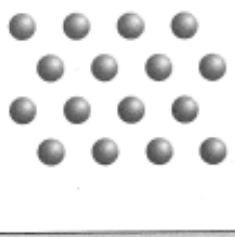
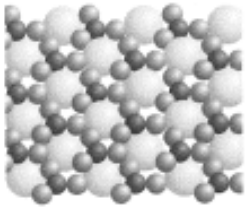
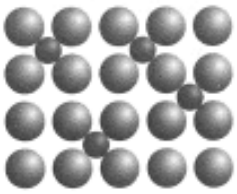
11. Classify matter by identifying the type of pure substances and mixtures shown below.

				
	W	**X**	**Y**	**Z**
A.	element	homogeneous mixture	compound	heterogeneous mixture
B.	compound	homogeneous mixture	heterogeneous mixture	element
C.	compound	heterogeneous mixture	element	homogeneous mixture
D.	element	heterogeneous mixture	compound	homogeneous mixture

12. Which of the following is correctly paired?

A. element – air

B. compound – baking soda

C. heterogeneous mixture – perfume

D. homogeneous mixture – pulpy orange juice

13. Which of the following is a mixture that has the same composition throughout?

A. gravel

B. wet sand

C. granola cereal

D. stainless steel spoon

14. Which of the following can be separated by physical means?

A. platinum

B. salt water

C. apple juice

D. iron filings and sand mixture

15. Boiling can be used to separate the parts of which of the following mixtures?

A. salt water

B. fruit smoothie

C. liquid mercury

D. marble and sand mixture

16. Solid tin becomes a liquid at 232 °C. Liquid tin becomes a gas at 2603 °C. What physical properties of tin are described?

A. malleability and hardness

B. state of matter and solubility

C. melting point and boiling point

D. texture and ability to conduct heat and electricity

17. Which of the following statements uses viscosity and texture to describe the substance?

A. Maple syrup flows slowly and is very smooth.

B. Bromine is a reddish brown liquid at room temperature.

C. Aluminum is shiny and can be hammered into thin sheets.

D. Copper is a soft metal that will allow electric currents to flow through it.

18. Sugar can dissolve in water. What physical property is described?

A. solubility

B. viscosity

C. hardness

D. malleability

19. Gasoline vapour is highly flammable and can burn easily. What chemical property is described?

A. combustibility

B. lack of reactivity

C. reactivity with acids

D. reactivity with oxygen

20. A colourless solution of calcium nitrate is added to a colourless solution of sodium carbonate. A white precipitate is formed. How do you know a chemical reaction has occurred?

A. bubbles are formed

B. heat is given off

C. a gas is released

D. a new substance is formed

21. Concentrated sulfuric acid is added to a sugar solution. Bubbles form as a result. Which of the following explains the presence of the bubbles?

A. a gas was formed

B. there was a colour change in the solution

C. smoke from the thermal energy was released

D. heat was produced in the chemical reaction

22. Which of the following is a safe practice in the science lab?

A. tie back long hair

B. remove the electrical plug from the socket by pulling on the cord

C. place the container directly under your nose and inhale the fumes

D. dispose of leftover chemicals by pouring them back into the original container

23. An investigation requires you to pour some hydrochloric acid into a test tube. Which of the following describes why it is important to wear gloves when working with corrosive chemicals?

A. to prevent contact with your skin

B. to have a better grip on the test tube

C. to protect the hydrochloric acid from contamination

D. to prevent the heat from your hands from reacting with the hydrochloric acid

24. You accidentally spilled some sodium hydroxide on your arm during an investigation. Which of the following is the best procedure to deal with this situation?

A. wash your arm thoroughly with cold water

B. remove the chemical by rubbing it vigorously with a piece of paper towel

C. let the sodium hydroxide dry and see if your skin is irritated by the chemical

D. leave it alone because sodium hydroxide will evaporate off the surface of your skin

25. When would you see the following safety icon in a science investigation?

A. when you are working with open flames

B. when you are using a razor blade during a dissection

C. when you need to take care with the disposal of blood from your finger

D. when you are working with chemicals that can produce dangerous fumes

26. Which of the following describes the proper way to clean up after an investigation?

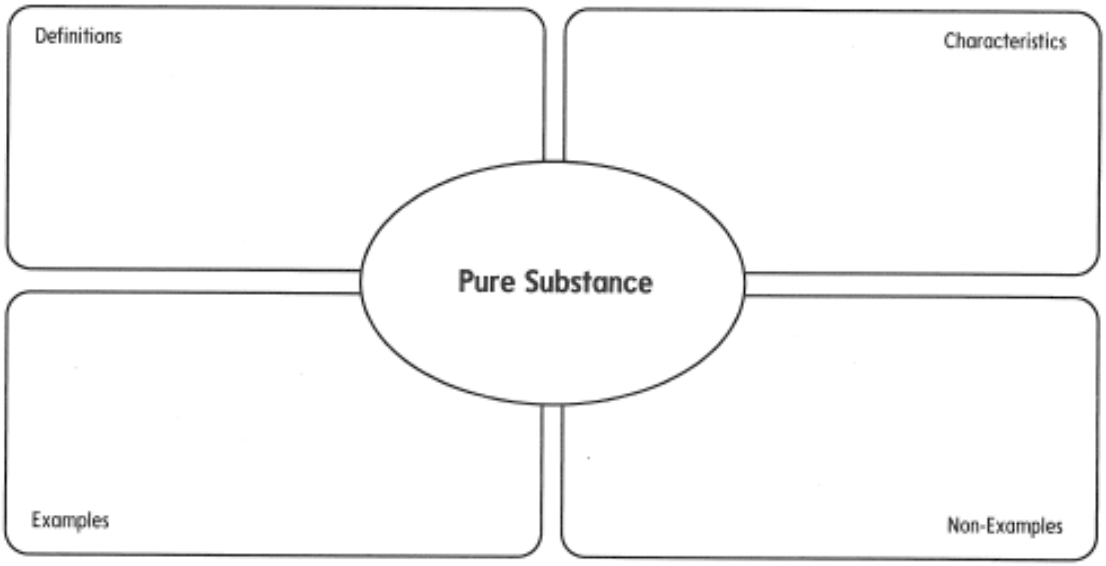
A. leave the laboratory burner on for the next class

B. pour all the chemicals used in the lab down the sink

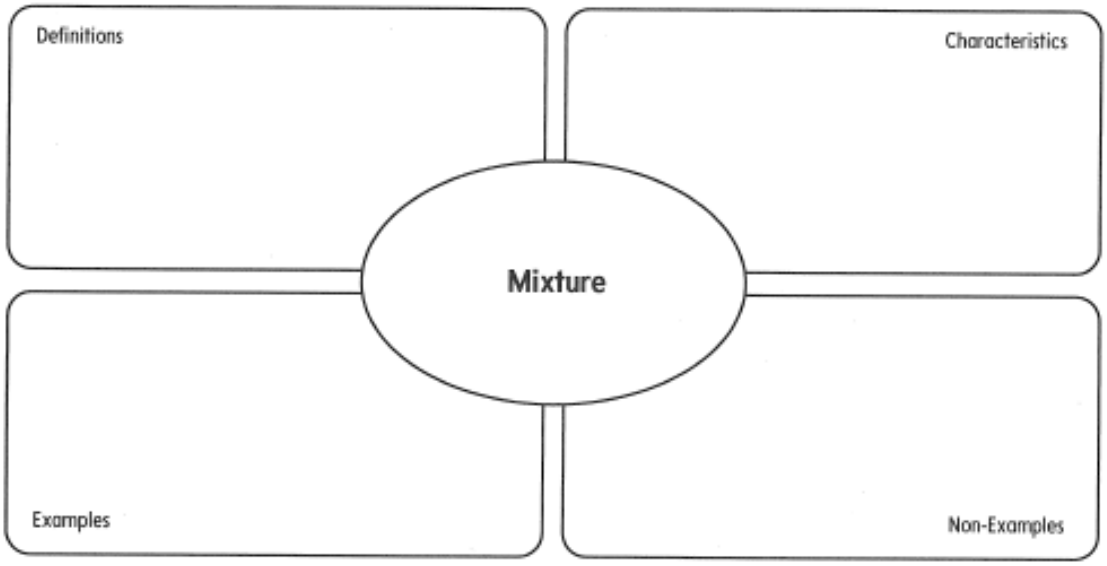
C. clean up any chemical spills as directed by your teacher

D. leave any electrical equipment plugged in for the next class

27. Complete the following Frayer model diagram for a pure substance.



28. Complete the following Frayer model diagram for a mixture.



Name Date

Topic 2.2 Highlights

How does the periodic table organize the elements?

Use with textbook pages 100–115.

Element Names and Symbols

Each chemical element on the periodic table is given a unique symbol consisting of one or two letters. The first letter is always capitalized and if there is a second letter, it is always lowercase. The chemical names for many of the elements come from ancient languages like Latin and Greek. Others are named after countries or famous scientists.

Dmitri Mendeleev

Dmitri Mendeleev created a chart that is now known as the periodic table. He organized the known elements at the time into columns (groups or families) and rows (periods) based on their chemical and physical properties, but left gaps in his arrangements. These gaps were later recognized as a powerful tool as they predicted the existence of elements not yet discovered.

Periodic Table

The periodic table separates the elements into three categories based on their chemical and physical properties: metals, non-metals, and semi-metals. Groups 1, 2, and 13 to 18 are known as main-group elements. Groups 3 to 12 are called transition elements. The inner transition metals are shown in two rows at the bottom of the table to keep the table compact.

Metals

The **metals** are located to the left of the zigzag line on the periodic table. They are shiny, malleable, ductile, and good conductors of thermal energy and electric current. The **alkali metals (Group 1)** are the most reactive metals and will react readily with other substances. The **alkaline-earth metals (Group 2)** are also highly reactive, but are not as reactive as the alkali metals.

Non-metals

The **non-metals** are found to the right of the zigzag line. They are generally gases or brittle, dull-looking solids that are poor conductors of heat and electrical current. **Halogens (Group 17)** are the most reactive non-metals. **Hydrogen** is a non-metal that is colourless, odourless, but highly flammable. The **noble gases (Group 18)** are stable elements and are the least reactive of all the elements.

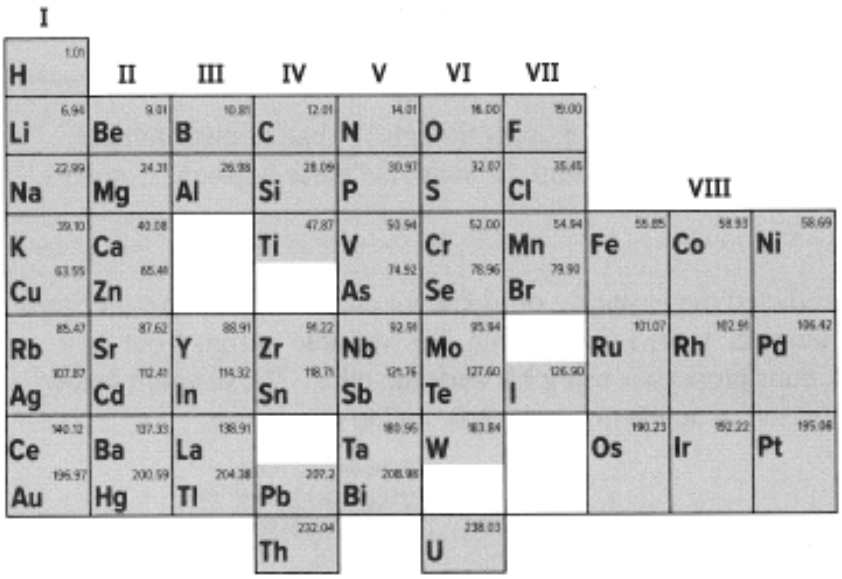
Semi-metals

Semi-metals or metalloids are found along the zigzag line. They have properties of both metals and non-metals. They are shiny like metals, but are brittle and not ductile like non-metals. They are poor conductors of thermal energy and electric current.

The Predictive Power of the Periodic Table

Use with textbook pages 104–105.

Use the following diagram representing Mendeleev's periodic table to answer questions 1 to 9.



1. Why do think it is fitting for this tabular arrangement to be called a "periodic" table?

2. Mendeleev noticed trends and used columns and rows to organize the known elements. From the table above, what can you infer about how Mendeleev arranged the elements?

3. What do you think the white gaps in Mendeleev's periodic table represent?

4. Mendeleev's decision to leave these gaps made his periodic table successful. What made Mendeleev certain that he should leave gaps in his table?

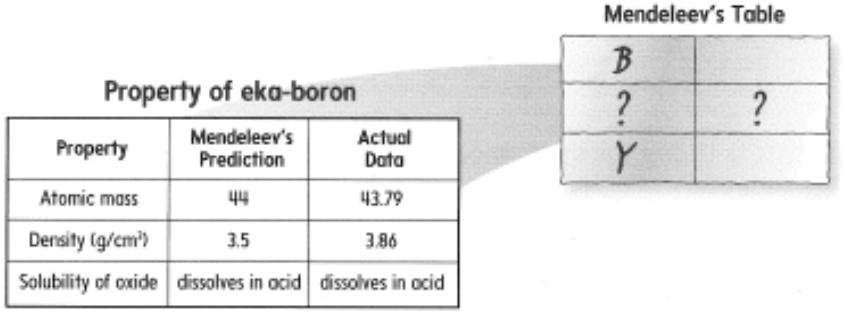
5. Analyze Mendeleev's periodic table. Describe the predictive power of his tabular arrangement.

6. Can you predict the atomic mass of the unknown element that is located between Mo and Ru? Explain your answer.

7. Would you expect to see the unknown element that is between La and Ta to have the same properties as Ti and Zr? Explain.

8. Mendeleev placed "I" and "Te" out of order, even though "I" had a lower relative atomic mass than "Te." Explain why you think he switched these adjacent elements.

9. Mendeleev accurately predicted the existence of unknown elements that have the same properties as the other elements in the same column. He was able to figure out their atomic mass and predict their properties using his periodic table. The diagram below shows Mendeleev's prediction of an element which he called eka-boron.



Property	Mendeleev's Prediction	Actual Data
Atomic mass	44	43.79
Density (g/cm³)	3.5	3.86
Solubility of oxide	dissolves in acid	dissolves in acid

a) Based on Mendeleev's periodic table, eka-boron is located between which two elements?

b) How was Mendeleev able to predict that eka-boron has a density of 3.5 g/cm^3 and that it dissolves in acid?

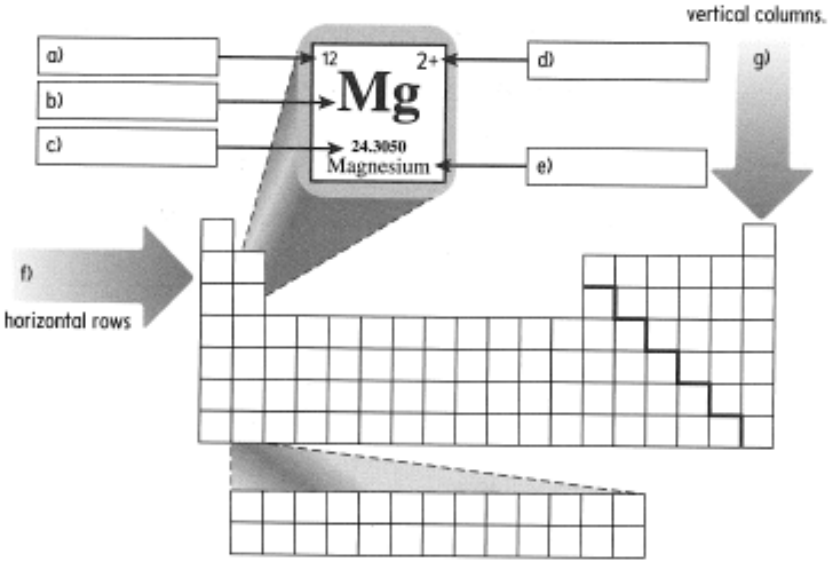
c) Which elements would you expect eka-boron to have the same properties as?

d) What is the current accepted element name for eka-boron?

The Modern Periodic Table

Use with textbook pages 106-109.

Use the diagram to answer questions 1 to 4.



1. Label the five different parts of a typical box from the periodic table and label the two arrows shown.

2. Describe what each labelled part represents.

   a) _____

   b) _____

   c) _____

   d) _____

   e) _____

   f) _____

   g) _____

3. The modern periodic table has the same basic structure as Mendeleev's original periodic table, but with a slight change based on Moseley's contribution.

   a) What fundamental characteristic is now used to characterize and arrange elements in the modern periodic table?

   _____

b) How does this new organizing scheme resolve problems that Mendeleev encountered with the reordering of adjacent elements like tellurium and iodine or cobalt and nickel?

_____

_____

4. List two ways in which elements are logically organized in a meaningful way.

_____

5. As you move from left to right along a horizontal row, what trend do you notice?

_____

6. Examine the periodic table entry for each of the following elements and complete the blanks.

a)

20 2+
Ca
Calcium
40.1

i. atomic number _____
ii. average atomic mass _____
iii. ion charge _____
iv. symbol for element _____

b)

17 –
Cl
Chlorine
35.5

i. name of element _____
ii. ion charge _____
iii. average atomic mass _____
iv. number of protons _____

c)

13 3+
Al
Aluminum
27.0

i. name of element _____
ii. number of protons _____
iii. ion charge _____
iv. symbol for element _____

d)

34 2–
Se
Selenium
79.0

i. atomic number _____
ii. name of element _____
iii. ion charge _____
iv. symbol for element _____

Metals, Non-metals, and Semi-metals

Use with textbook pages 110–114.

1. Identifying the Main Ideas and Details

To identify the main ideas in Concept 4 of Topic 2.2, use the following strategies:

- pay attention to headings and subheadings
- skim the text and figures to have a visual overview of the content
- note the terms that are boldfaced and italicized

a) What are the three headings and subheadings covered in Concept 4? Be sure to consider information found in figures and tables.

_____

_____

_____

_____

b) List the terms that are boldfaced and italicized.

_____

_____

_____

_____

2. Monitoring Comprehension

As you read, stop after each paragraph to check your understanding. Place a small sticky note beside each paragraph. Put a ✓ if you comprehend the concepts covered and put an ✗ if you do not understand or are confused about the content. For the paragraph that you *do* understand, rephrase the main ideas in your own words. For the paragraph that you *do not* understand, use the following strategies:

- reread the paragraph
- identify the part that is confusing you or that you do not understand
- if a key term is unclear, look up its definition in the glossary
- if a concept is unclear or confusing, look for visuals on the page to help you understand the concept

3. Making Study Notes

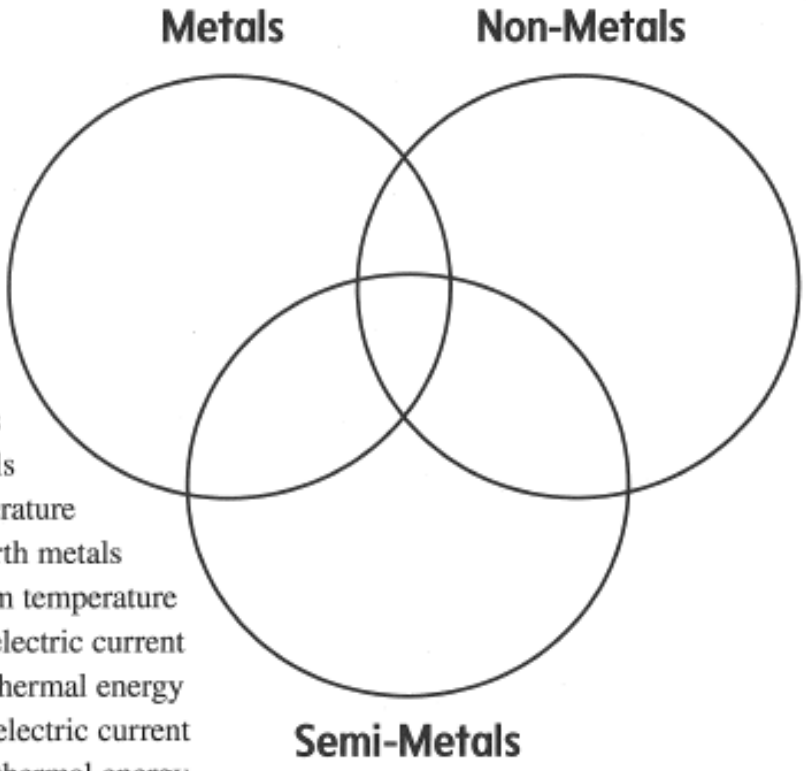
Now that you have identified headings, subheadings, and key terms, make study notes to help you reinforce main ideas by putting them in your own words. Read each paragraph and write point-form notes using these strategies:

- change each heading and subheading into a question
- list details that answer the question
- include the key terms that are boldfaced or italicized and give their definitions
- include examples

4. Comparing and Contrasting—Using Graphic Organizers

Comparing and contrasting using a Venn diagram helps you see how metals, non-metals, and semi-metals are similar to and different from each other. Place the letter of each description in the appropriate place in the Venn diagram.

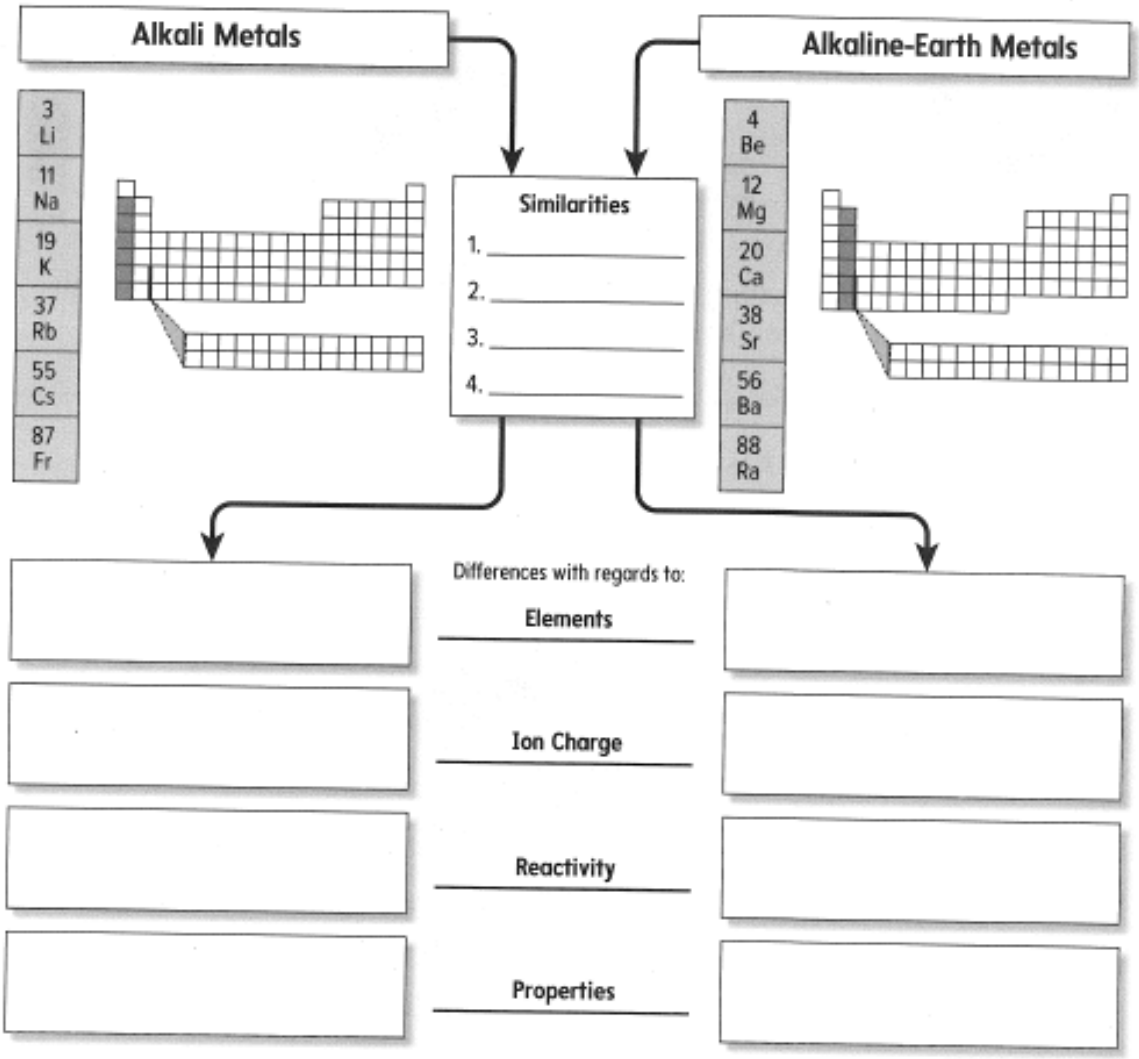
A. brittle
B. ductile
C. not shiny
D. malleable
E. not ductile
F. not malleable
G. shiny and smooth
H. dull-looking solids
I. includes halogens
J. includes noble gases
K. includes alkali metals
L. gases at room temperature
M. includes alkaline-earth metals
N. mostly solids at room temperature
O. poor conductors of electric current
P. poor conductors of thermal energy
Q. good conductors of electric current
R. good conductors of thermal energy
S. some elements are liquids at room temperature
T. has an atomic mass and a distinct atomic number
U. have physical and chemical properties of both metals and non-metals
V. can react with other elements to form compounds (except most noble gases)
W. elements that are made of atoms consisting of protons, electrons and neutrons



Comparing Alkali Metals to Alkaline-Earth Metals

Use with textbook pages 110–114.

1. Compare and contrast alkali metals to alkaline-earth metals by completing the graphic organizer.



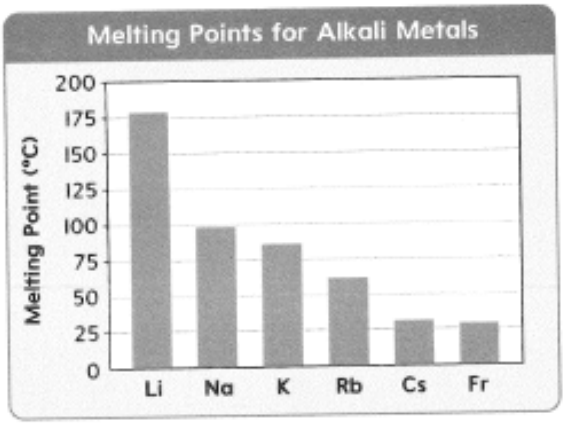
2. Compared to sodium, is magnesium more or less reactive?

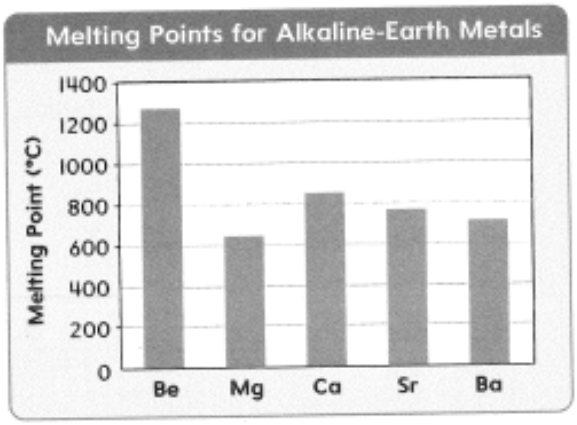
_____

3. Name three physical properties that lithium and beryllium have in common.

_____

Use the following graphs showing melting points to answer questions 4 to 6.





4. How is the change in melting points similar between alkali and alkaline-earth metals as you move down both groups?

5. Which group of metals has higher melting points? _____

6. Analyze both graphs. What are the states of these metals at room temperature?

Use the following tables to answer questions 7 to 9.

Group 1 (Alkali Metals)	Density (g/cm^3)
Lithium	0.53
Sodium	0.97
Potassium	0.86
Rubidium	1.53
Cesium	1.88

Group 2 (Alkaline-Earth Metals)	Density (g/cm^3)
Beryllium	1.85
Magnesium	1.74
Calcium	1.54
Strontium	2.54
Barium	3.51

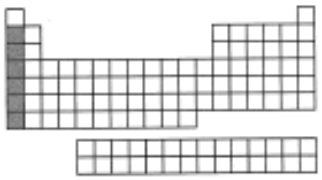
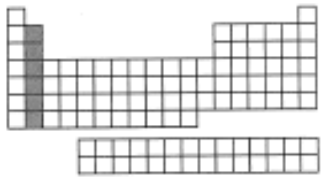
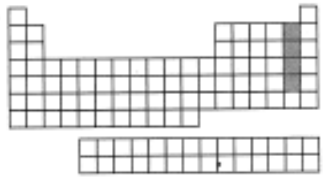
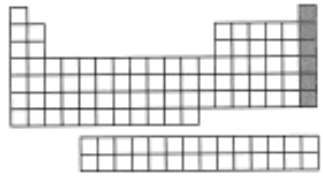
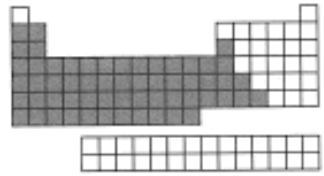
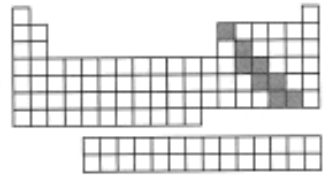
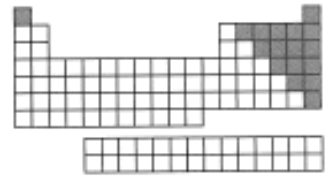
7. Describe the trend in density as you move down Group 1 and Group 2.

8. How do alkali metals and alkaline-earth metals compare with respect to density?

9. Would any of the alkaline-earth metals float on water (density: 1 g/cm^3)? Explain how you know from the data given.

2.2 Assessment

Match each term on the left with the best diagram of the periodic table on the right. Each section of the periodic table may be used only once.

Term	Diagram of the Periodic Table
1. ____ metals	A. 
2. ____ halogens	B. 
3. ____ non-metals	C. 
4. ____ semi-metals	D. 
5. ____ alkali metals	E. 
6. ____ noble gases	F. 
7. ____ alkaline-earth metals	G. 

Circle the letter of the best answer for questions 8 to 20.

8. If a new element, venusium, is discovered, which of the following could be its possible chemical symbol?

A. ve

B. Ve

C. VE

D. VeN

9. Which of the following elements is the most reactive?

A. helium

B. rubidium

C. magnesium

D. phosphorus

10. Which of the following elements are liquids at room temperature?

I	Bromine
II	Mercury
III	Chlorine

A. I and II only

B. I and III only

C. II and III only

D. I, II, and III

11. What do potassium, beryllium, and nickel all have in common?

I	They are solids at room temperature.
II	They are shiny, ductile, and malleable.
III	They are good conductors of heat and electricity.

A. I and II only

B. I and III only

C. II and III only

D. I, II, and III

12. An unknown element is a shiny, non-ductile solid, and is a poor conductor of thermal energy. This unknown element would be classified as

A. a metal.

B. a non-metal.

C. a semi-metal.

D. an inner transition metal.

13. Element "X" is a gas at room temperature and is highly reactive. In which group would element "X" most likely belong?

A. the halogens

B. the noble gases

C. the alkali metals

D. the alkaline-earth metals

14. Which of the following pairs of elements would have similar properties?

A. boron and carbon

B. strontium and iodine

C. phosphorus and argon

D. germanium and arsenic

15. Which two elements belong to the same group?

A. aluminum and silicon

B. hydrogen and helium

C. lithium and beryllium

D. oxygen and selenium

16. Which two elements belong to the same period?

A. helium and xenon

B. cerium and thorium

C. sodium and scandium

D. rubidium and antimony

17. Which of the following is unique to each element on the periodic table?

I	its chemical symbol
II	the group or family it belongs to
III	the number of protons in the atom

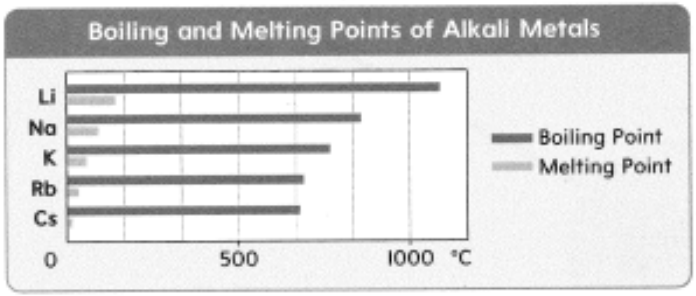
A. I and II only

B. I and III only

C. II and III only

D. I, II, and III

Use the following graph showing the melting and boiling points of alkali metals to answer questions 18 and 19.



18. Both melting and boiling points decrease as you move down Group 1, from lithium to cesium.

A. This statement is supported by the graph.

B. This statement is refuted by the graph.

C. This statement is neither supported nor refuted by the graph.

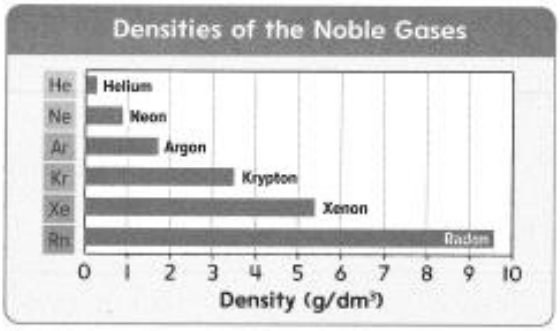
19. The melting points are at higher temperatures than the boiling points.

A. This statement is supported by the graph.

B. This statement is refuted by the graph.

C. This statement is neither supported nor refuted by the graph.

Use the following graph showing the density of the noble gases to answer question 20.



20. Which of the following statements are true about the densities of the noble gases?

I	Argon is more dense than krypton.
II	Xenon is about five times denser than neon.
III	There is an increase in density going down Group 18, from helium to radon.

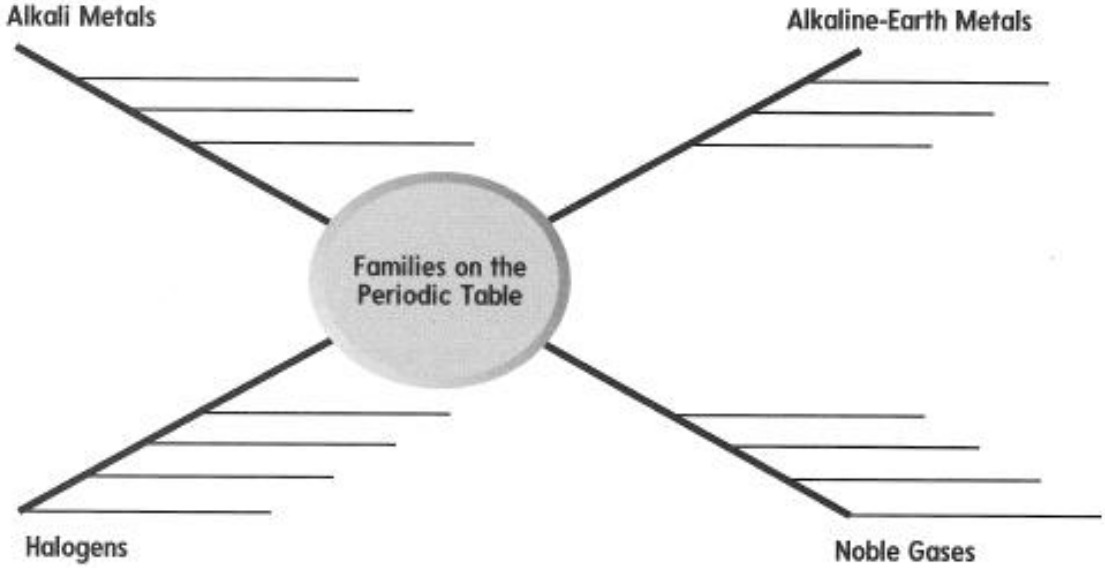
A. I and II only

B. I and III only

C. II and III only

D. I, II, and III

21. Complete a spider map for the four major families on the periodic table.



Name Date

Topic 2.3 Highlights

How can atomic theory explain patterns in the periodic table?

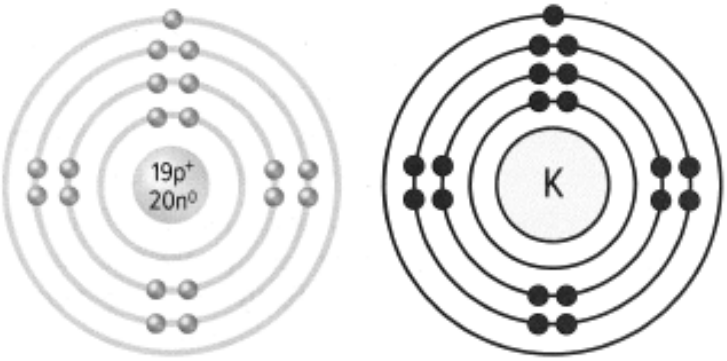
Use with textbook pages 122–133.

Parts of the Atom

The **atom** is the smallest particle of an element. It consists of three **subatomic particles**: protons, electrons, and neutrons. **Protons** (p^+) are positively charged particles, while **neutrons** (n^0) are particles with no charge. Both protons and neutrons are found in the dense, positively charged centre of the atom called the **nucleus**. The nucleus accounts for most of the atom's mass. **Electrons** (e^-) are negatively charged particles that exist in specific **energy** shells around the nucleus. Refer to Figure 2.15 and Table 2.3 on page 124 in the textbook to see a summary of the parts of an atom.

Bohr Diagrams

A **Bohr diagram** shows the electron arrangements of atoms and ions. The first energy shell can hold a maximum of two electrons, while the second and third energy shells can hold a maximum of eight electrons. The outermost energy shell of an atom is called the **valence shell**, and the electrons occupying this shell are called **valence electrons**. The diagram below shows the two different ways to draw a Bohr diagram.



Elements in the Same Groups and Periods

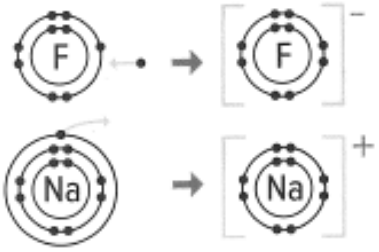
Elements that belong to the *same group* (vertical column) have the same number of valence electrons. For example, beryllium and magnesium belong to Group 2 and so they both have two valence electrons. Elements that belong to the *same period* (horizontal row) have the same number of energy shells. For example, sodium and sulfur both belong to Period 3 and therefore have three occupied energy shells. Analyze Figure 2.17 on page 126 of the textbook. How is the electron configuration similar for elements from the same group and period?

Name Date

Topic
2.3
Highlights

Full Valence Shells

Noble gases are the only elements on the periodic table that have full valence shells. This is what makes them stable. Atoms can obtain full valence shells like the noble gases, by forming ions. Ions are charged particles that have gained or lost electrons. Metals tend to lose electrons and non-metals tend to gain electrons to become stable ions with full valence shells. The figure below shows how an atom can give up an electron or gain an electron to become an ion.



Periodic Trend

Periodic trend refers to the regular pattern in the properties of elements on the periodic table. These trends help us predict the properties of an element. There are two clear trends.

1. Atomic size

The atomic size increases moving down a group. For example, in the alkali metals, potassium (in Period 4) is larger than lithium (in Period 2) because it has more occupied energy shells and its valence electrons are farther away from the nucleus.

The atomic size decreases going from left to right across a period. For example, in Period 2, lithium (in the first column) is larger than neon (in the last column). Neon has 10 protons, while lithium has 3 protons. So, the positively charged protons exert a greater pull on the negatively charged electrons, bringing them closer to the nucleus.

2. Reactivity

The reactivity of metals increases moving down a group. For example, rubidium (in Period 5) is much more reactive in water than lithium (in Period 2) is for the alkali metals. As you move down a group, the atoms get bigger. So, valence electrons are farther from the nucleus, and there is less pull on them.

Parts of the Atom

Use with textbook page 124.

1. Check Your Understanding

As you read the paragraph on Key Features of Atomic Structure on page 124 of the textbook, stop and reread any parts that you do not understand. Write down any sentences that help you understand the concepts better.

2. Summarizing

Summarizing means to restate the main ideas in your own words. A summary can be in point form or in sentence form. Read the paragraph on Key Features of Atomic Structure on page 124 of the textbook. Complete the following table by using point form to summarize the main ideas in the textbook paragraph. Write a summary sentence. Compare your table and points with a partner.

Section of the Textbook	Main Topic	What the Text Says About the Main Topic	Supporting Details
Page 124, "Key Features of Atomic Structure"			

Summary Sentence:

_____

3. Interpreting Tables

A table organizes information in rows and columns so that it can visually display concepts in an organized way for the reader. Refer to Table 2.3 on page 124 in the textbook. In Table 2.3, the word *nucleus* appears in the second row of the last column. The information can be interpreted as "Protons are located in the nucleus of an atom."

a) Analyze Table 2.3. Cover the table and read the boldfaced titles of each column. Based on the title, explain what you would expect to the see in the cells below it.

_____

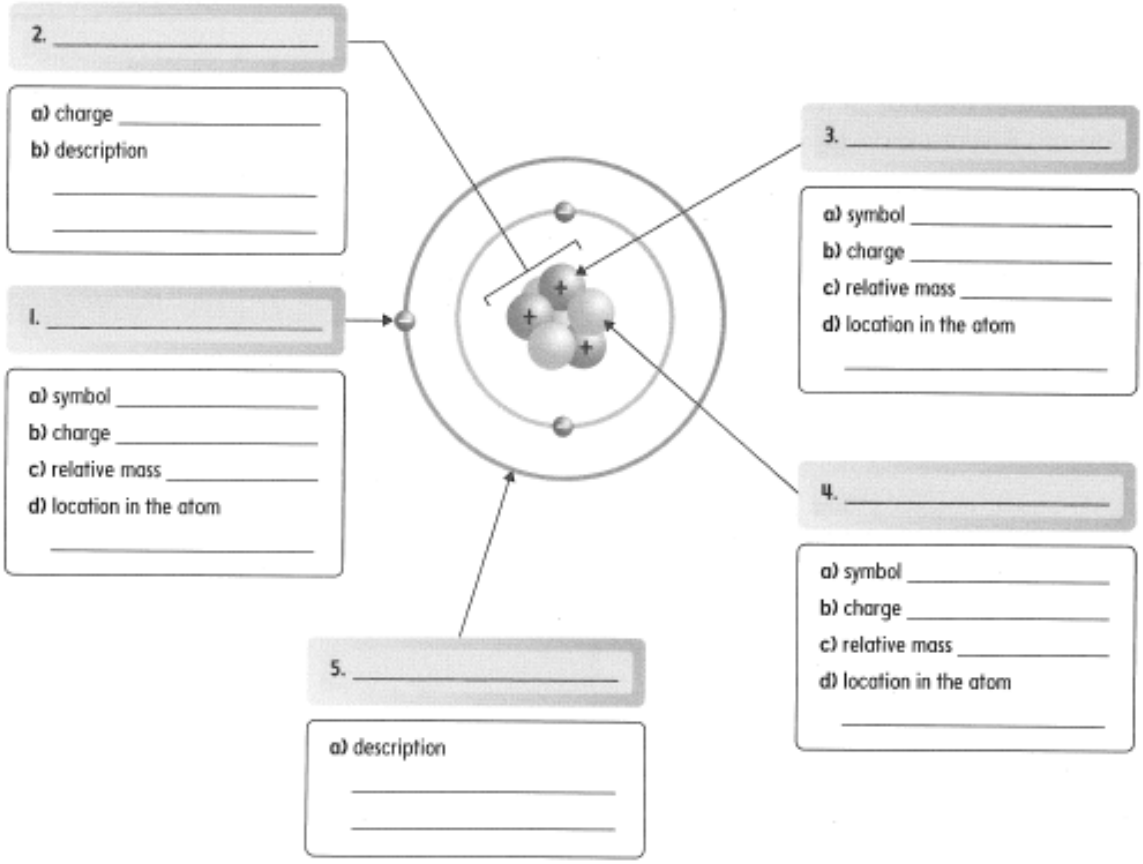
b) Choose a cell in Table 2.3. Interpret the contents of the cell by writing a complete sentence.

_____

4. Interpreting Diagrams

A diagram is a visual representation of some text that uses words and symbols to represent an object. Determine how each part of the diagram shows the main ideas in the paragraph and Table 2.3 from the textbook.

In the numbered boxes, identify the parts of an atom using the following terms: **electron**, **energy shell**, **neutron**, **nucleus**, **proton**. Describe the characteristics of the different parts of the atom by completing the boxes.



Bohr Diagrams

Use with textbook page 125.

1. Define the following terms.

a) Bohr diagram _____

b) valence shell _____

c) valence electron _____

2. List two things that a Bohr diagram shows.

a) _____

b) _____

3. What is the maximum number of electrons that can be found in

a) the first energy shell? _____

b) the second energy shell? _____

c) the third energy shell? _____

4. Draw the Bohr diagram for each of the following atoms.

a) lithium	b) magnesium	c) aluminum
d) oxygen	**e) chlorine**	**f) argon**

Full Valence Shells

Use with textbook page 127.

1. What information does the charge of an ion give?

_____

2. Why do atoms become ions? _____

3. a) Draw the Bohr diagram for a fluoride ion and a sodium ion in the first two columns of the table.

Fluorine Ion	Sodium Ion	Noble Gas = _____

b) What noble gas would have the same electron arrangement as a fluorine ion and a sodium ion? Draw the Bohr diagram for that noble gas in the third column of the table above.

c) What do these two ions have in common with the noble gas?

_____

4. a) Draw the Bohr diagram for a helium atom in the first column of the table.

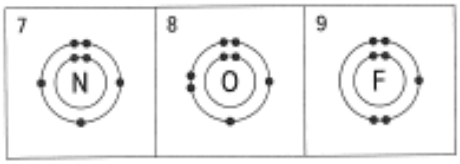
Helium Atom	Ion #1 = _____	Ion #2 = _____

b) What two ions would have the same electron arrangement as a helium atom? Draw the Bohr diagrams for these two ions in the second and third columns in the table above.

Electron Arrangements Show Patterns

Use with textbook page 126.

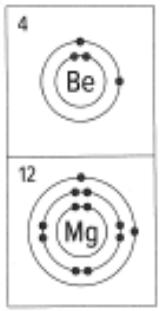
1. Consider the electron arrangements of nitrogen, oxygen, and fluorine.



a) What do all three of these elements have in common with respect to their position on the periodic table?

b) How is the number of occupied energy shells related to the period?

2. Consider the electron arrangements of beryllium and magnesium.



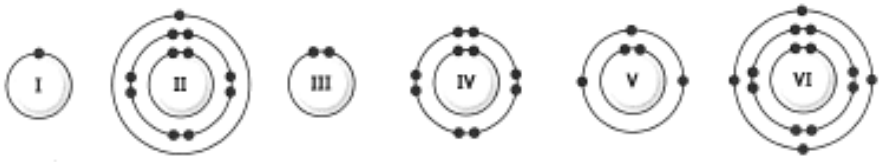
a) What do elements in Group 2 have in common?

b) How does this relate to their group number?

3. a) Which family on the periodic table has full valence shells?

b) How is the electron arrangement in helium different from the other noble gases?

4. Consider the six elements shown.



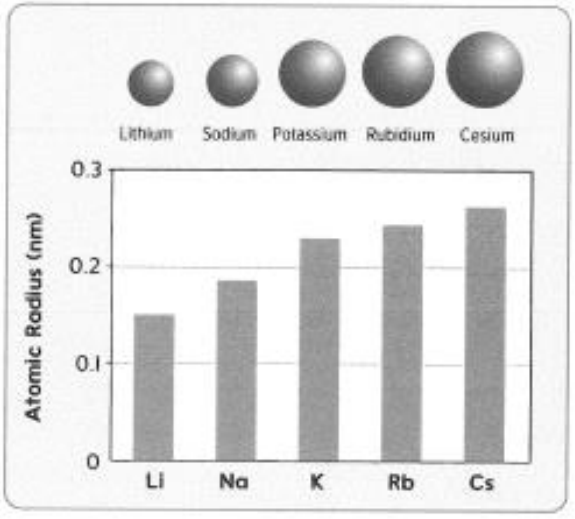
a) Which of these elements belong to the same group?

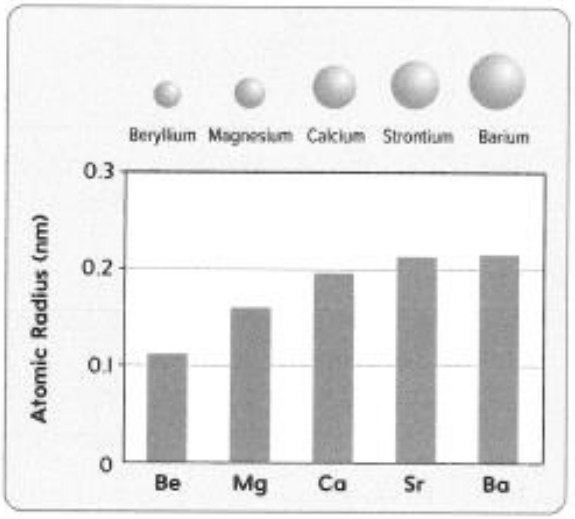
b) Which of these elements belong to the same period?

Periodic Trends

Use with textbook pages 130–131.

Use the following graphs showing the atomic radii for elements in Group 1 and Group 2 to answer questions 1 to 4.





1. What happens to the atomic size as you move down the two groups of elements shown above?

2. Predict the trend in the atomic size as you move down the halogen group.

3. Comparing adjacent elements on the same period (e.g., cesium and barium), which metal group has the bigger atomic size?

4. Why do you think calcium is almost twice as big as beryllium?

Use the diagram on reactivity to answer questions 5 to 8.

5. a) Between lithium, sodium, and potassium, which of these three alkali metals is the most reactive? Explain your answer.

_____

_____

_____

_____

b) What does this suggest about the reactivity of alkali metals as you move down the group on the periodic table?

_____

_____

6. Noting the periodic trend, predict whether rubidium would react more or less vigorously in water than potassium. Explain your answer.

_____

_____

_____

7. Note the relative reactivity of sodium and magnesium. What happens to the reactivity of metals as you move from left to right across the same period?

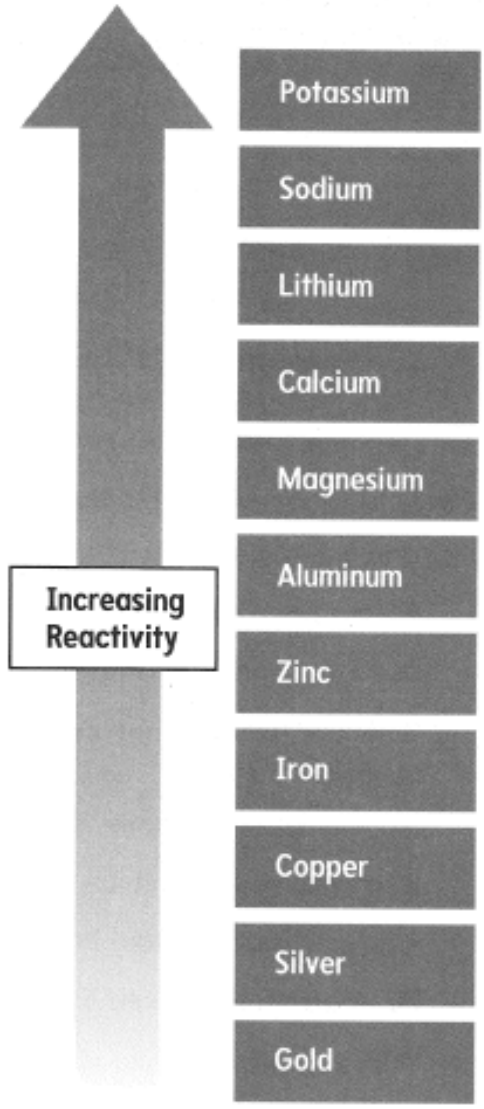
_____

8. Noting the periodic trend, predict whether lithium or beryllium would be more reactive. Explain your answer.

_____

_____

_____



2.3 Assessment

Match each term on the left with the best description on the right. Each descriptor may be used only once.

Term	Description
1. ____ ion	A. the outermost energy shell of an atom
2. ____ atom	B. the electrons in the outermost energy shell of an atom
3. ____ valence shell	C. protons, electrons, and neutrons that make up an atom
4. ____ Bohr diagram	D. a particle that has equal numbers of protons and electrons
5. ____ periodic trends	E. a particle that has a charge because it has lost or gained electrons
6. ____ valence electrons	F. a drawing that shows the electron arrangements in individual energy shells
7. ____ subatomic particles	G. regular patterns seen in the properties of elements due to their atomic structure

Circle the letter of the best answer for questions 8 to 21.

8. Which subatomic particles are found in the nucleus of an atom?

A. protons and neutrons

B. protons and electrons

C. electrons and neutrons

D. electrons, protons, and neutrons

9. Which of the following describes the difference between a magnesium atom and a magnesium ion?

A. A magnesium atom has more protons than a magnesium ion.

B. A magnesium ion has more neutrons than a magnesium atom.

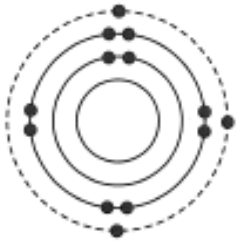
C. A magnesium atom has more electrons than a magnesium ion.

D. A magnesium atom has a positive charge and a magnesium ion has no charge.

10. Which of the following shows how a chlorine atom compares to a chloride ion?

	Chlorine Atom	Chloride Ion
A.	17 protons, 17 electrons	17 protons, 17 electrons
B.	17 protons, 17 electrons	17 protons, 18 electrons
C.	17 protons, 18 electrons	17 protons, 17 electrons
D.	17 protons, 18 electrons	17 protons, 18 electrons

Use the following Bohr diagram to answer questions 11 to 15.



11. Which element is represented by the Bohr diagram?

A. a silicon atom

B. an aluminum atom

C. a magnesium atom

D. a phosphorus atom

12. To what period does this atom belong?

A. Period 1

B. Period 2

C. Period 3

D. Period 4

13. How does this atom acquire a full valence shell?

A. by losing 3 protons

B. by gaining 3 protons

C. by losing 3 electrons

D. by gaining 3 electrons

14. When this atom becomes an ion, what is its ion charge?

A. 2–

B. 2+

C. 3–

D. 3+

15. What noble gas has the same electron arrangement as the ion for this element?

A. helium

B. neon

C. argon

D. krypton

16. How many valence electrons does a phosphorus atom have?

A. 2

B. 3

C. 4

D. 5

17. How many energy shells do a magnesium atom, a silicon atom, and a chlorine atom each have?

A. 1

B. 2

C. 3

D. 4

18. Which of the following particles have the same electron arrangements?

A. a lithium ion, a sodium ion, and a helium atom

B. a fluoride atom, a sodium ion, and a neon atom

C. a magnesium ion, a fluoride ion, and a neon atom

D. a chloride ion, a potassium atom, and an argon atom

19. Amongst the halogens, which correctly compares the relative size of the atoms?

A. iodine is larger than astatine

B. chlorine is larger than iodine

C. astatine is larger than fluorine

D. fluorine is larger than chlorine

20. Rank the following elements from largest to smallest: calcium, bromine, potassium.

	Largest → Smallest		
A.	bromine	calcium	potassium
B.	calcium	potassium	bromine
C.	potassium	bromine	calcium
D.	potassium	calcium	bromine

21. Which of the following elements is more reactive than chlorine?

A. sulfur

B. argon

C. fluorine

D. bromine

22. Complete a KWL chart for periodic trend.

K What I Know	W What I Want to Know	L What I Learned