Chapter 6: Quantities in Chemical Formulas

Mini Investigation: Comparing Salty Snacks, page 259
A. AgNO₃(aq) + NaCl(aq) → AgCl(s) + NaNO₃(aq)
B. Test tube #3 contained the most precipitate. Test tube #4 contained no precipitate. Test tubes #2 and #3 appeared to have the same amount of precipitate.
C. Raw potato should produce much less precipitate since it contains less salt than crushed chips.
D. Controlled variables include the volumes of distilled water and silver nitrate solution added to each test tube, which have to be the same for all test tubes; the mass of sodium chloride added to test tube #3; and the volumes of hot dog and chips added to test tubes #1 and #4, which have to be the same.
E. The foods have to be in small pieces to permit as much salt from within the foods to react with silver nitrate.
F. According to Health Canada, the daily intake of sodium should not exceed 2400 mg.

Section 6.1: Qualitative and Quantitative Analysis

Mini Investigation: Testing for sugar, page 261
A. The 10 % glucose solution produced a more intense red precipitate than the 1 % solution because it was more concentrated.
B. The colour of test tube #2 was different because it did not contain any glucose.
C. Test tube #1 was included as a control. This test tube shows the colour of just Benedict’s solution and water.
D. Answers may vary. Sample answer: Some diabetics can control their symptoms by adjusting their diets. This can be done by eating moderate quantities of nutritious foods and adhering to regular meal times. This helps to keep blood sugar levels under control.

Section 6.1 Questions, page 263
1. (a) Rainwater has a pH of 5.6 is an example of quantitative data.
   (b) Sonja’s blood glucose concentration was 4.6 mol/L is an example of quantitative data.
   (c) Carbon monoxide poisoning changes the colour of blood to cherry red is an example of qualitative data.
   (d) The addition of acid to a cleaning product produces a gas with bleach-like odour is an example of qualitative data.
   (e) A glowing splint lights in a container of gas, confirming that the gas is oxygen, is an example of qualitative data.
   (f) A recipe requires 1.0 g of baking powder for each cup of flour is an example of quantitative data.
2. (a) Two factors that doctors take into account when deciding on the dosage are the patient’s mass and age. Other factors include lifestyle and medical history.
   (b) A small dose of a drug may not be harmful but a large dose could kill a person. Failure to use the right quantity of medication or consuming alcohol or other drugs while taking prescribed medication can be harmful to the patient.
3. The product label provides important information about the use of the drug and the appropriate dosages. The pharmacist can supply additional information to assist a patient to determine the most appropriate medication.
4. The system would allow doctors to have instant access to your complete medical history. This would assist in making correct diagnoses and prescribing the most appropriate medication.

5. Answers may vary. Students’ answers should include arguments in favour of or against athletes being subject to regular doping tests. Arguments in favour of may include the fact of these tests being helpful in ensuring that no athlete has an unfair advantage over his or her opponents. The pressure to turn to doping also subjects athletes to health risks. Arguments against may include that technologies that mask some forms of doping are available. These will allow the “cheaters” to continue.

6. Answers may vary. Sample answer: This evidence only shows that there is a link or correlation between the presence of aluminum in the brain and Alzheimer’s disease. However, just because aluminum accumulates does not mean that aluminum is the cause of the disease.

7. (a) Risk factors for developing diabetes are:
   • obesity
   • lack of exercise
   • poor eating habits
   • age
   • family history of diabetes
   • high cholesterol and blood pressure

   (b) Lifestyle changes that can reduce the risk of developing diabetes include becoming more active, losing weight, and switching to a more nutritious diet.

   (c) These lifestyle changes may reduce the risk of developing diabetes but they cannot prevent diabetes. Some people are predisposed to getting diabetes as a result of their family history.