Pearson

Chapter 5
Chemical Bonding I: Drawing Lewis Structures and Determining Molecular Shapes

Morphinan (a morphine analog) binding to an opiod receptor (based on research done by Brian Kobilka (1955–) and coworkers at Stanford University). Morphine is derived from the sap of the opium poppy.

> "A geometrical and mechanical basis of the physical science cannot be constructed until we know the forms, sizes, and positions of the molecules of substances."
>
> —*George Gore (1826–1908)*

Learning Outcomes

CHEMICAL BONDING IS AT THE HEART of chemistry. In this book, we examine three different theories for chemical bonding. Recall from Section 4.4 that bonding theories explain why atoms bond together to form molecules and predict many of the properties (such as the shapes) of molecules. Therefore, bonding theories play an important role in helping us to see the relationship between the structure of a molecule and its properties. The first and simplest bonding theory is the Lewis model, which we introduced in Chapter 4 and expand upon in this chapter. With just a few dots, dashes, and chemical symbols, the Lewis model helps us to understand and predict a myriad of chemical observations. The Lewis model, combined with a theory called *valence shell electron pair repulsion theory (VSEPR)*, allows us to predict the shapes of molecules. The other two bonding theories are valence bond theory and molecular orbital theory, which we will cover in Chapter 6.