SB - Chapter Opener

# Chapter Title

Chapter 5: The Periodic Table and Chemical Trends  
Unit 2: Atomic Structure and Bonding

# Essential Questions

- How has the periodic table evolved into a powerful tool for understanding elements and their properties?  
- How do we use the periodic table to predict the properties of elements?  
- How can we predict the reactivity and properties of elements based on their positions on the periodic table?  
These essential questions are designed to guide your thinking as you explore how the periodic table is organized and its significance in predicting the behavior of elements.

# Big Idea

In this chapter, we explore how the periodic table was developed, how it is organized, and how it can be used to predict element properties. By understanding periodic trends such as atomic radius, ionization energy, and electronegativity, students will gain insights into the behavior of elements.

# Phenomenon-Based Learning

Three salts are commonly used to clear the roads of ice: sodium chloride, magnesium chloride, and calcium chloride. While they all contain chloride, each salt behaves differently. In this chapter, students will explore how the periodic table can be used to understand the properties of sodium, magnesium, and calcium, and predict how their compounds behave.

# Chapter STEM Task

By the end of this chapter, you will complete a STEM task that explores the different properties of sodium chloride, magnesium chloride, and calcium chloride. You will use the periodic table to predict which of these salts is the most effective for melting ice and why.

# Chapter Overview

This chapter includes the following lessons:  
1. Lesson 1: The Development of the Periodic Table  
2. Lesson 2: Classifying Elements and Periodic Trends  
3. Lesson 3: Predicting Properties Based on Periodic Trends

SB - Chapter Wrap-Up

# Summary of Main Ideas

Throughout this chapter, you learned about:  
- The scientists who contributed to the development of the periodic table, such as Mendeleev and Moseley.  
- The principles behind the organization of the modern periodic table.  
- How periodic trends such as atomic radius, ionization energy, and electronegativity help predict the properties of elements.  
These ideas help explain how the periodic table is used as a tool for understanding chemical properties.

# Revisit Phenomenon

Let’s revisit the phenomenon: Why are different salts used to melt ice on roads? Through this chapter, you learned that sodium, magnesium, and calcium are all metals from different groups on the periodic table, and their position helps explain why their chloride salts behave differently. These differences can be predicted using periodic trends like ionization energy and atomic radius.

# Extended STEM Activity (optional)

For further exploration, you can conduct an experiment to compare how quickly sodium chloride, magnesium chloride, and calcium chloride melt ice under different conditions. This hands-on activity can deepen your understanding of how elements in different groups exhibit unique chemical properties.

# Bring It Together

The lessons in this chapter helped you understand how the organization of the periodic table and its trends can be used to predict the behavior of elements. The mini STEM tasks, such as identifying periodic trends and predicting properties of elements, fit into the larger task of explaining how the salts used for melting ice behave. Together, these tasks helped you connect element properties to real-world phenomena.

# Chapter Reflective Journal

Reflect on the following:  
- How has your understanding of the periodic table and its trends evolved throughout the chapter?  
- How does the phenomenon of different salts melting ice shape your view of element properties and trends?  
Write about how your understanding of the periodic table has changed from the start of the chapter to now.

# Formative Assessment

1. Describe how Mendeleev and Moseley contributed to the development of the periodic table.  
2. Explain how the position of an element in the periodic table is related to its properties.  
3. Compare the properties of sodium, magnesium, and calcium based on their positions in the periodic table.  
4. How do periodic trends such as atomic radius and electronegativity predict the reactivity of elements?  
5. Draw a diagram of the periodic table showing groups and periods, and explain the significance of each.