The last element in the third period is argon, Ar, which is a noble gas. As in neon, the highest-occupied energy level of argon has an octet of electrons, $[Ne]3s^2 3p^6$. In fact, each noble gas other than He has an electron octet in its highest energy level. *A* **noble-gas configuration** *refers to an outer main energy level occupied, in most cases, by eight electrons.*

Elements of the Fourth Period

The electron configurations of atoms in the fourth-period elements are shown in **Table 5.** The period begins by filling the 4*s* orbital, the empty orbital of lowest energy. Thus, the first element in the fourth period is potassium, K, which has the electron configuration $[Ar]4s^1$. The next element is calcium, Ca, which has the electron configuration $[Ar]4s^2$.

With the 4*s* sublevel filled, the 4*p* and 3*d* sublevels are the next available vacant orbitals. **Figure 16** shows that the 3*d* sublevel is lower in

TABLE 5 *Electron Configuration of Atoms of Elements in the Fourth Period*

Name	Symbol	Atomic number	Number of electrons in sublevels above 2*p*					Noble-gas notation
			3*s*	3*p*	3*d*	4*s*	4*p*	
Potassium	K	19	2	6		1		*[Ar]$4s^1$
Calcium	Ca	20	2	6		2		[Ar]$4s^2$
Scandium	Sc	21	2	6	1	2		[Ar]$3d^1 4s^2$
Titanium	Ti	22	2	6	2	2		[Ar]$3d^2 4s^2$
Vanadium	V	23	2	6	3	2		[Ar]$3d^3 4s^2$
Chromium	Cr	24	2	6	5	1		[Ar]$3d^5 4s^1$
Manganese	Mn	25	2	6	5	2		[Ar]$3d^5 4s^2$
Iron	Fe	26	2	6	6	2		[Ar]$3d^6 4s^2$
Cobalt	Co	27	2	6	7	2		[Ar]$3d^7 4s^2$
Nickel	Ni	28	2	6	8	2		[Ar]$3d^8 4s^2$
Copper	Cu	29	2	6	10	1		[Ar]$3d^{10} 4s^1$
Zinc	Zn	30	2	6	10	2		[Ar]$3d^{10} 4s^2$
Gallium	Ga	31	2	6	10	2	1	[Ar]$3d^{10} 4s^2 4p^1$
Germanium	Ge	32	2	6	10	2	2	[Ar]$3d^{10} 4s^2 4p^2$
Arsenic	As	33	2	6	10	2	3	[Ar]$3d^{10} 4s^2 4p^3$
Selenium	Se	34	2	6	10	2	4	[Ar]$3d^{10} 4s^2 4p^4$
Bromine	Br	35	2	6	10	2	5	[Ar]$3d^{10} 4s^2 4p^5$
Krypton	Kr	36	2	6	10	2	6	[Ar]$3d^{10} 4s^2 4p^6$

*[Ar] = $1s^2 2s^2 2p^6 3s^2 3p^6$