

## Solubility Equil'm Practice Test

Name:

Date:

Block:

Multiple Choice:\_\_\_\_\_ 1. The relationship between the solubility of  $\text{SrF}_2$  and its  $K_{sp}$  is:

A.  $\text{solubility} = \frac{\sqrt[3]{K_{sp}}}{4}$

B.  $\text{solubility} = \sqrt[3]{\frac{K_{sp}}{2}}$

C.  $\text{solubility} = \sqrt[3]{\frac{K_{sp}}{4}}$

D.  $\text{solubility} = \sqrt[3]{K_{sp}}$

\_\_\_\_\_ 2. Which of the following compounds will form a saturated solution with the greatest concentration of  $\text{Ag}^+$  ?A.  $\text{AgI}$ C.  $\text{AgIO}_3$ B.  $\text{AgBr}$ D.  $\text{AgBrO}_3$ 

3. Explain your answer to the question above:

\_\_\_\_\_ 4. Which of the following compounds is the least soluble in water?

A.  $\text{H}_2\text{S}$ C.  $\text{ZnSO}_4$ B.  $\text{KNO}_3$ D.  $\text{Ca}(\text{OH})_2$ \_\_\_\_\_ 5. When  $\text{Ca}(\text{OH})_2$  attains solubility equilibrium, the:

A. solution is saturated.

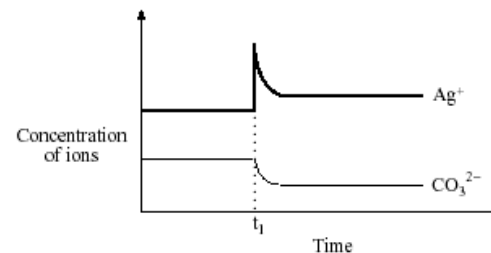
C. Trial  $K_{sp}$  is less than the  $K_{sp}$ .

B. solution will be acidic

D. concentrations of the ions are equal.

\_\_\_\_\_ 6. When equal volumes of 0.2 M  $\text{NH}_4\text{Cl}$  and 0.2 M  $\text{CuSO}_4$  are combined:

A. a precipitate does not form.

B. a precipitate of  $(\text{NH}_4)_2\text{SO}_4$  forms.C. a precipitate of  $\text{CuCl}_2$  forms.D. a precipitate of both  $(\text{NH}_4)_2\text{SO}_4$  and  $\text{CuCl}_2$ \_\_\_\_\_ 7. Consider the following graph for a saturated  $\text{Ag}_2\text{CO}_3$  solution:What change occurred at time  $t_1$ ?

A. Water was added.

C.  $\text{Na}_2\text{CO}_3$  was added.B.  $\text{AgNO}_3$  was added.

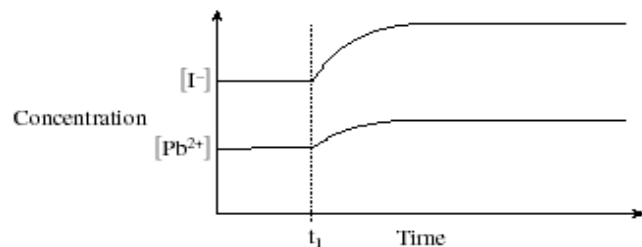
D. The temperature was increased

8. Explain your answer to the question above:

\_\_\_\_\_ 9. From the list of salts below, how many are considered soluble at  $25^\circ\text{C}$ ?

	$\text{CuCl}_2$	$\text{CaSO}_4$	$\text{PbS}$	$\text{Ag}_3\text{PO}_4$
A.	zero			
B.	one			
C.	two			
D.	three			

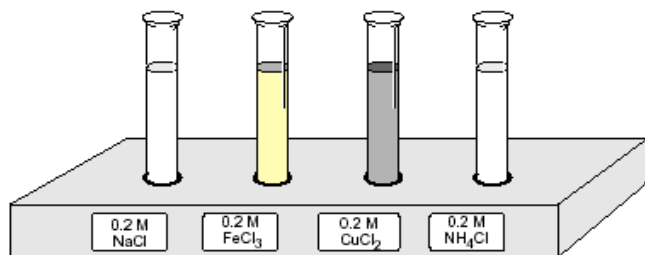
\_\_\_\_\_ 10. A saturated solution of  $\text{PbI}_2$  was subjected to a stress and the following graph was obtained.



Which stress was applied at time  $t_1$  ?

- A. the addition of  $\text{PbI}_2$                       C. an increase in volume  
 B. a temperature change                  D. the evaporation of water

\_\_\_\_\_ 11. A dilute solution of  $\text{AgNO}_3$  is added dropwise to each of the following test tubes until a precipitate forms in each tube.



Which solution requires the lowest  $[\text{Ag}^+]$  to form a saturated solution?

- A.  $\text{NaCl}$     C.  $\text{CuCl}_2$   
 B.  $\text{FeCl}_3$                                         D.  $\text{NH}_4\text{Cl}$

12. Explain your answer to the question above:

\_\_\_\_\_ 13. Which of the following solutions would have  $[\text{Fe}^{3+}] = 0.020\text{M}$ ?

- A.  $0.050\text{M Fe}(\text{NO}_3)_3$                       C.  $0.040\text{M FeC}_6\text{H}_5\text{O}_7$   
 B.  $0.020\text{M Fe}_2(\text{SO}_4)_3$                     D.  $0.010\text{M Fe}_2(\text{C}_2\text{O}_4)_3$

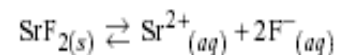
\_\_\_\_\_ 14. In a saturated solution, the rate of dissolving is:

- A. Equal to zero  
 B. Equal to the rate of recrystallization  
 C. Less than the rate of recrystallization  
 D. Greater than the rate of recrystallization

\_\_\_\_\_ 15. The solubility of  $\text{SnS}$  is  $3.2 \times 10^{-3}\text{ M}$ . The value of  $K_{sp}$  is:

- A.  $1.0 \times 10^{-5}$                                   C.  $6.4 \times 10^{-3}$   
 B.  $3.2 \times 10^{-3}$                                   D.  $5.7 \times 10^{-2}$

\_\_\_\_\_ 16. Consider the following equilibrium:



The equilibrium will shift left upon the addition of:

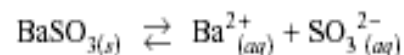
- A.  $\text{H}_2\text{O}$     C.  $\text{SrCl}_2$   
 B.  $\text{KCl}$     D.  $\text{NaNO}_3$

17. Explain your answer to the question above:

\_\_\_\_\_ 18. When equal volumes of calcium nitrate and sodium sulphate are combined,

- A. a precipitate of  $\text{CaSO}_4$  could form
- B. a precipitate of  $\text{NaNO}_3$  could form
- C. a precipitate of  $\text{CaSO}_4$  or  $\text{NaNO}_3$  could form
- D. no precipitate would form

\_\_\_\_\_ 19. Consider the following solubility equilibrium:



Which of the following will result in an increase of  $[\text{Ba}^{2+}]$ ?

- A. adding water
- B. adding BaS
- C. adding  $\text{BaSO}_3$
- D. adding  $\text{Na}_2\text{SO}_3$

\_\_\_\_\_ 20. Which of the following will **not** produce a precipitate when equal volumes of solutions are combined?

- A. KOH and  $\text{CaCl}_2$
- B.  $\text{Zn}(\text{NO}_3)_2$  and  $\text{K}_3\text{PO}_4$
- C.  $\text{Sr}(\text{OH})_2$  and  $(\text{NH}_4)_2\text{S}$
- D.  $\text{Na}_2\text{SO}_4$  and  $\text{Pb}(\text{NO}_3)_2$

\_\_\_\_\_ 21. The solubility of strontium fluoride is:

- A.  $4.3 \times 10^{-9} \text{ M}$
- B.  $6.6 \times 10^{-5} \text{ M}$
- C.  $1.0 \times 10^{-3} \text{ M}$
- D.  $1.6 \times 10^{-3} \text{ M}$

22. Show your calculation for the question above:

\_\_\_\_\_ 23. A solution contains two cations, each having a concentration of 0.20M. When an equal volume of 0.20M hydroxide ions are added, these cations are removed from the solution by precipitation. These ions are:

- A.  $\text{Ba}^{2+}$  and  $\text{K}^+$
- B.  $\text{Sr}^{2+}$  and  $\text{Na}^+$
- C.  $\text{Mg}^{2+}$  and  $\text{Sr}^{2+}$
- D.  $\text{Mg}^{2+}$  and  $\text{Ca}^{2+}$

\_\_\_\_\_ 24. The maximum  $[\text{SO}_4^{2-}]$  that can exist in  $1.0 \times 10^{-3} \text{ M Ca}(\text{NO}_3)_2$  without a precipitate forming is:

- A.  $7.1 \times 10^{-5} \text{ M}$
- B.  $1.0 \times 10^{-3} \text{ M}$
- C.  $8.4 \times 10^{-3} \text{ M}$
- D.  $7.1 \times 10^{-2} \text{ M}$

25. Show your calculation for the question above:

**Problems:**

1) A solution contains  $\text{Mg}^{2+}$ ,  $\text{Pb}^{2+}$ , and  $\text{Zn}^{2+}$ . What compounds could be added, and in what order, to ppt. out each ion separately? **(3 marks)**

2) Milk of magnesia, which contains  $\text{Mg}(\text{OH})_2$ , has a solubility of  $7.05 \times 10^{-3} \text{g/L}$ . Calculate the  $K_{\text{sp}}$  for magnesium hydroxide. **(2 marks)**

3) What mass of  $\text{Pb}^{2+}$  is present in 5.0L of saturated  $\text{Pb}(\text{IO}_3)_2$ ? **(3 marks)**

4) Predict whether a ppt. form when 20.0mL of  $5.0 \times 10^{-5}\text{M}$   $\text{Ca}(\text{NO}_3)_2$  is added to 35.0mL of  $2.5 \times 10^{-4}\text{M}$   $\text{Li}_2\text{C}_2\text{O}_4$ .

**(4 marks)**

5) A saturated solution of silver bromate is prepared by adding 5.00g of silver nitrate to a  $2.5 \times 10^{-2}\text{M}$  solution  $\text{NaBrO}_3$  (aq). What is the maximum volume of solution produced? **(5 marks)**