

## Chapter 11 – Introduction to Atoms

**Directed Reading A****Section: Development of the Atomic Theory****THE BEGINNING OF ATOMIC THEORY**

- \_\_\_\_\_ 1. The word *atom* comes from the Greek word *atomos*, which means
- “dividable.”
  - “invisible.”
  - “hard particles.”
  - “not able to be divided.”
- \_\_\_\_\_ 2. Which of the following statements is a part of Democritus’s theory about atoms?
- Atoms are small, soft particles.
  - Atoms are always standing still.
  - Atoms are made of a single material.
  - Atoms are small particles that can be cut in half again and again.
3. We know that Democritus was right to say that all matter was made up of atoms. So why did people ignore Democritus’s ideas for such a long time?
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_

4. The smallest unit of an element that maintains the properties of that element is a(n) \_\_\_\_\_.

**DALTON’S ATOMIC THEORY BASED ON EXPERIMENTS**

- \_\_\_\_\_ 5. Which of the following was NOT one of Dalton’s theories?
- All substances are made of atoms.
  - Atoms of the same element are exactly alike.
  - Atoms of different elements are alike.
  - Atoms join with other atoms to make new substances.
6. Dalton experimented with different substances. What did his results suggest?
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_

**Directed Reading A *continued*****THOMSON'S DISCOVERY OF ELECTRONS**

7. In Thomson's experiments with a cathode-ray tube, he discovered that a(n) \_\_\_\_\_ charged plate attracted the beam. He concluded that the beam was made up of particles that have \_\_\_\_\_ electric charges.
8. The negatively charged subatomic particles that Thomson discovered are now called \_\_\_\_\_.
9. In Thomson's "plum-pudding" model, electrons are mixed throughout an \_\_\_\_\_.

**RUTHERFORD'S ATOMIC "SHOOTING GALLERY"**

- \_\_\_\_\_ 10. Before his experiment, what did Rutherford expect the particles to do?
- a. He expected the particles to pass right through the gold foil.
  - b. He expected the particles to deflect to the sides of the gold foil.
  - c. He expected the particles to bounce straight back.
  - d. He expected the particles to become negatively charged.
11. What were the surprising results of Rutherford's gold-foil experiment?
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_

**WHERE ARE THE ELECTRONS?**

- \_\_\_\_\_ 12. In 1911, Rutherford revised the atomic theory. Which of the following is NOT part of that theory?
- a. Most of the atom's mass is in its nucleus.
  - b. The nucleus is a tiny, dense, positively charged region.
  - c. Positively charged particles that pass close by the nucleus are pushed away by the positive charges in the nucleus.
  - d. The nucleus is made up of protons and electrons.
13. The center of an atom is a dense region consisting of protons and neutrons called the \_\_\_\_\_.
14. What are electron clouds?
- \_\_\_\_\_

## Skills Worksheet

**Directed Reading A****Section: The Atom****HOW SMALL IS AN ATOM?**

- \_\_\_\_\_ 1. Which of the following statements is true?
- a. A penny has about 20,000 atoms.
  - b. A penny has more atoms than Earth has people.
  - c. Aluminum is made up of large-sized atoms.
  - d. Aluminum atoms have a diameter of about 3 cm.

**WHAT IS AN ATOM MADE OF?**

Match the correct description with the correct term. Write the letter in the space provided.

- |   |                           |
|---|---------------------------|
| _____ 2. particle of the nucleus that has no electrical charge    | a. electron               |
| _____ 3. particle found in the nucleus that is positively charged | b. atomic mass unit (amu) |
| _____ 4. particle with an unequal number of protons and electrons | c. nucleus                |
| _____ 5. negatively charged particle found outside the nucleus    | d. proton                 |
| _____ 6. contains most of the mass of an atom                     | e. ion                    |
| _____ 7. SI unit used to express the masses of atomic particles   | f. neutron                |

**HOW DO ATOMS OF DIFFERENT ELEMENTS DIFFER?**

8. The simplest atom is the \_\_\_\_\_ atom. It has one \_\_\_\_\_ and one \_\_\_\_\_.
9. Neutrons in the atom's \_\_\_\_\_ keep two or more protons from moving apart.
10. If you build an atom using two protons, two neutrons, and two electrons, you have built an atom of \_\_\_\_\_.
11. An atom does not have to have equal numbers of \_\_\_\_\_ and \_\_\_\_\_.

**Directed Reading A *continued***

- 12.** The number of protons in the nucleus of an atom is the \_\_\_\_\_ of that atom.

**ISOTOPES**

- \_\_\_\_\_ **13.** Isotopes always have
- a. the same number of protons.
  - b. the same number of neutrons.
  - c. a different atomic number.
  - d. the same mass.
- \_\_\_\_\_ **14.** Which of the following is NOT true about unstable atoms?
- a. They are radioactive.
  - b. They have a nucleus that always remains the same.
  - c. They give off energy as they fall apart.
  - d. They give off smaller particles as they fall apart.
- \_\_\_\_\_ **15.** What is the mass number of an isotope that has 5 protons, 6 neutrons, and 5 electrons?
- a. 1
  - b. 11
  - c. 10
  - d. 16
- \_\_\_\_\_ **16.** If carbon has an atomic number of 6, how many neutrons does carbon-12 have?
- a. 12
  - b. 8
  - c. 6
  - d. 18
- 17.** Most elements contain a mixture of two or more \_\_\_\_\_.
- 18.** The weighted average of the masses of all the naturally occurring isotopes of an element is the \_\_\_\_\_.

**FORCES IN ATOMS**

**Match the correct definition with the correct term. Write the letter in the space provided.**

- |   |                                 |
|---|---------------------------------|
| _____ <b>19.</b> helps protons stay together in the nucleus | <b>a.</b> gravitational force   |
| _____ <b>20.</b> pulls objects toward one another           | <b>b.</b> electromagnetic force |
| _____ <b>21.</b> an important force in radioactive atoms    | <b>c.</b> strong force          |
| _____ <b>22.</b> holds the electrons around the nucleus     | <b>d.</b> weak force            |