CHAPTER 10 LEARNING OBJECTIVES

To satisfy the minimum requirements for this course, you should be able to:

Use VSEPR to predict the molecular geometry of a molecule or ion with up to 6 electron pairs around the central atom. (Note: In Chang’s terminology, an “electron pair” can be a lone pair, a single bond, a double bond, or a triple bond even though a double bond consists of two electron pairs and a triple bond consists of three electron pairs. To avoid this confusion other textbooks use the term “electron domain” rather than “electron pair”.)

You should be able to:

• predict the arrangement of electron pairs around a specified atom of a molecule or ion
• predict the geometry around a specified atom in a molecule or ion and assign values to the bond angles
• explain why lone pairs of electrons exert a greater repulsive interaction on other regions of electron density than do bonding pairs

Predict from the molecular geometry and the polarities of the individual bonds whether a molecule is polar or nonpolar

Use valence bond theory to explain how a covalent bond forms and to account for molecular geometry. You should be able to:

• explain why bond formation is an exothermic process and bond breaking is an endothermic process
• explain the relationship between atomic orbitals and hybrid orbitals
• recognize names, shapes, and orientation of hybrid orbitals appropriate for central atoms surrounded by up to 6 electron pairs
• use Lewis structures to predict the hybridization state of each central atom in a molecule and the geometry around each atom
• distinguish between σ bonds and π bonds and be able to determine the number of sigma and pi bonds in a molecule
• describe the delocalized π bonding found in species such as benzene and carbonate ion and draw Lewis structures to depict the delocalized bonding.