

## Section 5.3 Electron Configurations

In your textbook, read about ground-state electron configurations.

Use each of the terms below just once to complete the passage.

Aufbau principle	electron configuration	ground-state electron configuration	Hund's rule
lowest	Pauli exclusion principle	spins	stable

The arrangement of electrons in an atom is called the atom's

(1) \_\_\_\_\_. Electrons in an atom tend to assume the arrangement that gives the atom the (2) \_\_\_\_\_ possible energy. This arrangement of electrons is the most (3) \_\_\_\_\_ arrangement and is called the atom's (4) \_\_\_\_\_.

Three rules define how electrons can be arranged in an atom's orbitals. The (5) \_\_\_\_\_ states that each electron occupies the lowest energy orbital available. The (6) \_\_\_\_\_ states that a maximum of two electrons may occupy a single atomic orbital, but only if the electrons have opposite (7) \_\_\_\_\_. (8) \_\_\_\_\_ states that single electrons with the same spin must occupy each equal-energy orbital before additional electrons with opposite spins occupy the same orbitals.

Complete the following table.

Element	Atomic Number	Orbitals					Electron Configuration
		1s	2s	2p <sub>x</sub>	2p <sub>y</sub>	2p <sub>z</sub>	
9. Helium							1s <sup>2</sup>
10.	7						
11. Neon		↑↓	↑↓	↑↓	↑↓	↑↓	

Answer the following questions.

12. What is germanium's atomic number? How many electrons does germanium have?

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13. What is noble-gas notation, and why is it used to write electron configurations?

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14. Write the ground-state electron configuration of a germanium atom, using noble-gas notation.

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*In your textbook, read about valence electrons.*

**Circle the letter of the choice that best completes the statement or answers the question.**

15. The electrons in an atom's outermost orbitals are called

- a.** electron dots.      **b.** quantum electrons.      **c.** valence electrons.      **d.** noble-gas electrons.

16. In an electron-dot structure, the element's symbol represents the

- a.** nucleus of the noble gas closest to the atom in the periodic table.  
**b.** atom's nucleus and inner-level electrons.  
**c.** atom's valence electrons.  
**d.** electrons of the noble gas closest to the atom in the periodic table.

17. How many valence electrons does a chlorine atom have if its electron configuration is  $[\text{Ne}]3s^23p^5$ ?

- a.** 3                      **b.** 21                      **c.** 5                      **d.** 7

18. Given boron's electron configuration of  $[\text{He}]2s^2 2p^1$ , which of the following represents its electron-dot structure?



19. Given beryllium's electron configuration of  $1s^2 2s^2$ , which of the following represents its electron-dot structure?



20. Which electrons are represented by the dots in an electron-dot structure?

a. valence electrons

b. inner-level electrons

c. only s electrons

d. both a and c