

THE FIRST PERIODIC TABLE

In 1869, the Russian scientist Dmitri Mendeleev discovered a set of patterns in the properties of the elements. **He noticed that the patterns of properties appeared when he arranged the elements in order of increasing atomic mass.** The **atomic mass number** of an element is the mass of protons plus neutrons in the nucleus. The atomic mass number is usually a decimal value because it represents the average mass of all the **isotopes** of an element that exist. Isotopes are atoms of an element with the same number of protons, but not neutrons. Isotopes will be discussed at a later time this unit!



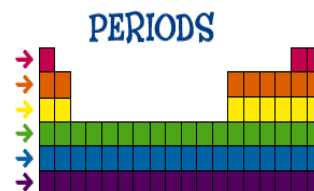
In Mendeleev's first **periodic table**, the properties of the elements repeated in every row. The word "periodic" means repeating. The most impressive thing that Mendeleev did was that he left 3 blank spaces in his early table. He predicted that these 3 spaces would be filled by elements that had not yet been discovered. Amazingly, he even predicted the basic properties of those elements. These 3 elements (scandium, gallium, germanium) were soon discovered and their properties were very close to those predicted by Mendeleev!

The periodic table has been updated since Mendeleev's time as scientists discovered new elements. After protons were discovered, elements were rearranged according to their **atomic number**, which is the number of protons in the nucleus only. Some elements changed positions and the patterns of properties became more regular compared to Mendeleev's table.

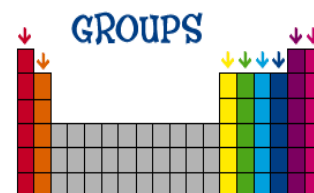
| |
|-----------|
| 26 |
| Fe |
| Iron |
| 55.84 |

The modern periodic table contains over 110 squares, one for each element. **Each square includes an element's atomic number, chemical symbol, name and average atomic mass.** The chemical symbol for an element usually consists of one or two letters, such as Fe, the chemical symbol for iron. The properties of an element can be predicted by its location in the periodic table.

Each horizontal row of the table is called a **period**. There are seven periods in total. As you move across a period from left to right, the properties of the elements change in a predictable pattern. Once you go down one period, the pattern repeats itself.



Each vertical column is called a **group**, or **family**. Elements in the same group have **similar physical and chemical properties**. Groups are numbered from Group 1 on the left to Group 18 on the right. The name of a group is usually the name of the first element in the column, but not always.



| |
|-------------|
| 101 |
| Md |
| Mendelevium |
| 258 |

Mendeleev became world famous because of his development of the periodic table. He traveled throughout Europe, visiting with other famous scientists. After his death in 1955, Mendeleev was honored for his contributions to chemistry when **Mendelevium**, a man-made element with atomic number 101, was named in honor of him.

THE FIRST PERIODIC TABLE

1. Who created the first successful periodic table? In what year?

2. Mendeleev noticed patterns appearing when he arranged the elements according to what?

3. Mendeleev's periodic table had _____ blank spaces left in it, which represented elements that had not been discovered.

4. What does the word *periodic* mean?

5. The modern periodic table is now arranged according to what property of the elements?

6. The one or two-letter representation of an element is called its what?

7. The atomic number for the element calcium (Ca) is 20 and its atomic mass number is 40. How many protons does calcium have? How many neutrons does it have? Electrons?

| |
|--|
| |
| |

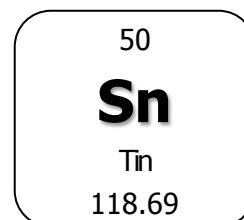
8. Use the square from the periodic table to fill in the blanks below.

a. Name of element: _____

b. Chemical symbol: _____

c. Atomic mass: _____

d. Atomic number: _____



9. Each horizontal row in the periodic table is called a(n) _____.

Each vertical column in the periodic table is called a(n) _____.

10. How can an element's chemical properties be predicted?

| |
|--|
| |
| |
| |

11. What is similar about all the elements in the same group?

| |
|--|
| |
| |
| |