

4.3

DISTINGUISHING BETWEEN ATOMS

Section Review

Objectives

- Explain how isotopes differ from one another
- Use the atomic number and mass number of an element to find the numbers of protons, electrons, and neutrons
- Calculate the atomic mass of an element from isotope data

Vocabulary

- atomic number
- mass number
- isotopes
- atomic mass unit (amu)
- atomic mass
- periodic table
- period
- group

Key Equations

- atomic number = number of protons = number of electrons
- number of neutrons = mass number – atomic number

Part A Completion

Use this completion exercise to check your understanding of the concepts and terms that are introduced in this section. Each blank can be completed with a term, short phrase, or number.

- The number of 1 in the nucleus of an atom is the **1.** _____
 atomic 2 of that element. Because atoms are electrically **2.** _____
 neutral, the number of protons and 3 in an atom are equal. **3.** _____
 The total number of 4 and neutrons in an atom is the mass **4.** _____
 number. Atoms of the same element are identical in most respects, **5.** _____
 but they can differ in the number of 5 in the nucleus. Atoms **6.** _____
 that have the same number of protons but different mass numbers **7.** _____
 are called 6. **8.** _____
 The 7 of an element is the weighted average of the **9.** _____
 masses of the isotopes of that element. Each of the three known **10.** _____
 isotopes of hydrogen has 8 proton(s) in the nucleus. The
 most common hydrogen isotope has 9 neutrons. It has a
 mass number of 10 and is called hydrogen-1.

Part B True-False

Classify each of these statements as always true, AT; sometimes true, ST; or never true, NT.

- _____ 11. The atomic number of an element is the sum of the protons and electrons in an atom of that element.
- _____ 12. The atomic number of an atom is the total number of protons in an atom of that element.
- _____ 13. An atom of nitrogen has 7 protons and 7 neutrons.
- _____ 14. Relative atomic masses are expressed in amus.
- _____ 15. The number of neutrons in the nucleus can be calculated by subtracting the atomic number from the mass number.

Part C Matching

Match each description in Column B to the correct term in Column A

Column A

- _____ 16. atomic number
- _____ 17. periodic table
- _____ 18. mass number
- _____ 19. group
- _____ 20. isotopes
- _____ 21. atomic mass unit (amu)
- _____ 22. atomic mass
- _____ 23. period

Column B

- a. atoms that have the same number of protons but different numbers of neutrons
- b. weighted average mass of the atoms in a naturally occurring sample of an element
- c. equals the number of neutrons plus the number of protons in an atom
- d. $\frac{1}{12}$ the mass of a carbon-12 atom
- e. the number of protons in the nucleus of an atom of an element
- f. an arrangement of elements according to similarities in their properties
- g. a vertical column of elements in the periodic table
- h. a horizontal row of the periodic table

Part D Questions and Problems

Solve the following problem in the space provided.

24. Given the relative abundance of the following naturally occurring isotopes of oxygen, calculate the average atomic mass of oxygen.

oxygen-16:	99.76%
oxygen-17:	0.037%
oxygen-18:	0.204%