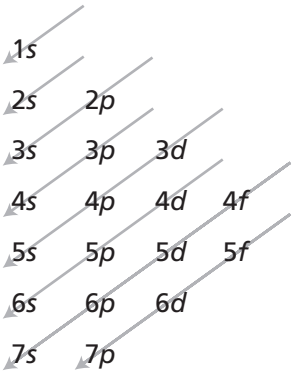

FIGURE 19 Follow the diagonal arrows from the top to get the order in which atomic orbitals are filled according to the Aufbau principle.

Elements of the Second Period

In the first-period elements, hydrogen and helium, electrons occupy the orbital of the first main energy level. The ground-state configurations in **Table 3** illustrate how the Aufbau principle, the Pauli exclusion principle, and Hund's rule are applied to atoms of elements in the second period. **Figure 19** shows the order in which orbitals are filled according to the Aufbau principle.

According to the Aufbau principle, after the 1*s* orbital is filled, the next electron occupies the *s* sublevel in the second main energy level. Thus, lithium, Li, has a configuration of $1s^2 2s^1$. The electron occupying the 2*s* level of a lithium atom is in the atom's highest, or outermost, occupied level. The *highest-occupied energy level* is the electron-containing main energy level with the highest principal quantum number. The two electrons in the 1*s* sublevel of lithium are no longer in the outermost main energy level. They have become *inner-shell electrons,* which are electrons that are not in the highest-occupied energy level.

The fourth electron in an atom of beryllium, Be, must complete the pair in the 2*s* sublevel because this sublevel is of lower energy than the 2*p* sublevel. With the 2*s* sublevel filled, the 2*p* sublevel, which has three vacant orbitals of equal energy, can be occupied. One of the three *p* orbitals is occupied by a single electron in an atom of boron, B. Two of the three *p* orbitals are occupied by unpaired electrons in an atom of carbon, C. And all three *p* orbitals are occupied by unpaired electrons in an atom of nitrogen, N. Hund's rule applies here, as is shown in the orbital notations in **Table 3.**

According to the Aufbau principle, the next electron must pair with another electron in one of the 2*p* orbitals rather than enter the third main energy level. The Pauli exclusion principle allows the electron to pair with

TABLE 3 *Electron Configurations of Atoms of Second-Period Elements Showing Two Notations*

Name	Symbol	Orbital notation 1*s*	2*s*	2*p*			Electron-configuration notation
Lithium	Li	↑↓	↑				$1s^2 2s^1$
Beryllium	Be	↑↓	↑↓				$1s^2 2s^2$
Boron	B	↑↓	↑↓	↑			$1s^2 2s^2 2p^1$
Carbon	C	↑↓	↑↓	↑	↑		$1s^2 2s^2 2p^2$
Nitrogen	N	↑↓	↑↓	↑	↑	↑	$1s^2 2s^2 2p^3$
Oxygen	O	↑↓	↑↓	↑↓	↑	↑	$1s^2 2s^2 2p^4$
Fluorine	F	↑↓	↑↓	↑↓	↑↓	↑	$1s^2 2s^2 2p^5$
Neon	Ne	↑↓	↑↓	↑↓	↑↓	↑↓	$1s^2 2s^2 2p^6$