CHEM 203

Important Topics for Review – See Chapters 1-3 of Brown-Foote-Iverson

Chapter 1

Covalent bonding in organic molecules

Covalent bonding as "electron-sharing" between atomic pairs

Particularly stable electronic configuration of inert (= noble) gases

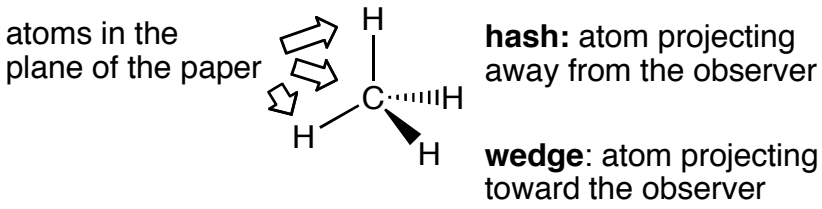
Principle: atoms in a bonded state tend to acquire an electronic configuration similar to that of a noble gas

Bonding in methane: σ-bonds

Valence Shell Electron Pair Repulsion (VSEPR)

Tetrahedral shape of methane predicted by VSEPR and confirmed by experiment

Use of wedges-and-dashed lines to represent the spatial orientation of atoms in a molecule

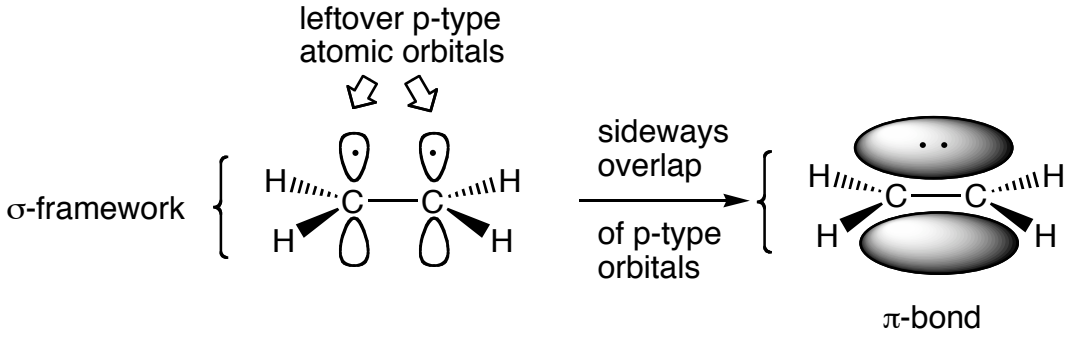


Association of tetrahedral geometry about a carbon atom with sp^3 hybridization

Possible occurrence of multiple bonds (double, triple) between atoms in an molecule

Bonding in ethene (ethylene), $CH_2=CH_2$: a molecule containing a C-C double bond

σ-Framework and π-bonds

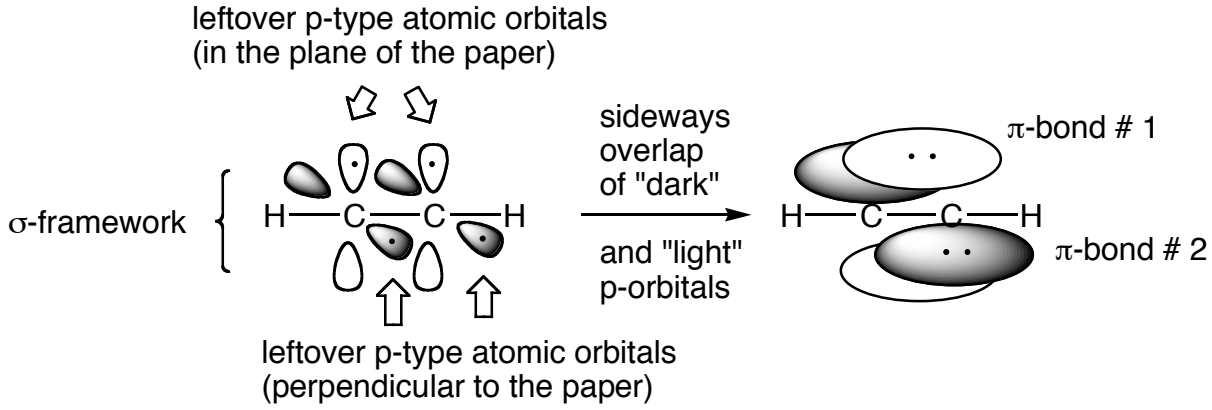


Trigonal geometry of the carbon atoms in ethene (ethylene) and related structures as predicted by VSEPR and as confirmed by experiment

Association of trigonal geometry about a carbon atom with sp^2 hybridization

Bonding in ethyne (acetylene), H–C≡C–H: a molecule containing a C-C triple bond

Presence of two independent π-bonds in acetylene



Linear geometry of the carbon atoms in acetylene and related structures as predicted by VSEPR and as confirmed by experiment

Association of linear geometry about a carbon atom with sp hybridization

Functional groups

Resonance

Chapter 2

Alkanes: structure, isomerism, and conformation (eclipsed, staggered forms)

Cycloalkanes (only monocylic molecules; i.e., those containing only 1 ring)

Conformations of cyclohexane (chair, boat, twist-boat)

Cis-trans isomerism in cycloalkanes

Axial and equatorial bonds in a chair cyclohexane

Chapter 3

Stereoisomers

Enantiomers

Optical activity

Specific rotation

Chirality

Centers of chirality

Stereogenic atoms / centers

R and *S* convention for designation of configuration of stereogenic centers

Diastereomers

meso compounds

racemic compounds and their resolution into the two enantiomers

Fischer projections.