

## Understanding Concepts

- What do all concentration units have in common?
- In general, what type of solvent dissolves
  - ionic compounds?
  - polar compounds?
  - nonpolar compounds?
- Water is capable of dissolving many things.
  - Provide some reasons, based on the theory you have studied, for water being “the universal solvent.”
  - List some reasons for dissolving substances in water. Give examples for these reasons.
  - How does water’s property as a powerful solvent affect our drinking water?
- Write IUPAC names for the solute and solvent in the following household solutions:
  - brine,  $\text{NaCl}_{(\text{aq})}$
  - vinegar,  $\text{HC}_2\text{H}_3\text{O}_{2(\text{aq})}$
  - washing soda,  $\text{Na}_2\text{CO}_{3(\text{aq})}$
  - pancake syrup,  $\text{C}_{12}\text{H}_{22}\text{O}_{11(\text{aq})}$
  - vodka,  $\text{C}_2\text{H}_5\text{OH}_{(\text{aq})}$
- Partly skimmed milk contains 2.0 g of milk fat (MF) per 100 mL of milk. What mass of milk fat is present in 250 mL (one glass) of milk?
- A shopper has a choice of yogurt with three different concentrations of milk fat: 5.9% MF, 2.0% MF, and 1.2% MF (Figure 1). If the shopper wants to limit his milk fat intake to 3.0 g per serving, calculate the mass of the largest serving he could have for each type of yogurt.



Figure 1

The label tells us the concentration of milk fat in yogurt.

- What volume of vinegar contains 15 mL of pure acetic acid (Figure 2)?



Figure 2

The label tells us the concentration of acetic acid in vinegar.

- Water from a well is found to have a nitrate ion concentration of 55 ppm, a level considered unsafe for drinking. Calculate the mass of nitrate ions in 200 mL of the water.
- Calculate the molar concentration of the following solutions:
  - 0.35 mol copper(II) nitrate is dissolved in water to make 500 mL of solution.
  - 10.0 g of sodium hydroxide is dissolved in water to make 2.00 L of solution.
  - 25 mL of 11.6 mol/L  $\text{HCl}_{(\text{aq})}$  is diluted to a volume of 145 mL.
  - A sample of tap water contains 16 ppm of magnesium ions.
- The label on a bottle of “sports drink” indicates that the beverage contains water, glucose, citric acid, potassium citrate, sodium chloride, and potassium phosphate, as well as natural flavours and artificial colours. The label also indicates that the beverage contains 50 mg of sodium ions and 55 mg of potassium ions per 400 mL serving.
  - Write chemical formulas for all the compounds named on the label, and classify them as ionic or molecular. Further classify the molecular