Introduction to
Organic Chemistry
HSSP
Myriam Taibi
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Periodic Table
Bonding in Carbon

• Carbon-12
  – $1s^2\ 2s^2\ 2p^2$
  – How many valence electrons in carbon? How can you tell?

• Organic Chemistry
  – Study of carbon containing compounds and its properties
  – Synthesis
Quick Review

• Covalent Bonds
  – Sharing of electrons between atoms in a molecule

• Octet Rule
  – Atoms combining together to give stable structure with 8 valence electrons in outer shell
Quick Review Contd.

• **Valence Shell Electron Pair Repulsion Theory (VESPR)**
  – Geometry of compound determined by electrostatic repulsion of valence electrons

• **Hybridization Theory**
  – Mixing of atomic orbitals to form new hybrid orbitals

• **Molecular Orbital Theory (MO)**
  – Determining molecular structures with moving electrons
Hybridization

\( s \text{ orbital} + p \text{ orbitals} \rightarrow sp^2 \text{ hybrid orbitals (trigonal planar)} \)
Methane – $\text{CH}_4$

- **Valence Shell Electron Pair Repulsion model (VSEPR)**
  - Carbon has four valence electrons
  - Forms 4 bonds
  - Tetrahedral

- **Hybridization**
  - $\text{sp}^3$ orbitals

**Structural formula**

H

C

H

H

**Lewis Dot Structure**

H : C : H

H

H

109.5
Resonance

• Movement of delocalized electrons in compound that gives more than 1 Lewis Structure
  – Major & Contributing structures
  – Gives compound stability!

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\begin{align*}
\text{Carbonate ion} &= \overset{-\text{O}}{\text{C}}\overset{-\text{O}}{\text{O}}^- \quad \overset{-\text{O}}{\text{C}}\text{O} \quad \overset{-\text{O}}{\text{C}}\overset{-\text{O}}{\text{O}}^- \\
\end{align*}
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Resonance

• Conjugation
  – System where atoms are covalently bonded with alternating single and multiple bonds

  benzene or

  – Can have atoms with electrons available in p-orbitals (like oxygen)

  furan
Benzene

P-orbitals (lobes on top) mix together to form delocalized “donut” from moving e-
Same occurs for bottom lobes of p-orbitals