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Unit 9 Solutions Exam

- At which temperature is the vapor pressure of ethanol equal to 80. kPa?
A) 48°C B) 73°C
C) 80°C D) 101°C
- Which formula represents a mixture?
A) C₆H₁₂O₆(ℓ) B) C₆H₁₂O₆(s)
C) LiCl(aq) D) LiCl(s)
- Which compound is insoluble in water?
A) calcium bromide B) potassium bromide
C) silver bromide D) sodium bromide
- At standard pressure, which substance becomes *less* soluble in water as temperature increases from 10.°C to 80.°C?
A) HCl B) KCl
C) NaCl D) NH₄Cl
- According to Table F which compound is soluble in water?
A) barium phosphate B) calcium sulfate
C) silver iodide D) sodium perchlorate
- Which compound is *least* soluble in water at 60. °C?
A) KClO₃ B) KNO₃
C) NaCl D) NH₄Cl
- 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
- When 5 grams of KCl are dissolved in 50. grams of water at 25°C, the resulting mixture can be described as
A) heterogeneous and unsaturated
B) heterogeneous and supersaturated
C) homogeneous and unsaturated
D) homogeneous and supersaturated
- The molarity of an aqueous solution of NaCl is defined as the
A) grams of NaCl per liter of water
B) grams of NaCl per liter of solution
C) moles of NaCl per liter of water
D) moles of NaCl per liter of solution
- What is the molarity of 1.5 liters of an aqueous solution that contains 52 grams of lithium fluoride, LiF, (gram-formula mass = 26 grams/mole)?
A) 1.3 M B) 2.0 M
C) 3.0 M D) 0.75 M
- A 2400.-gram sample of an aqueous solution contains 0.012 gram of NH₃. What is the concentration of NH₃ in the solution, expressed as parts per million?
A) 5.0 ppm B) 15 ppm
C) 20. ppm D) 50. ppm
- What is the total mass of solute in 1000. grams of a solution having a concentration of 5 parts per million?
A) 0.005 g B) 0.05g
C) 0.5 g D) 5g
- Which solution has the highest boiling point at standard pressure?
A) 0.10 M KCl(aq) B) 0.10 M K₂SO₄(aq)
C) 0.10 M K₃PO₄(aq) D) 0.10 M KNO₃(aq)
- 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.

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15. Which solution has the lowest freezing point?

- A) 10. g of KI dissolved in 100. g of water
- B) 20. g of KI dissolved in 200. g of water
- C) 30. g of KI dissolved in 100. g of water
- D) 40. g of KI dissolved in 200. g of water

16. 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

17. One hundred grams of water is saturated with NH_4Cl at 50°C . According to Table G, if the temperature is lowered to 10°C , what is the total amount of NH_4Cl that will precipitate?

- A) 5.0 g B) 17 g C) 30. g D) 50. g

18. According to Reference Table G, approximately how many grams of KClO_3 are needed to saturate 100 grams of H_2O at 40°C ?

- A) 6 B) 16 C) 38 D) 47

19. Which barium salt is *insoluble* in water?

- A) BaCO_3 B) BaCl_2
C) $\text{Ba}(\text{ClO}_4)_2$ D) $\text{Ba}(\text{NO}_3)_2$

20. What is the mass of NH_4Cl that must dissolve in 200. grams of water at $50.^\circ\text{C}$ to make a saturated solution?

- A) 26 g B) 42 g
C) 84 g D) 104 g

21. Base your answer to the following question on the information below and on your knowledge of chemistry.

Seawater contains dissolved salts in the form of ions. Some of the ions found in seawater are Ca^{2+} , Mg^{2+} , K^+ , Na^+ , Cl^- , HCO_3^- , and SO_4^{2-}

An investigation was conducted to determine the concentration of dissolved salts in seawater at one location. A 300.-gram sample of the seawater was placed in an open container. After a week, all the water had evaporated and 10. grams of solid salts remained in the container.

At standard pressure, compare the freezing point of seawater to the freezing point of distilled water.

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22. Base your answer to the following question on the information below.

A total of 1.4 moles of sodium nitrate is dissolved in enough water to make 2.0 liters of an aqueous solution. The gram-formula mass of sodium nitrate is 85 grams per mole.

Determine the molarity of the solution.

23. What is the mass of $\text{KNO}_3(\text{s})$ that must dissolve in 100. grams of water to form a saturated solution at $50.^\circ\text{C}$?

24. Base your answer to the following question on the information below.

A 2.0-liter aqueous solution contains a total of 3.0 moles of dissolved NH_4Cl at 25°C and standard pressure.

Identify the *two* ions present in the solute.

25. Base your answer to the following question on the information below.

Some Properties of Three Compounds at Standard Pressure

Compound	Boiling Point ($^\circ\text{C}$)	Solubility in 100. Grams of H_2O at $20.^\circ\text{C}$ (g)
ammonia	-33.2	56
methane	-161.5	0.002
hydrogen chloride	-84.9	72

Explain, in terms of molecular polarity, why hydrogen chloride is more soluble than methane in water at $20.^\circ\text{C}$ and standard pressure.
