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CHAPTER 4 STUDY GUIDE FOR CONTENT MASTERY

Section 4.3 How Atoms Differ

In your textbook, read about atomic number.

For each statement below, write *true* or *false*.

false **1.** The number of neutrons in an atom is referred to as its atomic number.

true **2.** The periodic table is arranged by increasing atomic number.

true **3.** Atomic number is equal to the number of electrons in an atom.

true **4.** The number of protons in an atom identifies it as an atom of a particular element.

false **5.** Most atoms have either a positive or a negative charge.

Answer the following questions.

6. Lead has an atomic number of 82. How many protons and electrons does lead have?
82 protons; 82 electrons

7. Oxygen has 8 electrons. How many protons does oxygen have? 8 protons

8. Zinc has 30 protons. What is its atomic number? 30

9. Astatine has 85 protons. What is its atomic number? 85

10. Rutherfordium has an atomic number of 104. How many protons and electrons does it have?
104 protons; 104 electrons

11. Polonium has an atomic number of 84. How many protons and electrons does it have?
84 protons; 84 electrons

12. Nobelium has an atomic number of 102. How many protons and electrons does it have?
102 protons; 102 electrons

In your textbook, read about isotopes and mass number.

Determine the number of protons, electrons, and neutrons for each isotope described below.

13. An isotope has atomic number 19 and mass number 39.
19 protons, 19 electrons, 20 neutrons

14. An isotope has 14 electrons and a mass number of 28.
14 protons, 14 electrons, 14 neutrons

15. An isotope has 21 neutrons and a mass number of 40.
19 protons, 19 electrons, 21 neutrons

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Section 4.3 *continued*

16. An isotope has an atomic number 51 and a mass number 123.
51 protons, 51 electrons, 72 neutrons

Answer the following question.

17. Which of the isotopes in problems 13–16 are isotopes of the same element? Identify the element.
The two isotopes with atomic number 19 are both isotopes of potassium.

Write each isotope below in symbolic notation. Use the periodic table to determine the atomic number of each isotope.

18. neon-22 $^{22}_{10}Ne$

19. helium $^{4}_{2}He$

20. cesium-133 $^{133}_{55}Cs$

21. uranium-234 $^{234}_{92}U$

Label the mass number and the atomic number on the following isotope notation.

22. mass number

23. atomic number

$^{24}_{12}Mg$

In your textbook, read about mass of individual atoms.

Circle the letter of the choice that best completes the statement.

24. The mass of an electron is
- **a.** smaller than the mass of a proton.
- **b.** smaller than the mass of a neutron.
- **c.** a tiny fraction of the mass of an atom.
- **(d.)** all of the above.

25. One atomic mass unit is
- **(a.)** 1/12 the mass of a carbon-12 atom.
- **b.** 1/16 the mass of an oxygen-16 atom.
- **c.** exactly the mass of one proton.
- **d.** approximately the mass of one proton plus one neutron.

26. The atomic mass of an atom is usually not a whole number because it accounts for
- **a.** only the relative abundance of the atom's isotopes.
- **b.** only the mass of each of the atom's isotopes.
- **c.** the mass of the atom's electrons.
- **(d.)** both the relative abundance and the mass of each of the atom's isotopes.