(10) **Today**

Sections 2.4 – 2.6
Resonance/Electron Delocalization

Next Class (11)

Sections 2.4 – 2.6
Resonance/Electron Delocalization

Sections 2.7 – 2.11
Acids and Bases

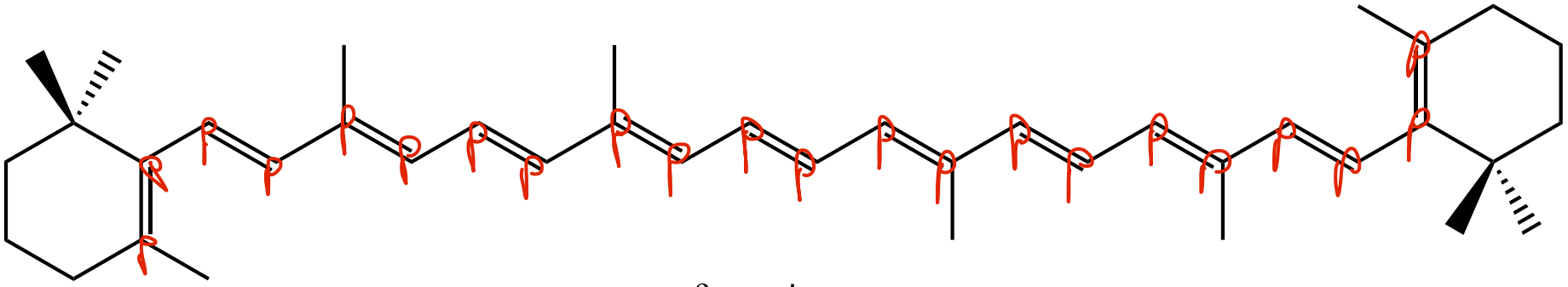
Second Class from Today

Test on Chap 1 and Chap 2 through section 2.6

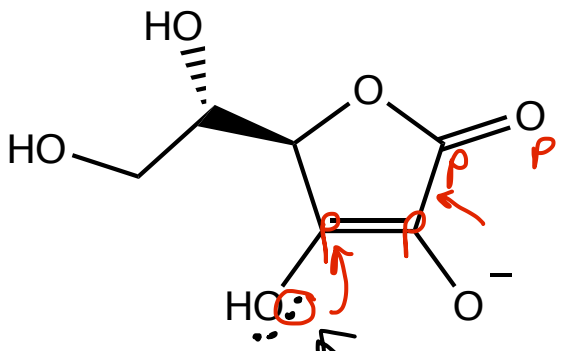
Third Class from Today (12)

Sections 2.7 – 2.11
Acids and Bases

Resonance: Where else do we see extended π systems/electron delocalization?



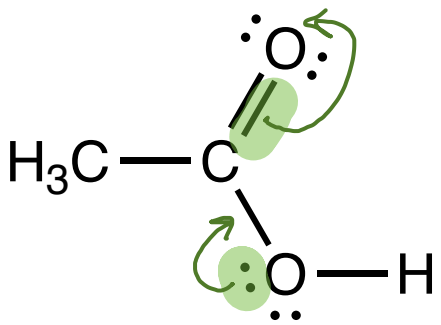
β-carotene

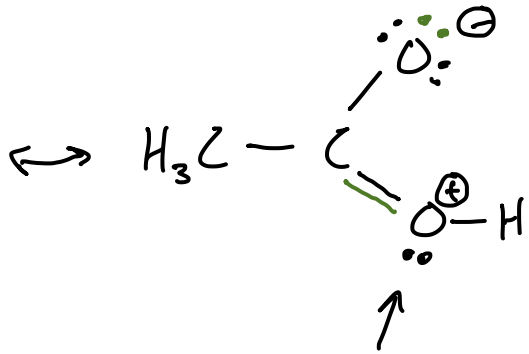


Vitamin C

not sp^3 it is sp^2 because 1 pair of lp e^-'s are delocalized into the π bond

Whenever 3 or more p orbitals are in a row experiments and MO theory say that the electrons are delocalized over all of the p orbitals.





FC = 6 − (6 + 1) = −1

FC_O = 6 − (2 + 3) = 1

v e⁻ in neutral atom

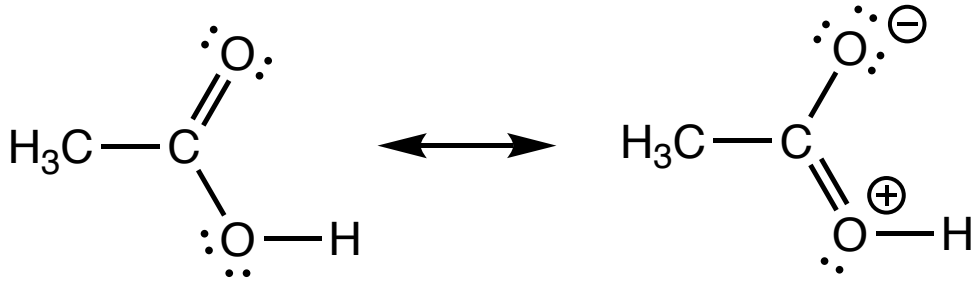
The more stable the resonance contributor is, the more it contributes to the resonance hybrid

What factors make the contributor less stable

1. Charge separation

2. “Wrong” charges
   - negative charge is not on the most electronegative element and
   - a positive charge is on the most electronegative element

3. Incomplete octets



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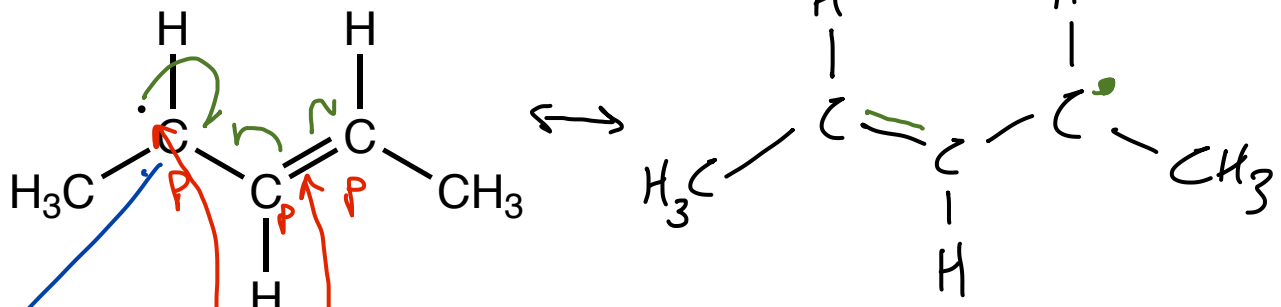
reactive intermediate



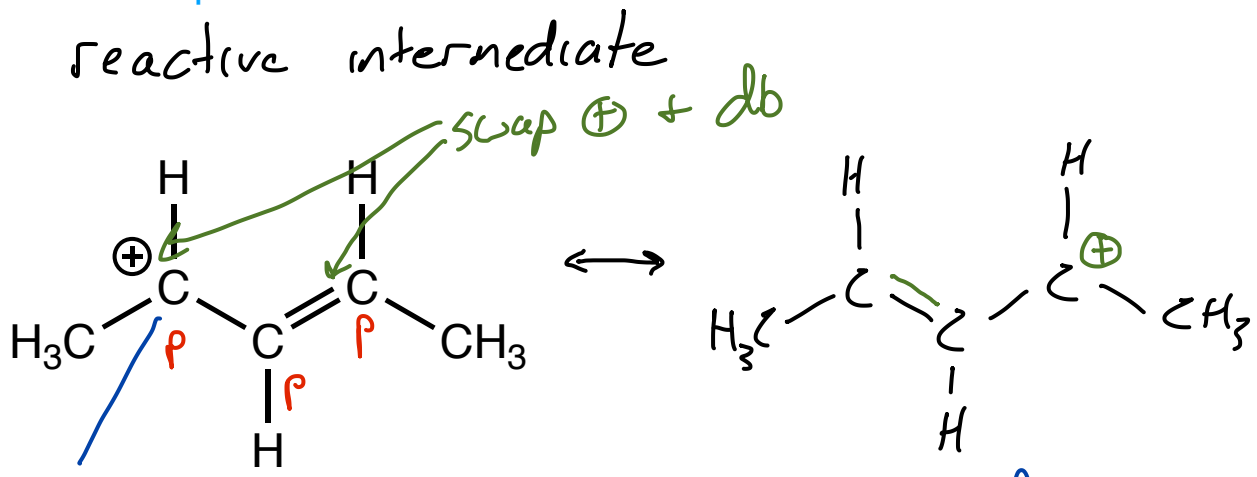
switch position of • and =

sp^2 hybridized

radical e^- is in an unhybridized p orbital

Whenever 3 or more p orbitals are in a row, experiments and MO theory say that the electrons are delocalized over all of the p orbitals.

reactive intermediate



sp^2 hybridized C ... empty unhybridized p orbital

⊕ charge means C is missing e^-'s

$$FC_2 = \#\ V\ e^-_{start} - (lp\ e^- + \tfrac{1}{2}\ bp)$$

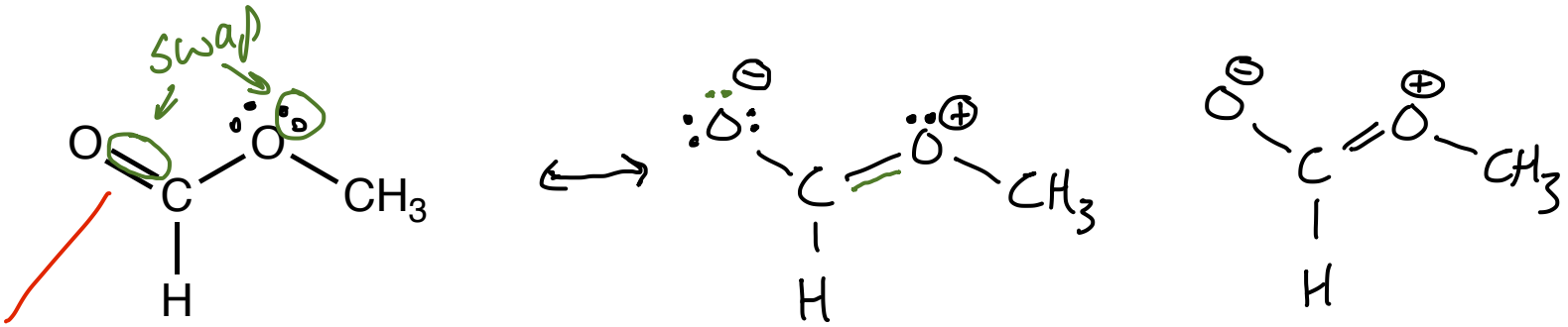
$$+1 = 4 - (lp\ e^-\text{'s} + 3)$$

$$+1 = 4 - lp\ e^- - 3$$

$$+1 = 1 - lp\ e^-$$

Rules for drawing Resonance Contributors

1. **atoms don't move**, only electrons
2. **don't move σ bonds**, only π bonds, lone pair e–'s, or unpaired e–'s (radicals)
3. the total number of electrons must stay the same, **don't change the net charge**
4. p orbitals must be able to line up parallel to each other



π bond

anything or adjacent atom that can be delocalized?

another π bond, lp e⁻, unpaired e⁻, or empty p orbital

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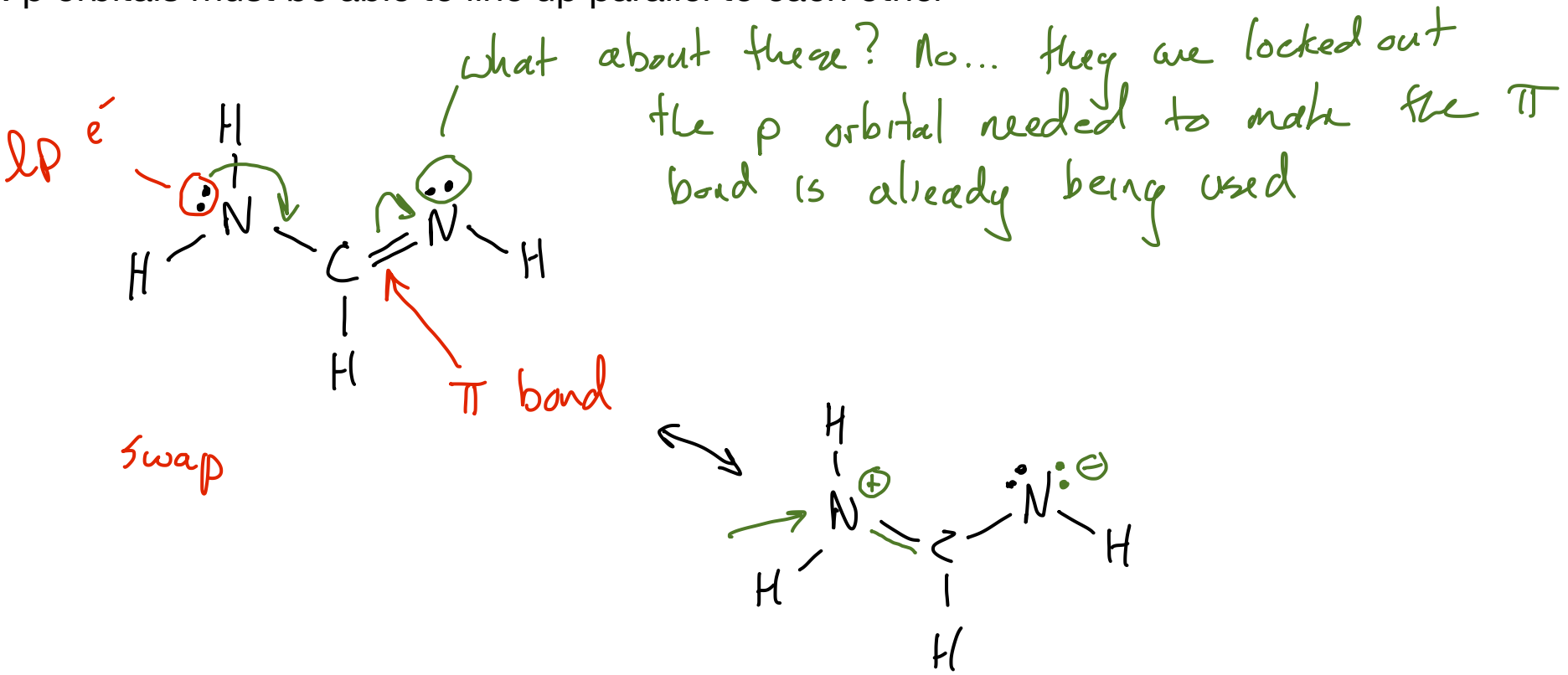

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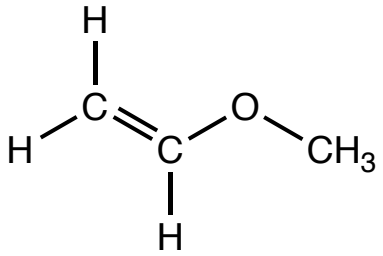

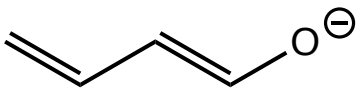

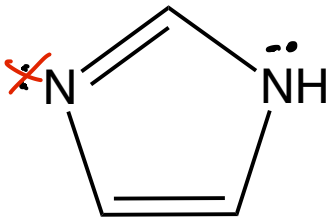

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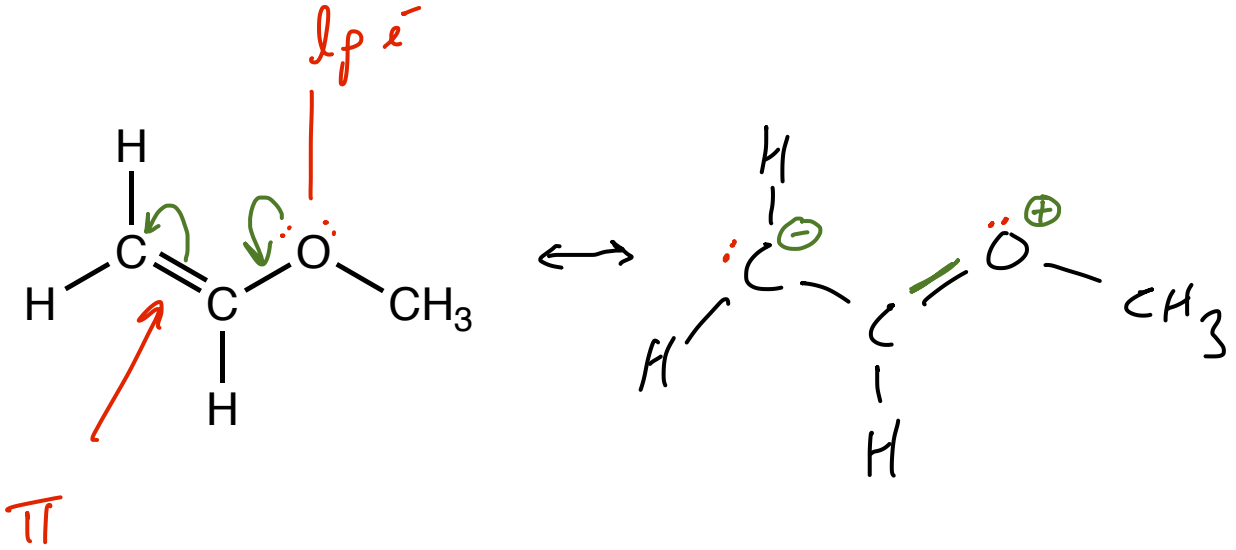

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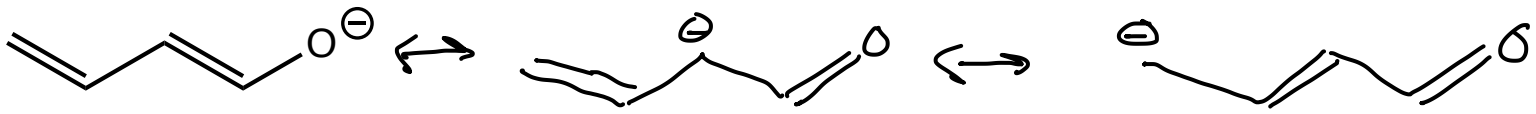

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