Equilibria

## Question 1

2.0 pts

What is the net ionic equation for the reaction between aqueous solutions of  $\text{Na}_3\text{PO}_4$  and  $\text{CuSO}_4$ ?

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

## Question 2

2.0 pts

What ions are present in solution after aqueous solutions of  $\text{Cu}(\text{NO}_3)_2$  and  $\text{K}_2\text{S}$  are mixed? Assume we mixed stoichiometric equivalent amounts of both reactants and 100% reaction.

- No ions are present as both products form precipitates.
- $\text{Cu}^{2+}, \text{S}^{2-}$
- $\text{K}^+, \text{NO}_3^-$
- $\text{Cu}^{2+}, \text{NO}_3^-, \text{K}^+, \text{S}^{2-}$

## Question 3

2.0 pts

Molar solubility is...

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

## Question 4

2.0 pts

The  $K_{\text{sp}}$  equation for sodium bicarbonate ( $\text{NaHCO}_3$ ) should be written as:

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

## Question 5

2.0 pts

Pure water is saturated with  $\text{PbCl}_2$ . In this saturated solution, which of the following is true?

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

## Question 6

2.0 pts

A hypothetical ionic substance  $\text{T}_3\text{U}_2$  ionizes to form  $\text{T}^{2+}$  and  $\text{U}^{3-}$  ions. The solubility of  $\text{T}_3\text{U}_2$  is  $4.04 \times 10^{-20}$  mol/L. What is the value of the solubility-product constant?

- $1.63 \times 10^{-39}$
- $1.16 \times 10^{-95}$
- $9.79 \times 10^{-39}$
- $1.08 \times 10^{-97}$

## Question 7

2.0 pts

The value of  $K_{\text{sp}}$  for  $\text{SrSO}_4$  is  $2.8 \times 10^{-7}$ . What is the solubility of  $\text{SrSO}_4$  in moles per liter?

- $5.3 \times 10^{-4}$
- $1.4 \times 10^{-7}$
- $2.8 \times 10^{-7}$
- $7.6 \times 10^{-7}$

## Question 8

2.0 pts

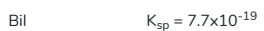
Determine the molar solubility of some salt with the generic formula  $\text{AB}_2$  if  $K_{\text{sp}} = 2.56 \times 10^2$ .

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

## Question 9

2.0 pts

Rank the following salts from least to most molar solubility:



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

## Question 10

3.0 pts

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

- $3.16 \times 10^{-5}$
- $2.69 \times 10^{-8}$
- $2.99 \times 10^{-9}$
- $9.48 \times 10^{-5}$

## Question 11

2.0 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  $BaCO_3$ ,  $K_{sp} = 2.8 \times 10^{-9}$ ).

- $BaBr_2$  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.
- $BaCO_3$  precipitates

## Question 12

2.0 pts

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

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

## Question 13

2.0 pts

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

- 1.9 M
- $8.3 \times 10^{-17}$  M
- $1.6 \times 10^{-16}$  M
- $4.4 \times 10^{-17}$  M

## Question 14

3.0 pts

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

- $5.44 \times 10^{-2}$
- $1.24 \times 10^{-1}$
- $2.37 \times 10^{-4}$
- $1.54 \times 10^{-2}$