

Organizing the Elements (pages 109–117)

Patterns in the Elements (pages 110–113)

Key Concept: Dmitri Mendeleev noticed that a pattern of properties appeared when he arranged the elements in order of increasing atomic mass.

- Mendeleev knew that some elements had similar physical and chemical properties. When Mendeleev arranged the elements in order of their atomic mass, the properties of the element fell into a pattern.
- The **atomic mass** of an element is the average mass of all the isotopes of that element. The mass of an atom is equal to the number of protons and neutrons in the nucleus.
- The **periodic table** is a chart of the elements. The periodic table shows the repeating pattern of the chemical and physical properties of all the elements. In the current periodic table, the elements are arranged in order of atomic number.

Answer the following questions. Use your textbook and the ideas above.

1. Draw a line from each term to its meaning.

Term	Meaning
atomic mass	a. a chart of the elements
periodic table	b. the average mass of all the isotopes of an element

2. Is the following sentence true or false? The elements in the current periodic table are arranged in order of atomic mass. _____

Elements and the Periodic Table ▪ *Adapted Reading and Study*

Organization of the Periodic Table (pages 114–115)

Key Concept: The properties of an element can be predicted from its location in the periodic table.

- A row of elements in the periodic table is called a **period**. As you look at the elements in a period from the left side of the table to the right side, the properties of the elements change in the same way for every period.
- The elements on the left side of a period are metals that react with other elements very easily. Elements in the middle of the period do not react with other elements very easily. Elements at the right end of the table are nonmetals.
- A column of elements in the periodic table is called a **group**. Groups are also called families. The elements in each group have properties that are the same. For example, the elements in Group 1 are metals that react very quickly with water. The elements in Group 18 rarely react at all.

Answer the following questions. Use your textbook and the ideas above.

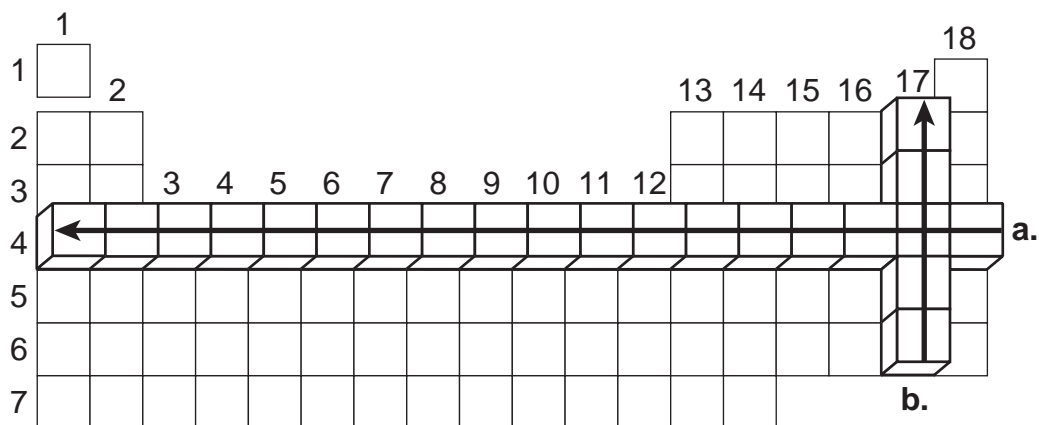
3. Read each word in the box. In each sentence below, fill in one of the words.

element	period	group
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- a. A row of elements in the periodic table is called a(an) _____.
- b. A column of elements in the periodic table is called a(an) _____.

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4. Look at the outline of the periodic table below. Tell which is a group and which is a period.



a. _____

b. _____

5. Circle the letter of each sentence that is true about the periodic table.
- a. The elements in a period have properties that are the same.
 - b. The properties of the elements change in the same way for every period.
 - c. The elements in each group have properties that are the same.
6. Is the following sentence true or false? Groups are also called families. _____

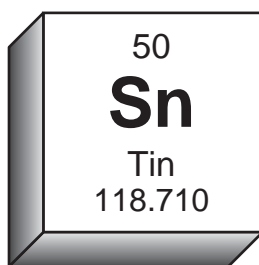
Elements and the Periodic Table ▪ *Adapted Reading and Study*

Key Concept: Each square of the periodic table includes the element's atomic number, chemical symbol, name, and atomic mass.

- The periodic table has one square for each element. Each square has information about the element.
- In an element square, the top number is the atomic number of the element. For example, the atomic number for iron is 26. Iron has 26 protons. Iron also has 26 electrons.
- In the element square, the chemical symbol for the element is below the atomic number. A **chemical symbol** is one or two letters that stand for an element. The chemical symbol for iron is Fe.
- The bottom number in an element square is the atomic mass of the element. The atomic mass of iron is 55.847 amu (atomic mass units).

Answer the following question. Use your textbook and the ideas above.

7. The picture shows an element square from the periodic table. Look at the square to answer the questions.



- a. Write the name of the element. _____
- b. Write the atomic number of the element.

- c. Write the chemical symbol of the element.

How Elements Form in Stars (pages 116–117)

Key Concept: Nuclear fusion, which occurs in stars on a huge scale, combines smaller nuclei into larger nuclei, creating heavier elements.

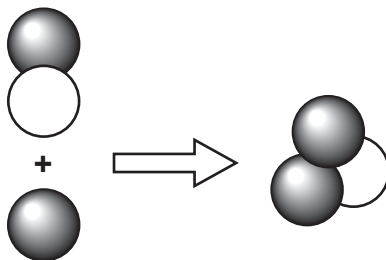
- The sun is made mostly of the element hydrogen.
- The sun is so hot that the matter making up the sun is not a solid, liquid, or gas. The matter making up the sun is plasma. **Plasma** is a mixture of free electrons and atomic nuclei without electrons.
- The pressure in stars is so high that the atomic nuclei are squeezed together. If these nuclei join, nuclear fusion takes place.
- In **nuclear fusion**, two atomic nuclei combine to form a larger nucleus of a new element. When nuclear fusion happens, huge amounts of energy are given off. The energy from the sun comes from nuclear fusion.
- Elements heavier than iron form when large stars explode in a supernova. A supernova is a huge explosion that breaks apart a very large star. The supernova gives off enough energy to form the heaviest elements.

Answer the following questions. Use your textbook and the ideas above.

8. Matter that is a mixture of free electrons and atomic nuclei is called
- a. a liquid.
 - a solid.
 - plasma.

Elements and the Periodic Table ▪ *Adapted Reading and Study*

9. The picture shows a nuclear fusion reaction. Draw a circle around the nucleus formed in the fusion reaction.



10. The heaviest elements are made from stars in an event called
- a. a supernova.
 - b. isotope formation.
 - c. plasma.