Unit 2 Exploring Matter

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BIG IDEAS

- Elements and compounds have specific properties that determine their uses.
- The use of elements and compounds has both positive and negative effects on society and the environment.

Overall Expectations

- **C1** analyze how properties of common elements and/or simple compounds affect their use, and assess the social and environmental impact associated with their production or use
- **C2** investigate, through inquiry, physical and chemical properties of common elements and simple compounds
- **C3** demonstrate an understanding of the properties of common elements and simple compounds, and general features of the organization of the periodic table

Materials

Please see pages TR-40 to TR-42 for a list of the materials required for this unit and other units.

Overview

In this unit, students will study the properties and hazards of chemicals and determine how using chemicals has an impact on their lives and the environment. They will also learn to work safely with chemicals while they perform independent investigations that explore how the properties of chemicals are important in determining their uses.

Using the Unit Opener (Student textbook pages 88-91)

- Use a think-pair-share activity to introduce the unit. Have students look at the periodic table on pages 88 and 89. Ask them to work alone to identify images they find familiar, unfamiliar, and interesting, and then share an example of each image with their partner. Working with a partner increases student confidence during the whole class discussion. To encourage student accountability, inform the class that you will randomly choose students to share their examples during the discussion. List their examples and observations in a table with the headings "Familiar", "Unfamiliar", and "Interesting". Students might recognize that copper is used for jewellery or wonder why some elements are represented by people's faces rather than objects.
- Ask the class respond to the question: "How could using elements have positive and negative effects on the environment?" To start the discussion, share the fact that Marie Curie (pictured under to curium, Cm) died from cancer caused by the radioactive elements she studied.
- Ask students to turn to pages 90 and 91 and complete **BLM G-29 K-W-L Chart** by listing the questions from Topics 2.1 to 2.6 down the left hand column. Have students revisit this blackline master at the end of the unit.
- Use the Internet to find an audio copy of "The Elements" from page 89 and play it for the class before looking at the periodic table.
- Have samples of common metallic elements for students to look at and touch, such as copper, zinc, magnesium, and carbon.
- ELL Preview any new vocabulary with English language learners. Add important terms to the word wall.
- It might be helpful to tell students that they will be looking at patterns in the periodic table but will not need to memorize the names of all the elements.
- Enrichment—Challenge students to choose two elements and respond to them in some way. They could make a drawing of the element in use, write questions they have about the element, or write a poem.

Preparing for the Unit Project (Student textbook page 91)

- Ask students to look ahead to the two unit projects on pages 156 and 157 of the student textbook.
- In the Inquiry Investigation, students design an investigation to test conditions necessary for the formation of rust. Throughout this unit there are several opportunities for students to build the skill necessary for success in this project. These include: Activity 2.4 Linking Physical Properties of Objects with Their Uses, Investigation 2A Physical and Chemical Properties of Substances in the Home, Investigation 2B Comparing the Physical Properties of Metals and Non-metals, and Activity 2.14 Which Would You Choose?
- Note that the Inquiry Investigation should be started at least one week before the end of the unit.

- In An Issue to Analyze, students evaluate the use of road salt and consider its effect on the environment. There are several research activities throughout the unit that prepare students for this project: Activity 2.6 Classify Elements, Case Study Investigation: Salt of the Earth, Activity 2.11 Learning More About the Elements and Their Compounds, and Activity 2.12: Analyze Some Chemical Reactions. Encourage students to focus on asking questions, evaluating good sources of information, and choosing appropriate formats for their reports, taking into account their audience and purpose.
- Ask students to consider which project they would rather carry out in this unit. Provide them with a folder to gather information that will be useful to them in their project and remind them to watch for useful information as they read the unit and perform the activities and investigations.
- To support student success in both unit projects, there are opportunities in each topic for students to develop literacy skills.

Get Ready (Student textbook pages 92-93)

- Students will interpret a graph by interpolation and draw conclusions about the data shown on the graph.
- Students will be familiar with the prefixes and units of measure in the metric system.
- Students studied density in grade 8. They should understand that density is the amount of matter in a specific volume and should know the formulas for density, mass, and volume.
- Students will substitute values into simple algebraic equations and solve for an unknown.

Students can review some of these skills using **BLM 2-2 Skills for Unit 2**.

Get Ready Answers

1. Answers may vary. For example, matter has several states, matter is made of particles, everything that is not energy is matter. Answers might include specific examples of matter.

2. Answers may vary.

a) beach umbrella

b) water

c) air in the balloon

d) sweat evaporating from the sunbathers

3. **a)** helium
   b) rocky road ice-cream
   c) fruit punch

4.

Clue	Physical or Chemical Property?	Substance
a) smells sweet	physical	ice cream
b) does not react with water	chemical	beach ball
c) feels rough	physical	sand
d) is red	physical	balloon

5. **a)** water
   b) air
   c) both

6. **a)** 248 g
   b) 30 g

7. At 70°C, 290 g of sugar will dissolve and 45 g of salt will dissolve. Sugar is more soluble at 70°C.

8. **a)** milligrams
   b) tonnes
   c) kilograms
   d) grams

9. **a)** millilitres
   b) litres
   c) kilolitres

10. 1.1 g/mL

11. Comics may vary. Scientist could put the fragment in water and make a conclusion based on if it floats or sinks. Or scientist could use the mass and volume of the fragment to calculate its density and look up the density in a reference book to identify the substance.

Assessment OF Learning for Unit 2		
Activity	**Evidence of Student Understanding**	**Supporting Learners**
Unit Inquiry Investigation, page 156	Students design and perform an experiment, including controlling some variables, to study rust formation. Students create a data table to record their observations Students use their results to justify their conclusions.	• Collect students' procedures before they perform their experiments and provide feedback and guidance. • Allow students to choose from samples of data tables instead of designing their own. • Provide students with sentence starters to use as a guide when writing their conclusions.
Unit An Issue to Analyse Project, page 157	Students pose questions and conduct research about the benefits and hazards of road salt and its effect on the environment. Students organize their research in an appropriate format. Students present their findings in a written or verbal report suitable for the audience.	• Suggest a starting point for the research process. • Collect students' questions before they start their research and provide feedback and guidance. • Provide students with a variety of choices for the presentation format. Students may prefer an artistic or technical format rather than a written or verbal format.

Assessment FOR Learning		
Tool	**Evidence of Student Understanding**	**Supporting Learners**
Get Ready questions 2 and 5, page 92	Students recognize and describe the states of matter.	• Provide students with samples of the three states of matter and have them choose adjectives to describe each state. • Allow students to use a think-pair-share strategy.
Get Ready questions 1, 3 and 4, page 92	Students describe some characteristics and properties of matter.	• Provide students with physical examples of mixtures and pure substances and have them work in pairs to classify each one. Then have the class work together to create a list of characteristics for each example. • As a class, discuss physical and chemical properties that students know. Invite discussion about which type of property each example displays. Make two lists on the chalkboard.
Get Ready questions 6 and 7, page 92	Students analyze and interpret information on a graph.	• Read Numeracy Toolkit 4: Organizing and Communicating Scientific Results with Graphs on page 370 of the student textbook together. For further practice, students can complete **BLM G-26 Interpreting Line Graphs**.
Get Ready questions 8 and 9, page 93	Students choose appropriate units for mass and volume.	• Provide students with some referents for each unit, or have them develop their own. For example, a textbook has a mass of about 1 kg. • ELL English language learners may have more success if an illustration of each item is provided, as well as its name.
Get Ready question 10, page 93	Students calculate density using a formula.	• Perform one calculation for students, then have them calculate the density of another substance using your model.
Get Ready question 11, page 93	Students illustrate effective inquiry steps.	• Some students may prefer to list steps or to act them out.