

- In an aqueous solution of sodium fluoride, the solvent is  
A) F      B) Na      C) NaF      D) H<sub>2</sub>O
- Which barium salt is *insoluble* in water?  
A) BaCO<sub>3</sub>                      B) BaCl<sub>2</sub>  
C) Ba(ClO<sub>4</sub>)<sub>2</sub>                  D) Ba(NO<sub>3</sub>)<sub>2</sub>
- In an aqueous solution of potassium chloride, the solute is  
A) Cl      B) K      C) KCl      D) H<sub>2</sub>O
- Which compound is *least* soluble in water at 60. °C?  
A) KClO<sub>3</sub>                      B) KNO<sub>3</sub>  
C) NaCl                        D) NH<sub>4</sub>Cl
- The solubility of KClO<sub>3</sub>(s) in water increases as the  
A) temperature of the solution increases  
B) temperature of the solution decreases  
C) pressure on the solution increases  
D) pressure on the solution decreases
- According to Reference Table G, how many grams of KNO<sub>3</sub> would be needed to saturate 200 grams of water at 70°C?  
A) 43 g    B) 86 g    C) 134 g    D) 268 g
- Based on Reference Table G, what is the maximum number of grams of KCl(s) that will dissolve in 200 grams of water at 50°C to produce a saturated solution?  
A) 38 g    B) 42 g    C) 58 g    D) 84 g
- As the pressure on a gas confined above a liquid increases, the solubility of the gas in the liquid  
A) decreases                  B) increases  
C) remains the same
- Under which conditions of temperature and pressure is a gas most soluble in water?  
A) high temperature and low pressure  
B) high temperature and high pressure  
C) low temperature and low pressure  
D) low temperature and high pressure
- The solubility of a salt in a given volume of water depends primarily on the  
A) surface area of the salt crystals  
B) temperature of the water  
C) rate at which the salt and water are stirred  
D) pressure on the surface of the water
- When PbI<sub>2</sub>(s) is added to Na<sub>2</sub>CO<sub>3</sub>(aq), a white precipitate is formed. According to Reference Table F, the white precipitate most likely is  
A) KNO<sub>3</sub>                      B) PbCO<sub>3</sub>  
C) NaI                         D) Na<sub>2</sub>CO<sub>3</sub>
- As additional KNO<sub>3</sub>(s) is added to a saturated solution of KNO<sub>3</sub> at constant temperature, the concentration of the solution  
A) decreases                  B) increases  
C) remains the same
- One hundred grams of water is saturated with KCl at 50°C. According to Table G, if the temperature is lowered to 10°C, what is the total amount of KCl that will precipitate?  
A) 5.0 g    B) 17 g    C) 30. g    D) 50. g
- According to Reference Table G, which solution at equilibrium contains 50 grams of solute per 100 grams of H<sub>2</sub>O at 75°C?  
A) an unsaturated solution of KCl  
B) an unsaturated solution of KClO<sub>3</sub>  
C) a saturated solution of KCl  
D) a saturated solution of KClO<sub>3</sub>
- According to Reference Table G, approximately how many grams of KClO<sub>3</sub> are needed to saturate 100 grams of H<sub>2</sub>O at 40°C?  
A) 6        B) 16        C) 38        D) 47
- Which ion, when combined with chloride ions, Cl<sup>-</sup>, forms an insoluble substance in water?  
A) Fe<sup>2+</sup>    B) Mg<sup>2+</sup>    C) Pb<sup>2+</sup>    D) Zn<sup>2+</sup>
- The attraction between water molecules and an Na<sup>+</sup> ion or a Cl<sup>-</sup> ion occurs because water molecules are  
A) linear                        B) symmetrical  
C) polar                         D) nonpolar
- Which compound becomes *less* soluble in water as the temperature of the solution is increased?  
A) HCl                         B) KCl  
C) NaCl                        D) NH<sub>4</sub>Cl
- According to your Reference Tables, which of these compounds is the *least* soluble in water?  
A) K<sub>2</sub>CO<sub>3</sub>                      B) KC<sub>2</sub>H<sub>3</sub>O<sub>2</sub>  
C) Ca<sub>3</sub>(PO<sub>4</sub>)<sub>2</sub>                D) Ca(NO<sub>3</sub>)<sub>2</sub>

20. Based on Reference Table G, what change will cause the solubility of  $\text{KNO}_3(\text{s})$  to increase?
- A) decreasing the pressure  
B) increasing the pressure  
C) decreasing the temperature  
D) increasing the temperature
21. According to Reference Table G, which compound's solubility decreases most rapidly when the temperature increases from  $50^\circ\text{C}$  to  $70^\circ\text{C}$ ?
- A)  $\text{NH}_3$                       B)  $\text{HCl}$   
C)  $\text{SO}_2$                       D)  $\text{KNO}_3$
22. At room temperature, the solubility of which solute in water would be most affected by a change in pressure?
- A) methanol                      B) sugar  
C) carbon dioxide              D) sodium nitrate
23. At which temperature can water contain the most dissolved oxygen at a pressure of 1 atmosphere?
- A)  $10^\circ\text{C}$    B)  $20^\circ\text{C}$    C)  $30^\circ\text{C}$    D)  $40^\circ\text{C}$
24. A solute is added to water and a portion of the solute remains undissolved. When equilibrium between the dissolved and undissolved solute is reached, the solution must be
- A) dilute                      B) saturated  
C) unsaturated              D) supersaturated
25. When 5 grams of  $\text{KCl}$  are dissolved in 50. grams of water at  $25^\circ\text{C}$ , the resulting mixture can be described as
- A) heterogeneous and unsaturated  
B) heterogeneous and supersaturated  
C) homogeneous and unsaturated  
D) homogeneous and supersaturated
26. A saturated solution of  $\text{NaNO}_3$  is prepared at  $60^\circ\text{C}$  using 100. grams of water. As this solution is cooled to  $10^\circ\text{C}$ ,  $\text{NaNO}_3$  precipitates (settles) out of the solution. The resulting solution is saturated. Approximately how many grams of  $\text{NaNO}_3$  settled out of the original solution?
- A) 46 g   B) 61 g   C) 85 g   D) 126 g
27. A solution containing 90. grams of  $\text{KNO}_3$  per 100. grams of  $\text{H}_2\text{O}$  at  $50^\circ\text{C}$  is considered to be
- A) dilute and unsaturated  
B) dilute and supersaturated  
C) concentrated and unsaturated  
D) concentrated and supersaturated
28. What is the molarity of 1.5 liters of an aqueous solution that contains 52 grams of lithium fluoride,  $\text{LiF}$ , (gram-formula mass = 26 grams/mole)?
- A) 1.3 M                      B) 2.0 M  
C) 3.0 M                      D) 0.75 M
29. Molarity is defined as the
- A) moles of solute per kilogram of solvent  
B) moles of solute per liter of solution  
C) mass of a solution  
D) volume of a solvent
30. What is the molarity of a solution that contains 0.50 mole of  $\text{NaOH}$  in 0.50 liter of solution?
- A) 1.0 M                      B) 2.0 M  
C) 0.25 M                      D) 0.50 M
31. Which solution is the most concentrated?
- A) 1 mole of solute dissolved in 1 liter of solution  
B) 2 moles of solute dissolved in 3 liters of solution  
C) 6 moles of solute dissolved in 4 liters of solution  
D) 4 moles of solute dissolved in 8 liters of solution
32. What is the concentration of  $\text{O}_2(\text{g})$ , in parts per million, in a solution that contains 0.008 gram of  $\text{O}_2(\text{g})$  dissolved in 1000. grams of  $\text{H}_2\text{O}(\text{l})$ ?
- A) 0.8 ppm                      B) 8 ppm  
C) 80 ppm                      D) 800 ppm
33. How many grams of  $\text{KNO}_3$  should be dissolved in water to make 500.0 grams of a 20.0 ppm solution?
- A)  $1.00 \times 10^{-1}$  g              B)  $1.00 \times 10^{-2}$  g  
C)  $1.00 \times 10^{-3}$  g              D)  $1.00 \times 10^{-4}$  g
34. What is the concentration expressed in parts per million of a solution containing 5.0 grams of  $\text{NH}_4\text{Cl}$  in 95.0 grams of  $\text{H}_2\text{O}$ ?
- A)  $5.0 \times 10^4$  ppm              B)  $2.0 \times 10^7$  ppm  
C)  $5.3 \times 10^4$  ppm              D)  $1.9 \times 10^7$  ppm

35. How do the boiling point and freezing point of a solution of water and calcium chloride at standard pressure compare to the boiling point and freezing point of water at standard pressure?
- A) Both the freezing point and boiling point of the solution are higher.
  - B) Both the freezing point and boiling point of the solution are lower.
  - C) The freezing point of the solution is higher and the boiling point of the solution is lower.
  - D) The freezing point of the solution is lower and the boiling point of the solution is higher.
36. Compared to a 0.1 M aqueous solution of NaCl, a 0.8 M aqueous solution of NaCl has a
- A) higher boiling point and a higher freezing point
  - B) higher boiling point and a lower freezing point
  - C) lower boiling point and a higher freezing point
  - D) lower boiling point and a lower freezing point
37. As a solute is added to a solvent, what happens to the freezing point and the boiling point of the solution?
- A) The freezing point decreases and the boiling point decreases.
  - B) The freezing point decreases and the boiling point increases.
  - C) The freezing point increases and the boiling point decreases.
  - D) The freezing point increases and the boiling point increases.
38. Which concentration of a solution of  $\text{CH}_3\text{OH}$  in water has the *lowest* freezing point?
- A) 0.1 M
  - B) 0.01 M
  - C) 0.001 M
  - D) 0.0001 M
39. Which solution will freeze at the *lowest* temperature?
- A) 1 mole of sugar in 500 g of water
  - B) 1 mole of sugar in 1,000 g of water
  - C) 2 moles of sugar in 500 g of water
  - D) 2 moles of sugar in 1,000 g of water
40. A 1 molal solution of  $\text{MgCl}_2$  has a higher boiling point than a 1 molal solution of
- A)  $\text{FeCl}_3$
  - B)  $\text{CaCl}_2$
  - C)  $\text{BaCl}_2$
  - D)  $\text{NaCl}$
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