

## **Atoms**

(Reading Passage)

Everything around us is made up of **atoms**. **Atoms** are one of the smallest units of matter. An **atom** is too small to see directly through a microscope. The smallest speck that can be seen under an ordinary microscope contains more than ten billion atoms. An **atom** is more than a million times smaller than the thickness of a human hair.

There are three pieces to an **atom**. They are **protons**, **neutrons**, and **electrons**. These are called **subatomic particles**.

The center of the **atom** is called the **nucleus**. **Neutrons** and **protons** are located in the **atomic nucleus**. **Electrons** are very small **particles** located outside the **nucleus**. They orbit the nucleus at fantastically speeds, like the Earth orbits the sun.

Each type of **subatomic particle** has a different electrical **charge**. A **proton** always has an electrical **charge** of +1. An **electron** always has an electrical **charge** of -1. A **neutron** has no electrical **charge** associated with it, a **charge** of 0.

**Atoms** form the building blocks of the simplest substances, the **chemical elements**. Familiar **elements** include hydrogen, helium, sodium, chlorine, iron, lead, carbon, nitrogen and oxygen.

The smallest unit into which an **element** may be divided while keeping all of the characteristics of that **element** is an **atom**. Each **chemical element** consists of only one type of **atom**. For example, pure 24K gold is composed of only one type of **atom**, gold **atoms**.

The **atoms** of any **element** are alike but are different from **atoms** of other **elements**. The thing that makes them different is the number of **protons**. Hydrogen, for example, has **atoms** with only one **proton**. All **atoms** with one **proton** are hydrogen. Helium has two **protons**. All atoms with two **protons** are helium. Oxygen has eight **protons**. **Atoms** with the same number of **protons** in the **atomic nucleus** are the same **element**.

The **atomic number** is the number of **protons** an **atom** has. The **atomic number** is unique for each **element**. The **atomic mass** (also referred to as the atomic weight) is the sum total of the number of **protons** and **neutrons** in an **atom**.

Hydrogen is different from all other **atoms** in that the hydrogen **atom** normally does not contain a **neutron**. The hydrogen **atom** is composed of one **proton** and one **electron** but no **neutron**.

The Periodic Table of the **Elements** provides a great deal of information about various **elements**. It tells us how many **electrons** and **protons** each **element** has. It also tells us the **atomic number** and **atomic mass**.

**Elements** are arranged in the periodic table from left to right and top to bottom in order of increasing **mass**. Each **element** is identified by an abbreviation (H=Hydrogen, Na=Sodium, K=Potassium, and so on). The table starts with hydrogen (with an atomic number of one) and goes on to unilennium (with an atomic number of 109).

All substances on Earth are made of different combinations of the 109 **elements**. Approximately 25 **elements** occur in living things. The six major **elements** in living things are carbon, hydrogen, nitrogen, oxygen, phosphorous, and sulfur.

Use the information from the reading passage to answer the following questions.

1. Name three pieces of an atom.
2. Name two subatomic particles that are located in the atomic nucleus.
3. Name three familiar chemical elements.
4. What is the thing that makes atoms of one element different from atoms of another element?
5. How many protons does oxygen have?
6. What does atomic number mean?
7. What does atomic mass mean?
8. How is hydrogen different from all other atoms?
9. Name three major elements in living things.

Fill in each blank with a word from the vocabulary in the reading passage that completes the sentence.

1. Protons, neutrons, and electrons are \_\_\_\_\_ particles.
2. The subatomic particle that has no electrical charge is the \_\_\_\_\_.
3. Each type of subatomic particle has a different electrical \_\_\_\_\_.
4. Hydrogen, helium, sodium and chlorine are examples of \_\_\_\_\_ elements.
5. The piece of the atom that has an electrical charge of  $-1$  is \_\_\_\_\_.
6. Each chemical element consists of only one type of \_\_\_\_\_.
7. The chemical element with 109 protons is \_\_\_\_\_.
8. Another name for atomic weight is atomic \_\_\_\_\_.
9. If we want to know how many electrons and protons an element has, we can look at the \_\_\_\_\_ Table.
10. The only atom that does not contain a neutron is a \_\_\_\_\_ atom.
11. Neutrons and protons are located in the atom's \_\_\_\_\_.
12. Electrons are very small \_\_\_\_\_ located outside the nucleus.
13. All atoms with the same number of \_\_\_\_\_ in the atomic nucleus are the same element.
14. The six major \_\_\_\_\_ in the living things are carbon, hydrogen, nitrogen, oxygen, phosphorous, and sulfur.
15. Atoms are one of the smallest units of \_\_\_\_\_.