

## Lesson 2: How are elements grouped?

### Vocabulary

**element** a substance that is made up of only one kind of atom

**periodic table** a chart that scientists use to list and organize the elements

### Elements

Atoms are called the building blocks of matter because all matter is made up of atoms. But some substances are made up of only one kind of atom. These substances are called elements. They are pure substances.

There are just over 100 different elements. Everything we know on Earth, and everything we have found in space, is made of these elements.

Both living and nonliving things are made up of elements. Oxygen, carbon, hydrogen, and nitrogen are the most common elements in the human body.

The atoms of each element are different from the atoms of other elements. All the atoms of a particular element are the same. Scientists identify an element by the number of protons found in the nucleus of its atom. For example, carbon has six protons in its nucleus, so all matter with six protons in its nucleus is carbon.

Atoms have as many electrons as protons. Carbon, for instance, has six electrons. Because of the equal number of protons and electrons, atoms have no electrical charge.

### Symbols for Elements

Scientists do not usually write out the full name of an element. Instead they use each element's chemical symbol. An element's symbol is often the first letter of its name. If that symbol is used by another element, another letter from the name is added. Some symbols come from an element's name in Greek or Latin.

### Classifying Elements

The elements are classified into three groups. Metals are elements that are usually hard. They are good conductors of heat and electricity, and can be turned into wires or flattened into sheets. Nonmetals are elements that are often easily broken. They are not good conductors of heat or electricity, and cannot be made into wires or flattened into sheets. Metalloids are elements that are similar in some ways to both metals and nonmetals.

### The Periodic Table

The periodic table is a chart that scientists use to list and organize the elements. The elements are listed in order from the lowest atomic number to the highest. The atomic number of an element is the number of protons in the nucleus of an atom. Elements on the left side of the table are metals. Elements on the right side are nonmetals. Metalloids are listed between the metals and nonmetals.

### Information on the Periodic Table

The periodic table, which is shown on pages 396–397 of your textbook, holds a great deal of information about the elements. An element's location on the table gives information about the element.

For example, the periodic table is made up of 18 columns. These columns are called families. Elements in a family are similar to one another. On page 398 in your textbook, you can learn how to use the periodic table.

## Lesson 2 Checkpoint

1. Atoms often are referred to as the building blocks of matter. Why do you think atoms were given this title?

---

---

2. What are the most common elements in the human body?

---

---

3. How many protons do the elements beryllium and helium each have?

---

---

4. Use the information in the table in your textbook to draw a model that shows the number of electrons and protons in a lithium atom.


---

---

5. Is bromine a metal or nonmetal? Is it a solid, liquid, or gas at room temperature? What is its chemical symbol?

---

---

6.  **Compare and Contrast** Find the elements oxygen and calcium on the periodic table. Tell how they are alike and different.

---

---