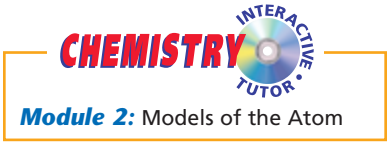
sublevel letter. For example, the orbital notations for hydrogen and helium are written as follows.

$$\text{H}\ \frac{\uparrow}{1s} \qquad \text{He}\ \frac{\uparrow\downarrow}{1s}$$

Electron-Configuration Notation

Electron-configuration notation eliminates the lines and arrows of orbital notation. Instead, the number of electrons in a sublevel is shown by adding a superscript to the sublevel designation. The hydrogen configuration is represented by $1s^1$. The superscript indicates that one electron is present in hydrogen's 1*s* orbital. The helium configuration is represented by $1s^2$. Here the superscript indicates that there are two electrons in helium's 1*s* orbital.



SAMPLE PROBLEM A

For more help, go to the Math Tutor at the end of Chapter 5.

The electron configuration of boron is $1s^2 2s^2 2p^1$. How many electrons are present in an atom of boron? What is the atomic number for boron? Write the orbital notation for boron.

SOLUTION

The number of electrons in a boron atom is equal to the sum of the superscripts in its electron-configuration notation: 2 + 2 + 1 = 5 electrons. The number of protons equals the number of electrons in a neutral atom. So we know that boron has 5 protons and thus has an atomic number of 5. To write the orbital notation, first draw the lines representing orbitals.

$$\underset{1s}{\_\_} \quad \underset{2s}{\_\_} \quad \underbrace{\_\_\ \_\_\ \_\_}_{2p}$$

Next, add arrows showing the electron locations. The first two electrons occupy $n = 1$ energy level and fill the 1*s* orbital.

$$\underset{1s}{\uparrow\downarrow} \quad \underset{2s}{\_\_} \quad \underbrace{\_\_\ \_\_\ \_\_}_{2p}$$

The next three electrons occupy the $n = 2$ main energy level. Two of these occupy the lower-energy 2*s* orbital. The third occupies a higher-energy *p* orbital.

$$\underset{1s}{\uparrow\downarrow} \quad \underset{2s}{\uparrow\downarrow} \quad \underbrace{\uparrow\ \_\_\ \_\_}_{2p}$$

PRACTICE

Answers in Appendix E

1. The electron configuration of nitrogen is $1s^2 2s^2 2p^3$. How many electrons are present in a nitrogen atom? What is the atomic number of nitrogen? Write the orbital notation for nitrogen.
2. The electron configuration of fluorine is $1s^2 2s^2 2p^5$. What is the atomic number of fluorine? How many of its *p* orbitals are filled?

extension

Go to **go.hrw.com** for more practice problems that deal with electron configurations.

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