A) Solutions and Their Concentrations

36. Terms and Definitions

A	B
____i. a substance that has other substances dissolved in it	a. immiscible
____ii. a substance that is present in a smaller amount in a solution	b. aqueous
____iii. a solution in which water is the solvent	c. solute
____iv. liquids that readily dissolve in each other	d. miscible
____v. liquids that do not readily dissolve in each other	e. solvent
	f. solubility
	g. alloy

37. Units of Concentration

A	B
____i. mass solubility	a. mol/L
____ii. molar concentration	b. g/100mL
____iii. parts per billion	c. ppm
____iv. mass/volume percentage	d. ppb
____v. volume/volume percentage	e. % (v/v)
	f. % (m/v)
	g. 1 mg/mL

38. Calculating Concentration

A	B
____i. 30 g of NaCl in 500 mL of solution	a. 46% (m/v)
____ii. 46 g of NaOH in 100 mL of water	b. 25% (m/m)
____iii. 5.25 g of $AgNO_3$ in 50 g of water	c. 1.03 mol/L
____iv. 3 mL of hydrogen peroxide in 10 mL of water	d. 5.25% (m/m)
____v. 125 g of copper(II) sulfate in 500 g of water	e. 30% (v/v)
	f. 10.5% (m/m)

39. Explain the statement "Like dissolves like."

41. a) Draw the Lewis structure of a water molecule. Show the shape and charge distribution.
    b) Explain why water is a polar molecule.
    c) Why is water called the universal solvent?
    d) Describe the properties of water that make it a good solvent.

42. 0.25 mol of potassium nitrate is added to enough water to make a 175 mL solution. What is the molar concentration of potassium nitrate?

43. What is the mass/volume percentage of 3.0 g in 50.0 mL of solution?

44. Calculate the mass (in grams) of sodium sulfide that is needed to make 350 mL of a 0.50 mol/L solution.

45. Calculate the concentration of 0.75 mL of hydrogen peroxide in 10 mL of solution. Express the concentration as a volume/volume percentage.

46. Calculate the concentration of 0.575 g of magnesium acetate in 265 g of water. Express the concentration as a mass/mass percentage.

47. 35 mL of a 0.250 mol/L solution of hydrochloric acid is mixed with an excess of silver nitrate. A white precipitate of silver chloride forms. What is the mass of the silver chloride precipitate?

48. 10.0 mL of a 0.10 mol/L solution of copper(II) sulfate is reacted with 25.0 mL of a 0.20 mol/L solution of sodium sulfide. This reaction creates a brown precipitate, copper(II) sulfide. What is the mass of the copper(II) sulfide precipitate?

49. What volume of 0.20 mol/L acetic acid solution is needed to make 100 mL of 0.015 mol/L acetic acid solution?

B) Aqueous Solutions
50. Using the Solubility Table

A	B
____i. magnesium sulfate	a. soluble
____ii. lithium hydroxide	b. insoluble
____iii. calcium carbonate	
____iv. silver nitrate	
____v. iron(II) sulfate	

51. Precipitation Reactions

A	B
____i. silver nitrate and sodium chloride	a. precipitation
____ii. silver nitrate and sodium acetate	b. no reaction
____iii. magnesium bromide and zinc sulfate	
____iv. ammonium hydroxide and strontium sulfide	
____v. mercury nitrate and lithium iodide	

53. A solution of sodium sulfide is mixed with a solution of copper(II) chloride. Write the total ionic equation and the net ionic equation for the reaction. Identify the spectator ions in the reaction.

54. 65 mL of a 2.5 mol/L solution of silver nitrate is added to an excess of calcium chloride. Identify the precipitate, and calculate the mass of this precipitate that is formed.

55. An excess of sodium carbonate solution is added to 75.0 mL of calcium chloride solution. 7.50 g of precipitate is formed. Calculate the concentration of the calcium chloride solution.

56. Suppose that you are given a sample that contains Ag^+, Ba^{2+}, and Fe^{3+} ions. Outline a procedure to separate these ions from each other. What will you add to precipitate out the different ions? Write the net ionic equation for each reaction.

C) Acids and Bases

60. Name each acid.
    a) $HBr_{(aq)}$ b) $H_3PO_{2(aq)}$ c) $H_2SO_{3(aq)}$ d) $HIO_{3(aq)}$ e) $HBrO_{4(aq)}$

61. Write the chemical formula of each acid.
    a) carbonic acid   b) hyponitrous acid   c) sulfurous acid   d) hydrocyanic acid   e) perchloric acid

63. 34.2 mL of 0.200 mol/L sulfuric acid neutralizes 23.8 mL of lithium hydroxide. Determine the concentration of the base.

64. 20.0 mL of 0.15 mol/L sodium hydroxide is reacted with 30.0 mL of 0.20 mol/L sulfuric acid.
    a) How many grams of salt are produced?
    b) What is the concentration of hydronium ions in the resulting solution?
    c) What is the pH of the resulting solution?