

Chapter 7 Periodic Table

Classes of Elements

7. a. *Students know* how to identify regions corresponding to metals, nonmetals, and inert gases.

The periodic table is divided into regions of elements. Each region corresponds to a different class of elements—metals, nonmetals, semimetals, and inert gases. The elements in each class share similar properties.

Metals

Elements characterized by physical properties that include shininess, malleability, ductility, and conductivity are **metals**. The majority of elements in the periodic table are metals. Metals are located to the left of the zigzag line that begins with boron in Group 13 and ends at astatine in Group 17. The periodic table on page 167 shows this zigzag line.

Metals react with the atoms of other elements by losing electrons. Some metals react more readily than others. **Reactivity** is the ease and speed with which a substance reacts with other substances. The most reactive metals are in Group 1. Continuing across the periodic table from left to right, the metals become less reactive. The elements in Groups 3 through 12, called the **transition metals**, are less reactive than those in Groups 1 and 2.

The two rows of elements placed below the main part of the periodic table also consist of metals. The elements in the top row are the lanthanides. The elements in the bottom row are the actinides. The lanthanides are sometimes called rare earth elements. Some rare earth elements can be used to produce very strong magnets.

Look at the names of the elements that make up the actinides. A scientist who discovers a new element has the right to name it. Some elements were named after people, such as curium, einsteinium, mendelevium, and nobelium. Others were named after places, such as americium, berkelium, and californium.

Nonmetals

Elements that lack most of the properties of metals are **nonmetals**. On the periodic table, nonmetals are found to the right of the zigzag line, in Groups 14 through 17. Most nonmetals are poor conductors of electric current and heat. Solid nonmetals tend to be dull and brittle. Nonmetals usually react with the atoms of other elements by gaining or sharing electrons. Group 17 contains the most reactive nonmetals. These elements are so highly reactive that they are dangerous.

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Semimetals

The semimetals lie along the zigzag line between the metals and nonmetals. A **semimetal** is an element that has some characteristics of both metals and nonmetals. Semimetals tend to be hard, brittle solids at room temperature, and somewhat reactive. The most useful property of semimetals is their varying ability to conduct electric current. A substance that can conduct electric current only under certain conditions is called a **semiconductor**. These conditions may be related to temperature, exposure to light, or the presence of impurities.

Inert Gases

The elements in Group 18, on the far right side of the periodic table, are the **inert gases**. Inert gases tend to be unreactive because they do not usually gain, share, or lose electrons. Scientists have, however, been able to synthesize some inert gas compounds in the laboratory. Inert gases are also known as noble gases.

Standard 7. a. Check

- 1** Most of the elements in the periodic table are
- A metals.
 - B nonmetals.
 - C semimetals.
 - D inert gases.

- Periodic Table of the Elements (Top Section)**
- | | | | | | | | | | | | | | | | | | |
|---|---|--|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|
| 1 | | | | | | | | | | | | | | | | | 18 |
| 1 | | | | | | | | | | | | 13 | 14 | 15 | 16 | 17 | |
| 2 | | | | | | | | | | | | | | B | | A | |
| 3 | | | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | | | | | |
| 4 | C | | | | | | | | | | | | D | | | E | |

Which two elements identified in the periodic table *most* likely share similar properties?

- A** Elements A and B
B Elements D and E
C Elements C and D
D Elements A and E

- 3** The most reactive nonmetals are located in Group
- A 1.
- B 2.
- C 17.
- D 18.

- 4** Elements that have some properties of metals but also some properties of nonmetals are classified as
- A transition metals.
 - B nonmetals.
 - C semimetals.
 - D inert gases.