

# The Periodic Table and Chemical Properties

Textbook pages 52–63

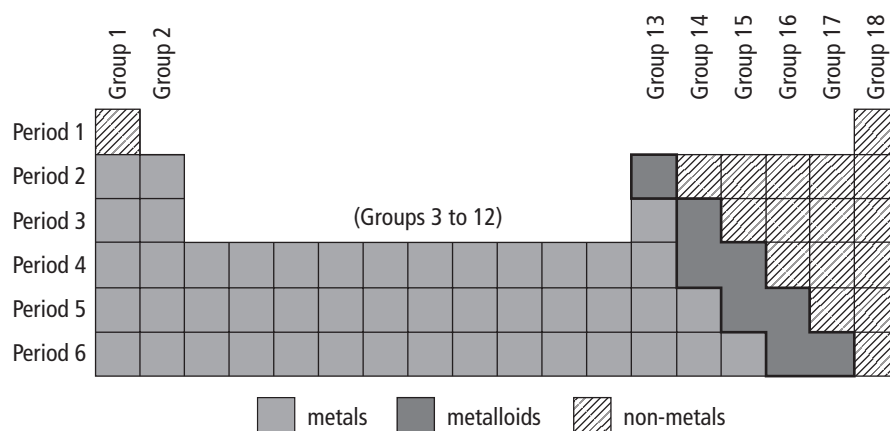
## Before You Read

Imagine you had to classify all of the different elements. How would you organize them? How might properties help you decide? Write your thoughts below.

### Mark the Text

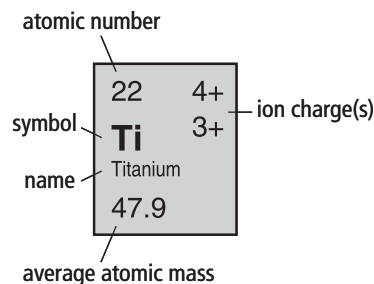
#### Identify Details

As you skim the section, use one colour to highlight the text or labels that talk about the periodic table. Use another colour to highlight facts about atomic number and other facts about each element.



### What is the periodic table?

The **periodic table** places each element on a chart based on its chemical and physical properties. Each box of the periodic table lists information about the atoms that make up an element. You can see:



- ◆ the name of the element
- ◆ the chemical symbol of the element
- ◆ the **atomic number** of the element—the number of protons in the nucleus of each one of its atoms
- ◆ the **average atomic mass** of the element—the weighted average of the masses of the atoms of an element
- ◆ the **ion charge** (or charges) of the element—the electric charge of its atoms when they gain or lose electrons. If the atoms can gain or lose electrons in more than one way, they will have a **multiple ion charge**. ✓

### ✓ Reading Check

1. What five facts about an element can you find in the periodic table?

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**What patterns does the periodic table show?**

One pattern in the periodic table is that elements are of three major types. Metals are on the left side of the periodic table. Non-metals are on the right side. A small number of elements, such as boron (B) and silicon (Si) are metalloids. **Metalloids** have some properties that are like those of metals and other properties that are like those of non-metals. Metalloids form a zigzag staircase toward the right side of the periodic table.

Another pattern in the periodic table is that elements in a group (vertical column) have similar properties. Because they have properties in common, the elements in a group are often called a **chemical family**. ✓

1 H								2 He
3 Li	4 Be	5 B	6 C	7 N	8 O	9 F	10 Ne	
11 Na	12 Mg	13 Al	14 Si	15 P	16 S	17 Cl	18 Ar	
19 K	20 Ca	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr	
37 Rb	38 Sr	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe	
55 Cs	56 Ba	81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn	
87 Fr	88 Ra							

**alkali metals** (Group 1): metallic elements that are strongly reactive, soft, and have low densities

**alkaline earth metals** (Group 2): metallic elements that are reactive, fairly soft, and have fairly low densities

**halogens** (Group 17): non-metallic elements that are strongly reactive and are gases at room temperature (except for bromine, which is a liquid)

**noble gases** (Group 18): non-metallic elements that are very unreactive and are colourless, odourless gases at room temperature

✓ **Reading Check**

2. What is a chemical family?

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**A complete periodic table is shown on page 202.**

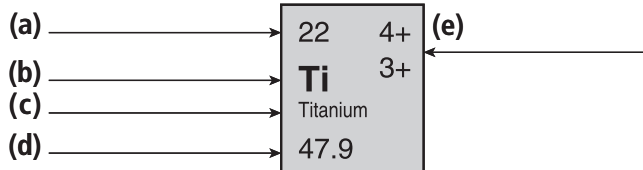
Use with textbook pages 52–57.

## What is in the box?

Test your knowledge how information is displayed for each element in the periodic table.

1. Use the vocabulary words listed to label the diagram.

Vocabulary	
ion charge	name
atomic number	symbol
average atomic mass	



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

2.

12	2+
<b>Mg</b>	
Magnesium	
24.3	

- (a) atomic number \_\_\_\_\_  
 (b) average atomic mass \_\_\_\_\_  
 (c) ion charge \_\_\_\_\_  
 (d) number of protons \_\_\_\_\_

3.

19	+
<b>K</b>	
Potassium	
39.1	

- (a) name of element \_\_\_\_\_  
 (b) ion charge \_\_\_\_\_  
 (c) number of protons \_\_\_\_\_  
 (d) average atomic mass \_\_\_\_\_

4.

8	2-
<b>O</b>	
Oxygen	
16.0	

- (a) atomic number \_\_\_\_\_  
 (b) average atomic mass \_\_\_\_\_  
 (c) ion charge \_\_\_\_\_  
 (d) symbol of element \_\_\_\_\_

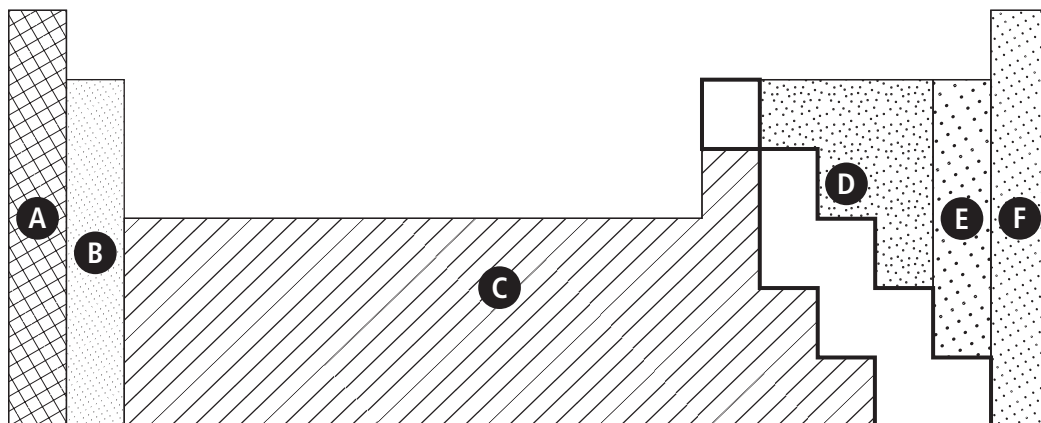
5.

15	3-
<b>P</b>	
Phosphorus	
31.0	

- (a) name of element \_\_\_\_\_  
 (b) average atomic mass \_\_\_\_\_  
 (c) ion charge \_\_\_\_\_  
 (d) number of protons \_\_\_\_\_

Use with textbook pages 52–57.

## Families of elements



Use the simplified periodic table shown above to answer questions 1 to 12. To which region does each element or family belong? Place the letter corresponding to the shaded region on the blank line. You can use regions more than once.

You can use the periodic table on page 201 to help you answer these questions.

1. helium \_\_\_\_\_
2. lithium \_\_\_\_\_
3. fluorine \_\_\_\_\_
4. beryllium \_\_\_\_\_
5. halogens \_\_\_\_\_
6. noble gases \_\_\_\_\_
7. alkali metals \_\_\_\_\_
8. alkaline earth metals \_\_\_\_\_
9. non-metallic elements that are strongly reactive \_\_\_\_\_
10. metallic elements that are strongly reactive \_\_\_\_\_
11. metallic elements that are reactive \_\_\_\_\_
12. non-metallic elements that are very unreactive \_\_\_\_\_

Name \_\_\_\_\_

Date \_\_\_\_\_

*Use with textbook pages 52–57.*

## Using the periodic table

### Vocabulary

average atomic mass	metalloids
atomic number	multiple ion charge
electrons	noble gases
families	non-metals
good	periodic table
halogens	periods
ions	poor
ion charge	properties
metals	

Use the terms in the vocabulary box to fill in the blanks. You can use each term more than once. You will not need to use every term.

1. The \_\_\_\_\_ organizes the elements according to their physical and chemical \_\_\_\_\_.
2. The periodic table is divided into seven horizontal rows called \_\_\_\_\_ and 18 vertical columns called \_\_\_\_\_.
3. \_\_\_\_\_ appear on the left side of the periodic table. These elements are \_\_\_\_\_ conductors of heat and electricity.
4. \_\_\_\_\_ appear on the right side of the periodic table. These elements are \_\_\_\_\_ conductors of heat and electricity.
5. The \_\_\_\_\_ form a zigzag staircase arrangement on the periodic table. These elements have properties similar to both \_\_\_\_\_ and \_\_\_\_\_.
6. The \_\_\_\_\_ refers to the number of protons that an atom has in the nucleus.
7. The \_\_\_\_\_ is the weighted average of the masses of the atoms of an element.
8. A(n) \_\_\_\_\_ is an electric charge that forms on an atom when it gains or loses electrons.
9. Some metals, like platinum and cobalt, form \_\_\_\_\_ in more than one way. In other words, they have a(n) \_\_\_\_\_.

Use with textbook pages 52–57.

## The periodic table and chemical properties

Match each Term on the left with the best Descriptor on the right. Each Descriptor may be used only once.

Term	Descriptor
1. _____ halogens	<b>A.</b> most reactive metals
2. _____ noble gases	<b>B.</b> most reactive non-metals
3. _____ alkali metals	<b>C.</b> have properties of both metals and non-metals
4. _____ alkaline earth metals	<b>D.</b> most unreactive elements
	<b>E.</b> includes beryllium and magnesium

Circle the letter of the best answer.

5. What is the name of a horizontal row in the periodic table?
- column
  - family
  - period
  - group
6. Which of the following are metalloids?

I.	silicon
II.	boron
III.	neon

- I and II only
- I and III only
- II and III only
- I, II, and III

Use the following diagram to answer questions 7 and 8.

30	2+
<b>Zn</b>	
Zinc	
65.4	

7. What does the “30” refer to?
- ion charge
  - average atomic mass
  - atomic number
  - family number
8. What does the “2+” refer to?
- ion charge
  - average atomic mass
  - atomic number
  - family number
9. To which of the following groups does oxygen belong?
- gas
  - metal
  - metalloid
  - non-metal
10. Which of the following is the same as the atomic number of an element?
- number of protons
  - number of neutrons
  - number of electrons
  - number of ion charges