one of the electrons occupying the 2*p* orbitals as long as the spins of the paired electrons are opposite. Thus, atoms of oxygen, O, have the configuration $1s^2 2s^2 2p^4$. Oxygen's orbital notation is shown in **Table 3.**

Two 2*p* orbitals are filled in fluorine, F, and all three are filled in neon, Ne. Atoms such as those of neon, which have the *s* and *p* sublevels of their highest occupied level filled with eight electrons, are said to have an *octet* of electrons. Examine the periodic table inside the back cover of the text. Notice that neon is the last element in the second period.

Elements of the Third Period

After the outer octet is filled in neon, the next electron enters the *s* sublevel in the $n = 3$ main energy level. Thus, atoms of sodium, Na, have the configuration $1s^2 2s^2 2p^6 3s^1$. Compare the configuration of a sodium atom with that of an atom of neon in **Table 3.** Notice that the first 10 electrons in a sodium atom have the same configuration as a neon atom, $1s^2 2s^2 2p^6$. In fact, the first 10 electrons in an atom of each of the third-period elements have the same configuration as neon. This similarity allows us to use a shorthand notation for the electron configurations of the third-period elements.

Noble-Gas Notation

Neon is a member of the Group 18 elements. *The Group 18 elements (helium, neon, argon, krypton, xenon, and radon) are called the* **noble gases.** To simplify sodium's notation, the symbol for neon, enclosed in square brackets, is used to represent the complete neon configuration: $[Ne] = 1s^2 2s^2 2p^6$. This allows us to write sodium's electron configuration as $[Ne]3s^1$, which is called sodium's *noble-gas notation.* **Table 4** shows the electron configuration of each of the third-period elements using noble-gas notation.

TABLE 4 *Electron Configurations of Atoms of Third-Period Elements*

Name	Symbol	Atomic number	Number of electrons in sublevels					Noble-gas notation
			1*s*	2*s*	2*p*	3*s*	3*p*	
Sodium	Na	11	2	2	6	1		*[Ne]$3s^1$
Magnesium	Mg	12	2	2	6	2		[Ne]$3s^2$
Aluminum	Al	13	2	2	6	2	1	[Ne]$3s^2 3p^1$
Silicon	Si	14	2	2	6	2	2	[Ne]$3s^2 3p^2$
Phosphorus	P	15	2	2	6	2	3	[Ne]$3s^2 3p^3$
Sulfur	S	16	2	2	6	2	4	[Ne]$3s^2 3p^4$
Chlorine	Cl	17	2	2	6	2	5	[Ne]$3s^2 3p^5$
Argon	Ar	18	2	2	6	2	6	[Ne]$3s^2 3p^6$

*[Ne] = $1s^2 2s^2 2p^6$