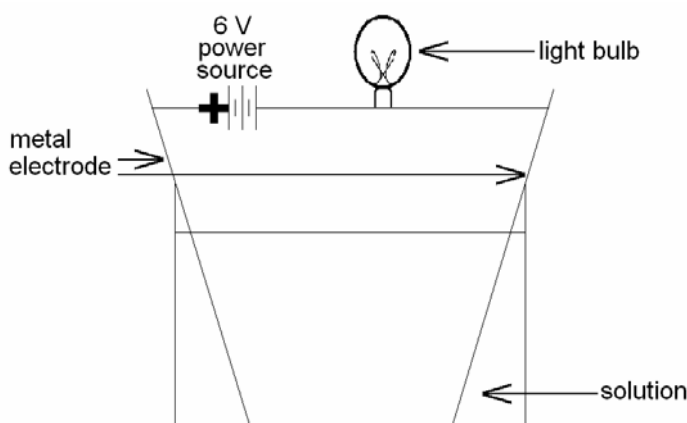


Multiple-Choice Questions

Circle the letter for the choice that best completes the statement or answers the question.

1. All aqueous solutions can be described as
 - a) saturated
 - b) unsaturated
 - c) electrolytes
 - d) homogeneous
2. The apparatus shown in the diagram below is used to determine if an aqueous solution conducts an electric current. Which substance will cause the bulb to light up when added to the water?



- a) $\text{C}_8\text{H}_{17}\text{OH}(l)$
 - b) $\text{K}_2\text{O}(s)$
 - c) $\text{CH}_3\text{OH}(l)$
 - d) $\text{C}_{12}\text{H}_{22}\text{O}_{11}(s)$
3. A solid is dissolved in water to form an aqueous solution. As dissolving proceeds, the temperature of the solution decreases. What can be concluded from this observation?
 - a) More energy is required to break bonds in the solute than in the solvent.
 - b) More energy is released from bonds forming between solute and solvent than is needed to break bonds in the solute and solvent.
 - c) More energy is needed to break bonds in the solute and solvent than is released from bonds forming between the solute and solvent.
 - d) When the solute dissolves, a net amount of energy is released.
 4. When 1.0×10^{15} formula units of $\text{Ba}(\text{OH})_2$ completely dissolve to form an aqueous solution, the number of ions produced is
 - a) 2.0×10^{15}
 - b) 5.0×10^{15}
 - c) 1.0×10^{15}
 - d) 3.0×10^{15}

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5. The mass of sodium sulfate needed to make 250 mL of a 0.192 mol/L solution is
- 154 g
 - 109 g
 - 6.82 g
 - 5.71 g
6. A 2.00 L solution of silver nitrate has a concentration of 2.00 mol/L. If you place 1.00 L of it in a beaker, then the beaker contains
- a 1.00 mol/L solution
 - 4.00 mol of dissolved solute
 - 339.8 g of dissolved solute
 - the same concentration of solute
7. A 6.00 mg sample of $\text{Al}_2(\text{SO}_4)_3(\text{s})$ is dissolved to prepare 60.0 mL of solution. The molar concentration of this solution is
- 0.292 mmol/L
 - 0.385 mmol/L
 - 4.68 mmol/L
 - 0.100 mol/L

Use the following information to answer the next two questions.

Solution I 30.0 mL of 5.0 mol/L NaCl(aq)
Solution II 50.0 mL of 4.0 mol/L NaCl(aq)
Solution III 100 mL of 1.5 mol/L NaCl(aq)
Solution IV 3.00 mL of 0.5 mol/L NaCl(aq)

8. The solutions with the same number of moles of salt in solution are
- I and III
 - I and II
 - I and IV
 - III and IV
9. The solution with the largest mass of solute dissolved is
- I
 - II
 - III
 - IV
10. A vinegar solution contains 14.8 g of ethanoic acid, $\text{CH}_3\text{COOH}(\text{aq})$, in 300 g of solution. The percent by mass concentration is
- 20.3% m/m
 - 14.8% m/m
 - 4.93% m/m
 - 0.0493% m/m

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11. What volume of a 6.00 mol/L hydrobromic acid solution is required to make 5.00 L of a 0.0100 mol/L solution by dilution?
- 4.20 mL
 - 8.33 mL
 - 12.4 mL
 - 50.0 mL
12. Which of the following is the least concentrated solution?
- 150 mL of 0.400 mol/L hydrochloric acid
 - 100 mL of 0.100 mol/L methanol
 - 250 mL of 1.00 mol/L sucrose (sugar) solution
 - 50.0 mL of 0.150 mol/L sodium hydroxide
13. What mass of NaOH(s) is required to prepare 500.0 mL of 2.0 mol/L NaOH(aq)?
- 80.0 g
 - 40.0 g
 - 20.0 g
 - 10.0 g
14. If the concentration of a solution of barium iodide is 0.25 mol/L solution, then the concentration of the iodide ions is
- 0.13 mol/L
 - 0.25 mol/L
 - 0.50 mol/L
 - 0.75 mol/L
15. The dissociation equation for aluminium nitrate can be written as
- $\text{Al}(\text{NO}_3)_3(\text{s}) \rightarrow \text{Al}^+(\text{aq}) + 3\text{NO}_3^-(\text{aq})$
 - $\text{Al}(\text{NO}_3)_3(\text{s}) \rightarrow \text{Al}^{3+}(\text{aq}) + 3\text{NO}_3(\text{aq})$
 - $\text{Al}(\text{NO}_3)_3(\text{s}) \rightarrow 3\text{Al}^+(\text{aq}) + \text{NO}_3^-(\text{aq})$
 - $\text{Al}(\text{NO}_3)_3(\text{s}) \rightarrow \text{Al}^{3+}(\text{aq}) + 3\text{NO}_3^-(\text{aq})$
16. What mass of NaF is dissolved in 20.0 L of water in which the fluoride ion concentration is 0.900 ppm? (Density of solution = 1.00 g/mL)
- 18.0 mg
 - 18.0 g
 - 1.80×10^3 mg
 - 0.180 g
17. A saturated solution of potassium chlorate, KClO_3 , contains 10.0 g of KClO_3 in 100 mL of solution. If 250 mL of saturated solution is evaporated to half this volume, what would you expect to occur?
- The remaining solution contains 5.0 g of solute per 100 mL.
 - 25.0 g of solute will come out of solution.
 - 12.5 g of solute will come out of solution.
 - No solute will come out of solution.

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18. Which concentration is equivalent to 100 ppb?
- 1 ppm
 - 0.1 ppm
 - 0.001 ppm
 - 1.0×10^5 ppm
19. A solution is prepared by dissolving 30.0 g of solute in 70.0 mL of water. What is the concentration of the solution in percent by mass? (Density of water = 1.00 g/mL)
- 30.0%
 - 42.8%
 - 40.0%
 - 4.28%
20. What is the concentration of carbonate ion, $\text{CO}_3^{2-}(\text{aq})$, in 100 mL of 0.020 mol/L K_2CO_3 ?
- 0.0020 mol/L
 - 0.040 mol/L
 - 0.010 mol/L
 - 0.020 mol/L

Numerical Response Questions

For each numerical response question, record the answer in the following response box.

21.
22.
23.
24.
25.
26.
27.

ASSESSMENT	Chapter 5 Test	BLM 5.5.1
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21. Determine the molar solubility of an unknown substance “X” from the data below.
- Volume of solution = 2.00 L
Molar mass of “X” = 48.00 g/mol
Mass of “X” added to water = 9.00 g
Mass of “X” undissolved = 4.15 g
22. A sample of well water contains 1.00×10^{-5} mol/L of arsenic. What is this concentration expressed in ppm? (Density of solution = 1.00 g/mL)
23. Hydrochloric acid, HCl(aq), can be used to clean cement driveways. What volume of 11.6 mol/L HCl(aq) is required to prepare 25.0 L of 1.5 mol/L HCl(aq)?
24. The density of air at 80.0 °C is 1.00 g/L. If air is 23.2% oxygen by mass, what is the molar concentration of air at this temperature?
25. 100.0 mL of 0.200 mol/L NaCl is mixed with 400.0 mL of 0.200 mol/L NaCl. What is the concentration of Cl⁻(aq) in the resulting solution?
26. What mass of K₂SO₄ is needed to prepare 1.00 L of solution in which the concentration of potassium ions, K⁺(aq), is 0.200 mol/L?
27. 100.0 g of hexane accidentally spills into 1.00 kL of water. Generally speaking, hexane and water are immiscible and can easily be separated. However, the solubility of hexane is reported to be 0.0011 g hexane per 100 mL of water at 25 °C. What mass of hexane will dissolve in the water?

ASSESSMENT	Chapter 5 Test	BLM 5.5.1
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Written Response Questions

Answer each question in the space provided. Use complete sentences and diagrams when necessary.

28. The conductivity of a saturated solution of silver chloride, AgCl , is so low that the solution would be classed as a non-electrolyte. What conclusion can be drawn from this information?

29. Solutions expand when heated. Will this change the molar concentration of a solution? Give a reason for your answer.

30. A solid has a molar mass of 80.06 g/mol . 50.00 g of the solid is dissolved in 100 mL of water. The concentration of the solution is reported as 6.245 mol/L . Determine if this is a valid report of the molar calculation.
