

Chapters 5
Bonding Theories: Explaining Molecular Geometry
Learning Objectives

8.2.2021

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

1. Use VSEPR to predict the molecular geometry of a molecule or ion with up to 6 electron pairs around the central atom. (**Note:** *In the textbook's (Gilbert, et al.) 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 four electrons and a triple bond consists of six electrons.*) You should be able to:
 - determine the steric number (SN) of the central atom of a molecule or ion
 - predict the electron-pair geometry around a specified atom of a molecule or ion from the SN
 - predict the molecular 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

2. Predict from the molecular geometry and the polarities of the individual bonds whether a molecule is polar or nonpolar
 - explain the relationship between atomic orbitals and hybrid orbitals up to sp^3
 - recognize names, shapes, and orientation of hybrid orbitals appropriate for central atoms surrounded by up to 4 electron pairs.
 - use Lewis structures to predict the hybridization of each central atom in a molecule and the geometry around each atom
 - distinguish between sigma (σ) bonds and pi (π) bonds and be able to determine the number of sigma and pi bonds in a molecule

N.B. Section 5.6 and 5.7 will not be covered.