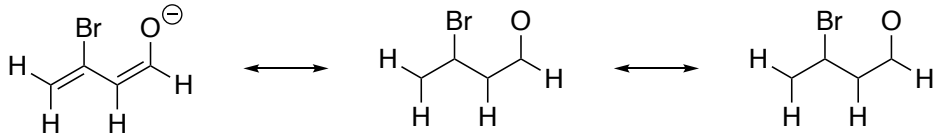
Rules for Drawing Resonance Structures:

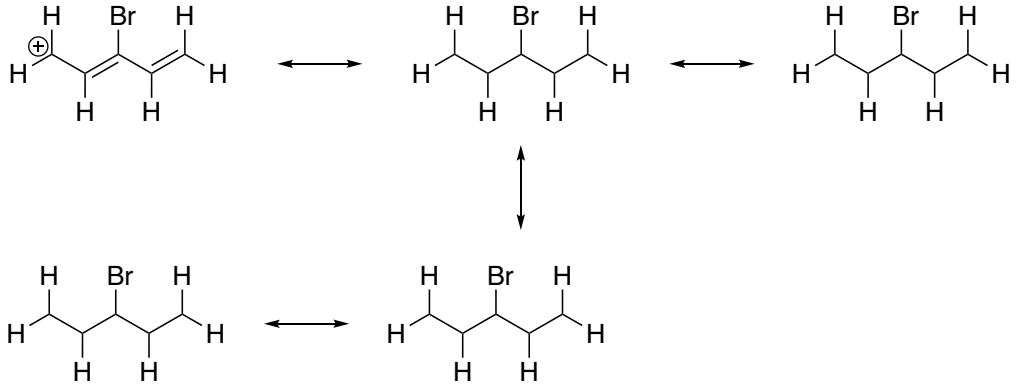
1. Leave atoms where they are at!
2. Draw in all hydrogens and lone pairs to start with
3. Electrons move
4. Electrons in π bonds or non-bonding pairs readily participate in resonance
    a. Therefore, lone pairs on oxygen, halogens, nitrogen, etc and anions can participate in resonance.
    b. Be aware: high-energy (separation of charges) resonance forms can and will be drawn to explain certain concepts; you will be explicitly directed to draw high-energy resonance forms when necessary.
    c. It is possible to draw high-energy resonance structures whereby sigma electrons move; however, that concept is outside the scope of this course.
5. The total number of electrons does not change.
6. Do not exceed the octet rule on any atom.
7. The overall net charge of the molecule never changes.

Rules for moving Electrons in Resonance Structures:

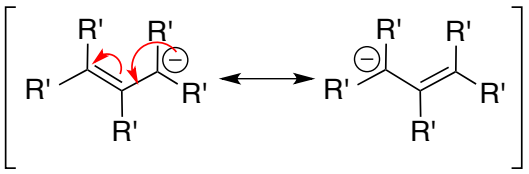
1. Move π electrons toward a positive (+) charge
2. Move non-bonding pair (or single electron/radical) toward a π bond
3. Move a non-bonding pair toward a positive (+) charge
4. Move π electrons toward π bond
5. Move π electrons up onto a heteroatom
6. Draw the arrows then draw the resulting structure

Examples:

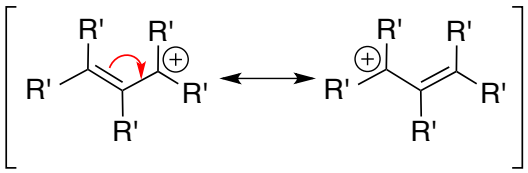




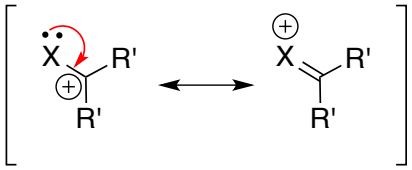
Anion Resonance Structures



Cation Resonance Structures

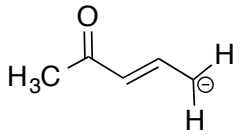


OR



X = O, N, S, Cl, Br, I, etc

A



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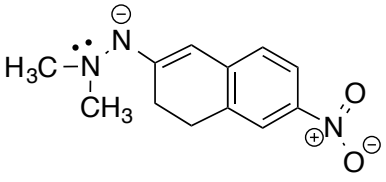

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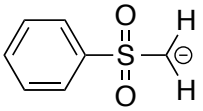

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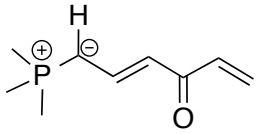

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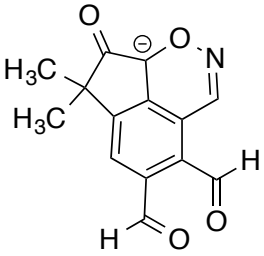

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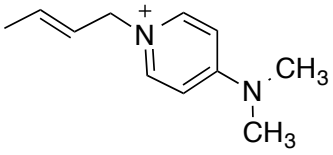

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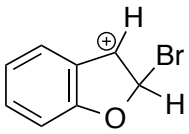

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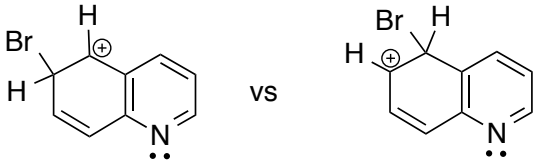

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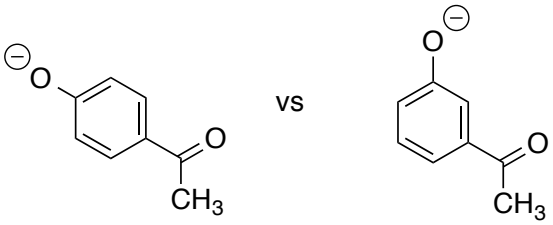

J