**1.** Identify at least two solutions in your home that are

**(a)** beverages

**(b)** found in the bathroom or medicine cabinet

**(c)** solids

**2.** How is a solution different from a pure compound? Give specific examples.

**3.** Mixing 2 mL of linseed oil and 4 mL of turpentine makes a binder for oil paint. What

term is used to describe liquids that dissolve in each other? Which liquid is the solvent?

**4.** How does the bonding in water molecules account for the fact that water is an excellent solvent?

**5.** Why does an aqueous solution of an electrolyte conduct electricity, but an aqueous solution of a non-electrolyte does not?

**6.** Use the concept of forces between particles to explain why oil and water are immiscible.

**7.** Explain the expression “like dissolves like” in terms of intermolecular forces.

**8.** What factors affect the rate of dissolving of a solid in a liquid?

**9.** Which of the following substances would you expect to be soluble in water? Briefly explain each answer.

**(a)** potassium chloride, KCl

**(b)** carbon tetrachloride, CCl4

**(c)** sodium sulfate, Na2SO4

**(d)** butane, C4H10

**10.** Benzene, C6H6, is a liquid at room temperature. It is sometimes used as a solvent. Which of the following compounds is more soluble in benzene: naphthalene, C10H8, or sodium fluoride, NaF? Would you expect ethanol, CH3CH2OH, to be soluble in benzene? Explain your answers.

**11.** Boric acid solution is used as an eyewash. What mass of boric acid is present in 250 g of solution that is 2.25% (m/m) acid in water?

**12.** 10% (m/m) sodium hydroxide solution, NaOH(aq), is used to break down wood fibre

to make paper.

**(a)** What mass of solute is needed to make 250 mL of 10% (m/m) solution?

**(b)** What mass of solvent is needed?

**(c)** What is the molar concentration of the solution?

**13.** What volume of pure ethanol is needed to make 800 mL of a solution of ethanol in water that is 12% (v/v)?

**DEFINITIONS**

solution

solvent

solutes

variable composition

aqueous solution

miscible

immiscible

alloys

solubility

saturated solution

unsaturated solution

rate of dissolving

dipole

dipole-dipole attraction

hydrogen bonding

ion-dipole attractions

hydrated

electrolyte

non-electrolytes

concentration

mass/volume percent

mass/mass percent

volume/volume percent

parts per million

parts per billion

molar concentration

standard solution

volumetric flask

• Describe the difference between a saturated and an unsaturated solution.

• Explain how you can predict whether a solute will dissolve in a solvent.

• What factors affect the rate of dissolving?

• What factors affect solubility?

• How does temperature affect the solubility of a solid, a liquid, and a gas?

• Describe how particle attractions affect solubility.

• Explain how to plot a solubility curve.

• Write the formulas for (m/v) percent, (m/m) percent, (v/v) percent, ppm, ppb, and molar

concentration.

• Explain how you would prepare a standard solution using a volumetric flask.



**24.** Use the graph on the next page to answer questions 24 and 25. At 80°C, what mass of sodium chloride dissolves in 1.0 L of water?

**25.** What minimum temperature is required to dissolve 24 g of potassium nitrate in 40 g

of water?