Periodic Table of Atomic Radii (pm)

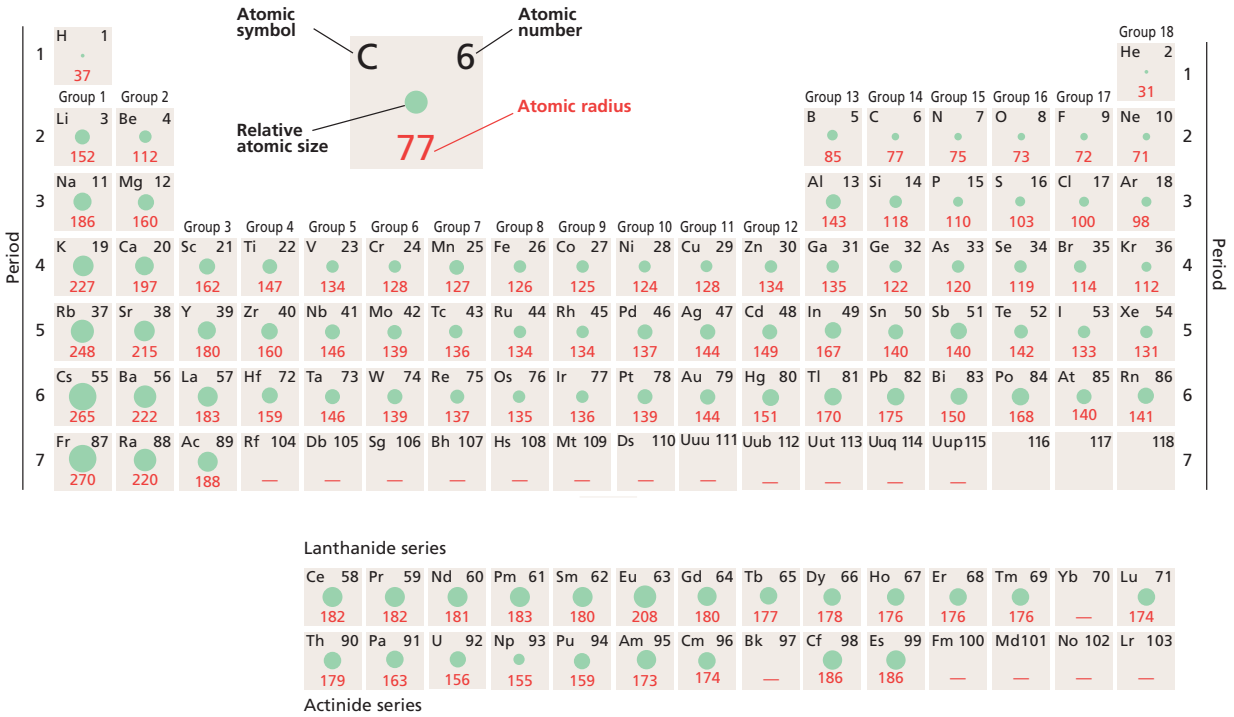

FIGURE 13 Atomic radii decrease from left to right across a period and increase down a group.

trend to smaller atoms across a period is caused by the increasing positive charge of the nucleus. As electrons add to *s* and *p* sublevels in the same main energy level, they are gradually pulled closer to the more highly charged nucleus. This increased pull results in a decrease in atomic radii. The attraction of the nucleus is somewhat offset by repulsion among the increased number of electrons in the same outer energy level. As a result, the difference in radii between neighboring atoms in each period grows smaller, as shown in **Figure 13.**

Group Trends

Examine the atomic radii of the Group 1 elements in **Figure 13.** Notice that the radii of the elements increase as you read down the group. As electrons occupy sublevels in successively higher main energy levels located farther from the nucleus, the sizes of the atoms increase. *In general, the atomic radii of the main-group elements increase down a group*.

Now examine the radii of the Group 13 elements. Although gallium, Ga, follows aluminum, Al, it has a slightly smaller atomic radius than does aluminum. This is because gallium, unlike aluminum, is preceded in its period by the 10 *d*-block elements. The expected increase in gallium's radius caused by the filling of the fourth main-energy level is outweighed by a shrinking of the electron cloud caused by a nuclear charge that is considerably higher than that of aluminum.

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Module 3: Periodic Properties