Assessment

Review A

Chapter 3: Atoms: The Building Blocks of Matter

In the space provided, write the letter of the term or phrase that best completes each statement or best answers each question.

1. Neutral atoms contain equal numbers of

a. electrons and neutrons.

b. protons and neutrons.

c. protons and electrons.

d. protons, electrons, and neutrons.

2. The atomic symbol for beryllium, , indicates that the

a. atomic number is 4.

b. atomic number is 9.

c. mass number is 4.

d. atomic number is equal to 9 − 4.

3. Rutherford’s gold-foil experiment led him to conclude that

a. Thomson’s plum pudding model of the atom was accurate.

b. alpha particles were a poor choice for a bombardment material.

c. a dense region of positive charge existed somewhere in the atom.

d. light was emitted by electrons returning to ground state.

4. Which of the following is not one of the five principles of Dalton’s theory?

a. Atoms of different elements combine in simple, whole-number ratios to form compounds.

b. All matter is made of indivisible, indestructible atoms.

c. All atoms of the same element have similar physical and chemical properties.

d. Chemical reactions consist of the combination, separation, or rearrangement of atoms.

5. According to the law of conservation of mass, when sodium, hydrogen, and oxygen react to form a compound, the mass of the compound will be

a. equal to the sum of the masses of the reactants.

b. greater than the sum of the masses of the reactants.

c. less than the sum of the masses of the reactants.

d. either less than or equal to the sum of the masses of the reactants.

6. Thomson’s experiment showed that the charge-to-mass ratio of electrons was

a. greater with noble gases than for other gases.

b. less with noble gases than for other gases.

c. the same in all gases.

d. dependent on the element’s atomic mass.

7. An atom of potassium has 19 protons and 20 neutrons. Its mass number is

a. 9.

b. 19.

c. 20.

d. 39.

8. The ancient Greek natural philosopher who first proposed the notion of the atom was

a. Aristotle.

b. Socrates.

c. Democritus.

d. Plato.

9. The word atom means

a. indivisible.

b. indestructible.

c. energetic.

d. charged.

10. Which feature of Dalton’s atomic theory is different from modern atomic theory?

a. Atoms cannot be destroyed.

b. Atoms cannot be subdivided.

c. Atoms cannot be rearranged in chemical reactions.

d. Atoms combine in whole-number ratios.

11. The least massive particle in an atom is the

a. proton.

b. neutron.

c. electron.

d. None of the above

12. The most massive particle in an atom is the

a. proton.

b. neutron.

c. electron.

d. None of the above

Assessment

Review B

Chapter 3: Atoms: The Building Blocks of Matter

PART I On the line at the left of each statement, write the letter of the choice that best completes the statement or best answers the question.

1. The behavior of cathode rays in a glass tube containing gas at low pressure led scientists to conclude that the rays are composed of

a. energy.

b. positive particles.

c. negative particles.

d. neutral particles.

2. Neutral atoms of the same element can differ in

a. chemical properties.

b. mass number.

c. atomic number.

d. number of protons and electrons.

3. Dalton’s atomic theory helped to explain the law of conservation of mass because it stated that atoms

a. cannot combine.

b. are indivisible.

c. all have the same mass.

d. cannot be created or destroyed.

4. The discovery of the nucleus was a result of Rutherford’s observation that a small percentage of the positively charged particles bombarding the metal’s surface

a. were slightly deflected as they passed through the metal.

b. were deflected back toward the source.

c. passed straight through the metal.

d. combined with the metal.

5. Most of the volume of an atom is occupied by the

a. nucleus.

b. nuclides.

c. electrons.

d. protons.

PART II Write the correct term (or terms) in the space provided.

6. Because any metal cathode used in a cathode-ray tube produces the same charged particles, it was concluded that all atoms contain \_\_electrons\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

7. The smallest particle of an element that retains the chemical properties of that element is a(n) \_\_\_atom\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

8. Atoms of one element that have different masses are called \_\_\_isotopes\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

9. The total number of protons and neutrons in the nucleus of an isotope is called its \_\_\_\_\_\_mass\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ number.

10. The number of protons in the nucleus of an element is called its \_\_\_\_atomic\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ number.

11. Dalton’s theory agreed with the modern atomic theory in almost all cases. List the two statements that were later changed.

PART III Complete the following table to compare the types of subatomic particles.

Particle Mass number Relative charge Location

12. Proton 1 +1 nucleus

13. Neutron 1 0 nucleus

14. Electron 0 -1 electron cloud (outside nucleus)

PART IV Write the answers to the questions on the line to the left, and show your work in the space provided.

32 15. The atomic number of nickel-60 is 28. How many neutrons does this isotope have?

6 16. Carbon-14 has 8 neutrons. What is the atomic number of carbon-14?

14 17. A neutral atom of silicon-30 contains 14 protons. How many electrons does it have?

**PART V Complete the following tables.**

Ions:

|  |  |  |
| --- | --- | --- |
| **Ion** | **# of p+** | **# of e-** |
| Ca2+ | 20 | 18 |
| F1- | 9 | 10 |

Isotopes:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Hyphen Notation** | **Nuclear Notation** | **Atomic Number** | **Mass Number** | **# of p+** | **# of n0** | **# of e-** |
| H-3 | 31H | 1 | 3 | 1 | 2 | 1 |
| O-17 | 178O | 8 | 17 | 8 | 9 | 8 |