

CHAPTER 12 REVIEW*Solutions***SECTION 1****SHORT ANSWER** Answer the following questions in the space provided.**1.** Match the type of mixture on the left to its representative particle diameter on the right.

_____ solutions (a) larger than 1000 nm

_____ suspensions (b) 1 nm to 1000 nm

_____ colloids (c) smaller than 1 nm

2. Identify the solvent in each of the following examples:

_____ a. tincture of iodine (iodine dissolved in ethyl alcohol)

_____ b. sea water

_____ c. water-absorbing super gels

3. A certain mixture has the following properties:

- No solid settles out during a 48-hour period.
- The path of a flashlight beam is easily seen through the mixture.
- It appears to be homogeneous under a hand lens but not under a microscope.

Is the mixture a suspension, colloid, or true solution? Explain your answer.

4. Define each of the following terms:

a. alloy

b. electrolyte

SECTION 1 continued

c. aerosol

d. aqueous solution

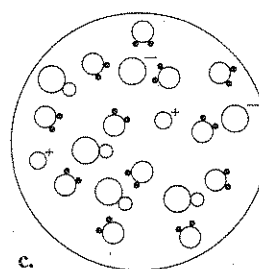
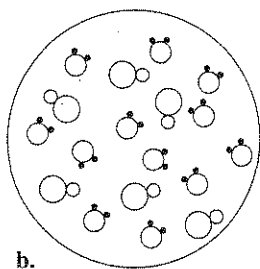
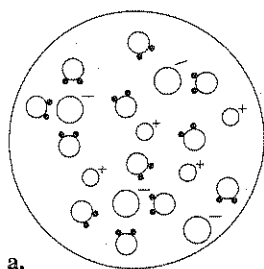
5. For each of the following types of solutions, give an example other than those listed in Table 1 on page 402 of the text:

a. a gas in a liquid

b. a liquid in a liquid

c. a solid in a liquid

6. Using the following models of solutions shown at the particle level, indicate which will conduct electricity. Give a reason for each model.



= water molecule

a. _____

b. _____

c. _____

CHAPTER 12 REVIEW

Solutions

SECTION 2

SHORT ANSWER Answer the following questions in the space provided.

1. The following are statements about the dissolving process. Explain each one at the molecular level.

a. Increasing the pressure of a solute gas above a liquid solution increases the solubility of the gas in the liquid.

b. Increasing the temperature of water speeds up the rate at which many solids dissolve in this solvent.

c. Increasing the surface area of a solid solute speeds up the rate at which it dissolves in a liquid solvent.

2. The solubility of KClO_3 at 25°C is 10. g of solute per 100. g of H_2O .

a. If 15 g of KClO_3 are stirred into 100 g of water at 25°C , how much of the KClO_3 will dissolve? Is the solution saturated, unsaturated, or supersaturated?

SECTION 2 continued

- b. If 15 g of KClO_3 are stirred into 200 g of water at 25°C , how much of the KClO_3 will dissolve? Is the solution saturated, unsaturated, or supersaturated?

PROBLEMS Write the answer on the line to the left. Show all your work in the space provided.

3. Use the data in **Table 4** on page 410 of the text to answer the following questions:

_____ a. How many grams of LiCl are needed to make a saturated solution with 300. g of water at 20°C ?

_____ b. What is the minimum amount of water needed to dissolve 51 g of NaNO_3 at 40°C ?

_____ c. Which solute forms a saturated solution when 36 g of it are dissolved in 25 g of water at 20°C ?

4. KOH is an ionic solid readily soluble in water.

_____ a. What is its enthalpy of solution in kJ/g ? Refer to the data in **Table 5** on page 416 of the text.

b. Will the temperature of the system increase or decrease as the dissolution of KOH proceeds? Why?

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SECTION 3

SHORT ANSWER Answer the following questions in the space provided.

1. Describe the errors made by the following students in making molar solutions.
- a. James needs a 0.600 M solution of KCl. He measures out 0.600 g of KCl and adds 1 L of water to the solid.

- b. Mary needs a 0.02 M solution of NaNO₃. She calculates that she needs 2.00 g of NaNO₃ for 0.02 mol. She puts this solid into a 1.00 L volumetric flask and fills the flask to the 1.00 L mark.

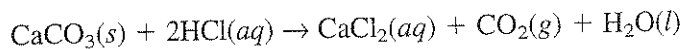
PROBLEMS Write the answer on the line to the left. Show all of your work in the space provided.

2. _____ What is the molarity of a solution made by dissolving 2.0 mol of solute in 6.0 L of solvent?

3. _____ CH₃OH is soluble in water. What is the molality of a solution made by dissolving 8.0 g of CH₃OH in 250. g of water?

SECTION 3 continued

4. Marble chips effervesce when treated with hydrochloric acid. This reaction is represented by the following equation:



To produce a reaction, 25.0 mL of 4.0 M HCl is added to excess CaCO_3 .

_____ a. How many moles of HCl are consumed in this reaction?

_____ b. How many liters of CO_2 are produced at STP?

_____ c. How many grams of CaCO_3 are consumed?

5. Tincture of iodine is $\text{I}_2(s)$ dissolved in ethanol, $\text{C}_2\text{H}_5\text{OH}$. A 1% solution of tincture of iodine is 10.0 g of solute for 1000. g of solution.

_____ a. How many grams of solvent are present in 1000. g of this solution?

_____ b. How many moles of solute are in 10.0 g of I_2 ?

_____ c. What is the molality of this 1% solution?

- d. To determine a solution's molarity, the density of that solution can be used. Explain how you would use the density of the tincture of iodine solution to calculate its molarity.

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MIXED REVIEW

SHORT ANSWER Answer the following questions in the space provided.

1. Solid CaCl_2 does not conduct electricity. Explain why it is considered to be an electrolyte.

2. Explain the following statements at the molecular level:

- a. Generally, a polar liquid and a nonpolar liquid are immiscible.

- b. Carbonated soft drinks taste flat when they warm up.

3. An unknown compound is observed to mix with toluene, $\text{C}_6\text{H}_5\text{CH}_3$, but not with water.

- a. Is the unknown compound ionic, polar covalent, or nonpolar covalent? Explain your answer.

- b. Suppose the unknown compound is also a liquid. Will it be able to dissolve table salt? Explain why or why not.

MIXED REVIEW continued

PROBLEMS Write the answer on the line to the left. Show all your work in the space provided.

4. Consider 500. mL of a 0.30 M CuSO_4 solution.

_____ a. How many moles of solute are present in this solution?

_____ b. How many grams of solute were used to prepare this solution?

5. a. If a solution is electrically neutral, can all of its ions have the same type of charge? Explain your answer.

_____ b. The concentration of the OH^- ions in pure water is known to be 1.0×10^{-7} M. How many OH^- ions are present in each milliliter of pure water?

6. 90. g of CaBr_2 are dissolved in 900. g of water.

_____ a. What volume does the 900. g of water occupy if its density is 1.00 g/mL?

_____ b. What is the molality of this solution?