

What Do You Remember?

- Name the chemical family to which each of the following elements belongs. Describe the location of each named group on the periodic table. (6.1, 6.4) **K/U**
 - iodine
 - barium
 - francium
 - krypton
- What is the significance of the bold staircase line on the periodic table? (6.1) **K/U**
- Who designed the early periodic table on which the modern one is based? (6.4) **K/U**
- What is the basis of the way in which the elements are organized on the periodic table? (6.4, 6.7) **K/U**
- Explain the difference between the terms in each pair below. (6.1, 6.4, 6.6, 6.7) **K/U**
 - an element and a compound
 - a group and a period
 - a metal and a non-metal
 - a proton and a neutron
 - a proton and an electron
 - atomic number and atomic mass
- Explain the similarities and differences between the plum pudding model and the Bohr model of the atom. Draw a sketch to illustrate your answer. (6.6) **K/U C**
- What did the surprising results of Rutherford's gold foil experiment lead him to conclude? Explain. (6.6) **K/U**

What Do You Understand?

- In Dalton's atomic model, atoms are the smallest possible particles of an element, and they are indivisible. Explain whether our modern atomic model supports or refutes Dalton's model. (6.6) **K/U**
- Describe the experimental evidence that led J. J. Thomson to propose that atoms contain particles that are negatively charged. (6.6) **K/U**
- In your notebook, copy and complete Table 1. Round atomic masses to whole numbers to obtain the mass number. (6.7) **T/I**

Table 1

Element name	Element symbol	Atomic number	Mass number	Number of protons	Number of neutrons	Number of electrons
	Mn					
		73				
mercury						
						36
				15	16	

- Draw Bohr–Rutherford diagrams for the most common isotope of each of the following in the sequence listed. (6.7) **T/I C**
 - the first three elements in the alkaline earth metal family
 - Ne, Ar, Kr
 - Li, Be, B, C, N, O, F, Ne
 - F, Cl
- Describe and explain any identifiable patterns that emerge from the series of Bohr–Rutherford diagrams in question 11. (6.7) **T/I**
- Complete a summary of similarities and differences in the structure and properties among
 - elements in the same family, such as Be, Mg, Ca
 - elements in the same period
 - elements in the family of noble gases (6.2, 6.4, 6.5, 6.7) **K/U**
- In the Bohr model of the atom, electrons are found in orbits around the nucleus. (6.6, 6.7) **K/U T/I**
 - What is the maximum number of electrons that can be found in the first three orbits closest to the nucleus?
 - Count the number of elements in the first three periods of the periodic table. What is the correlation of this number to the number of electrons in Bohr's orbits?
 - Suggest an explanation for the correlation between the rows in the periodic table and the electron orbits.

15. Elements in the same family exhibit similar properties, often to varying degrees. Refer to each of the following families to support the claim that, as far as physical and chemical properties go, “it’s all about the electrons.” (6.7) **K/U T/I**
- the alkali metals
 - the halogens
 - the noble gases
16. Considering our current understanding of atomic structure, why does the atom remain a “black box” to us? (6.6) **A**
17. As a student, you often work with other students in group activities, sharing ideas and solving problems together. Explain how the history of the development of atomic theory is an example of the importance of collaboration. (6.6) **A**
18. Theories and models of the structure of matter have changed over time. Most advances are made when scientists use the scientific method. In the investigations that you have designed, in what ways do you incorporate the scientific steps of questioning, predicting, testing, and analyzing? Give an example of each to illustrate your answer. (6.3) **T/I A C**

Solve a Problem

19. Three different solids, A, B, and C, each with a metallic lustre, were combined individually with water and with an acid. The following observations were made (Table 2):

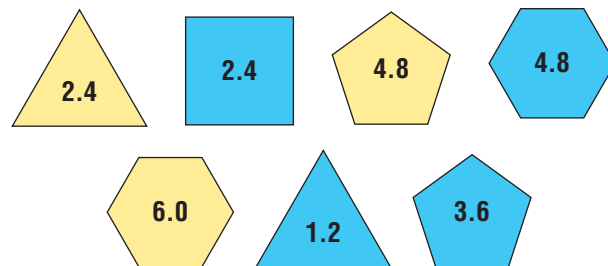
Table 2

Solid	Reaction with water	Reaction with acid
A	no change	bubbled slightly
B	no change	no change
C	bubbled slightly	bubbled vigorously

- Which solid was the most reactive? Which was the least reactive?
- If these solids belong to the same chemical family, which solid would you place highest in the column? Which would you place lowest?
- Imagine another solid, X, which is correctly placed between the two top solids in your answer to (b). Predict how solid X would react with water and with acid. Give reasons for your answer. (6.5, 6.7) **T/I**

Create and Evaluate

20. You have found the following pieces in an old puzzle box. (6.4) **T/I A**



- Consider the different features of the pieces and propose an arrangement that incorporates all these features in a systematic way. Explain why you chose this arrangement. **T/I C**
- According to your arrangement, is there a possible missing piece? Explain. **T/I C**
- Predict the shape, colour, and number of one or more additional pieces that would fit your proposed arrangement. The predicted pieces may be filling a gap or extending the pattern you have selected. **T/I**
- Compare the process you have used in this activity to Mendeleev’s arrangement of elements in the periodic table. **A**

Reflect on Your Learning

21. Does the scientific process require more experimentation or creative thinking? Reflect on what you learned in this chapter and give examples where one or both types of thinking were used.

Web Connections



22. What are the possible disadvantages of Kevlar? Is it biodegradable or environmentally friendly? Is the unregulated addition of Kevlar to consumer goods a wise decision? **A**
23. Research and report on one discarded (obsolete) scientific theory. Describe the theory and the main reasons it was discarded. Examples include Lamarckism, phlogiston, caloric theory of heat, miasma theory of disease, and the theory of the geocentric universe. **T/I A**



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