Master Organic Chemistry

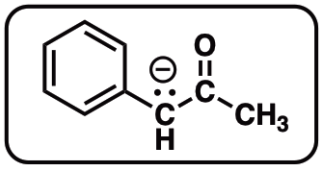
Resonance Exam Preparation Pack

Answer Key

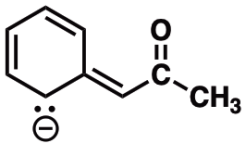
Section A: Identifying Proper Resonance Forms

Link to answer
http://bit.ly/Res-MOC-1

A-1 Which of these molecules is NOT a resonance form of



A



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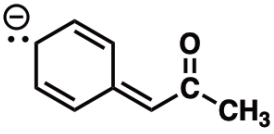

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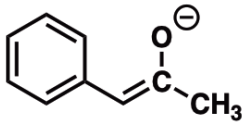
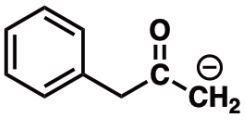
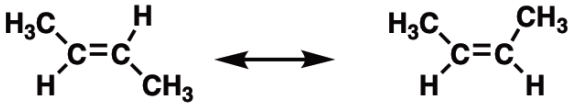


D



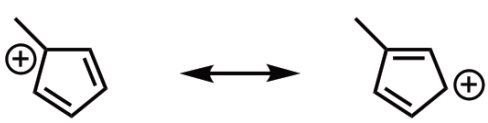
A-2 Which of these represents a pair of resonance forms? http://bit.ly/Res-MOC-2

A

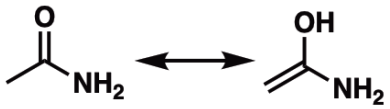


B

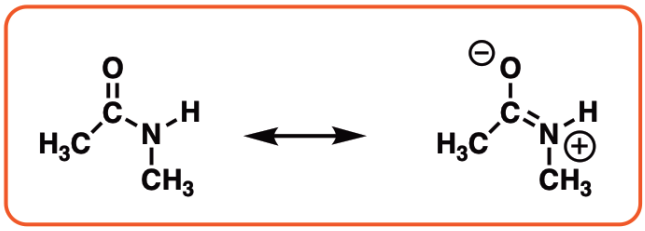
C

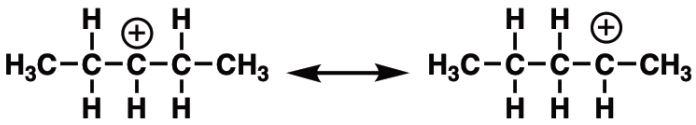


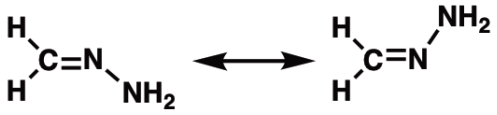
D



A-3 Which of these represents a pair of resonance forms?



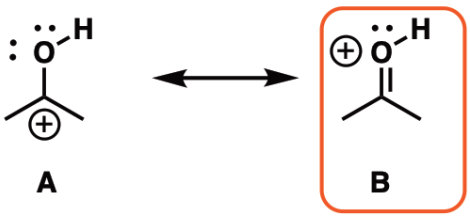


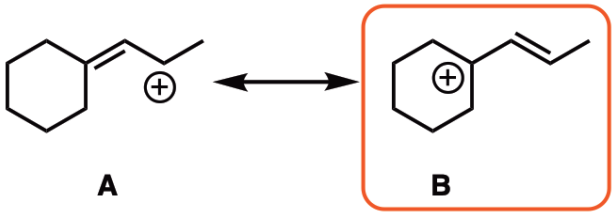


http://bit.ly/Res-MOC-3

Section B: Identifying Important Resonance Forms

B-1 Which resonance form is more important?





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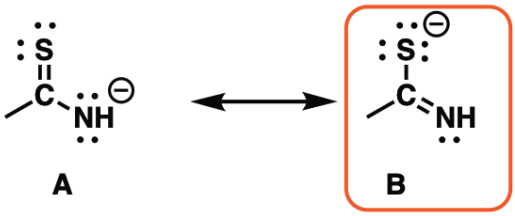
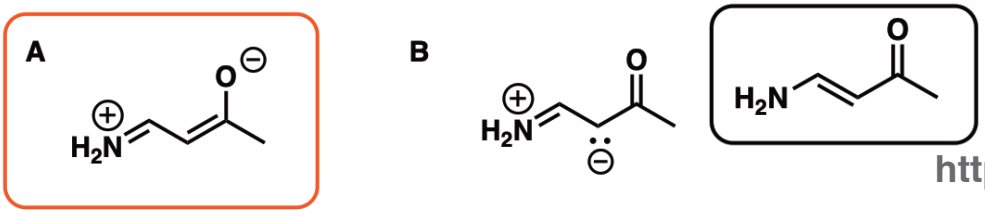


B-2 Which resonance form contributes the most to the resonance hybrid of



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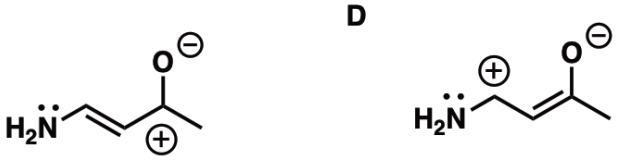
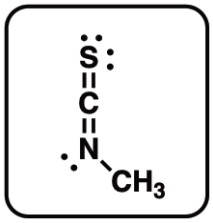
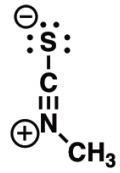


B-3 Which resonance form contributes the most to the resonance hybrid of

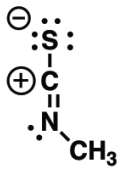


http://bit.ly/Res-MOC-6

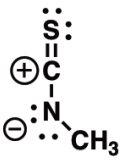
A



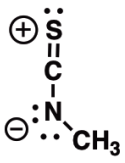
B



C



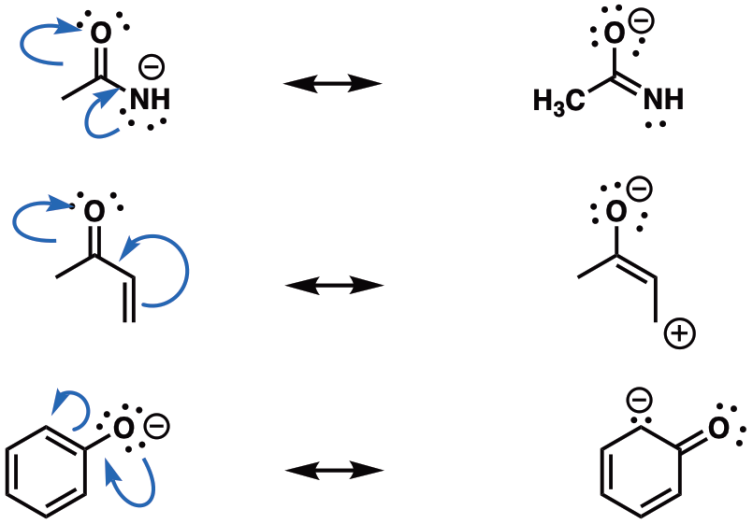
D



Section C: Drawing Curved Arrows

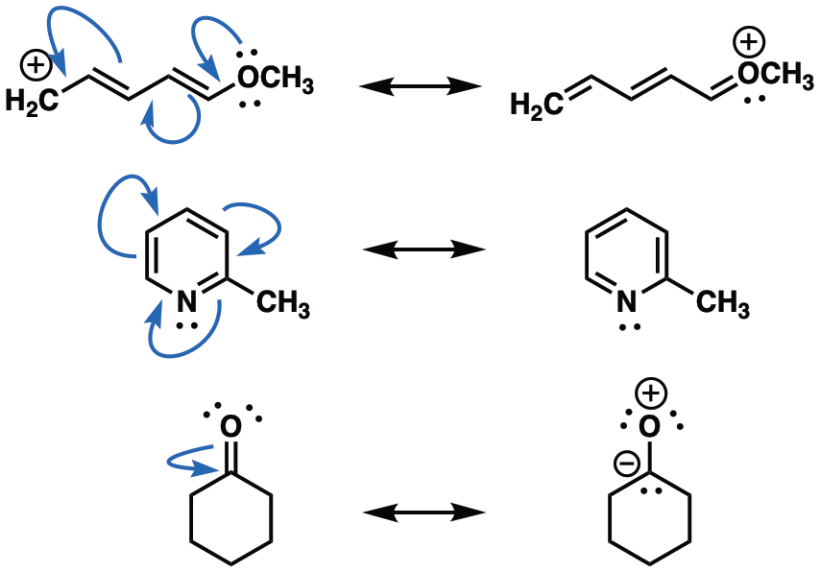
C-1 Draw in the curved arrows to convert left-hand resonance forms to the right-hand resonance form.

http://bit.ly/Res-MOC-7



C-2 Draw in the curved arrows to convert the left-hand structures to the right-hand structures.

http://bit.ly/Res-MOC-8

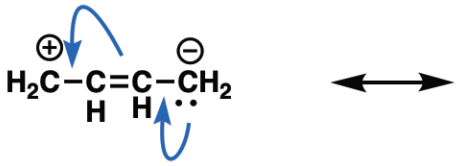


Section D: Draw One Resonance Form For The Molecule

D-1 Draw a more important contributing structure for each of these two examples. Use curved arrows and show formal charges.

http://bit.ly/Res-MOC-9

No empty octets



Less overall charge

D-2 a) Draw a reasonable resonance structure for this molecule:

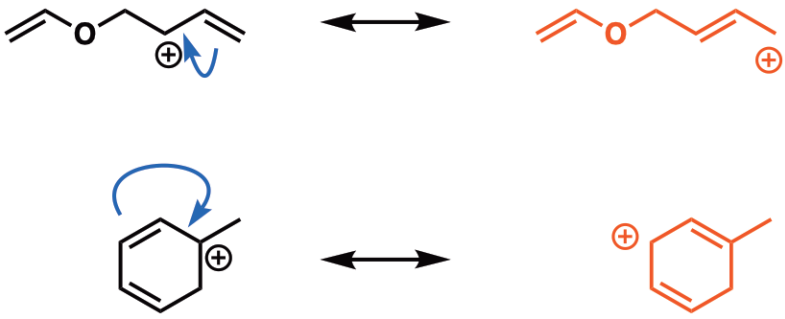
http://bit.ly/Res-MOC-10

b) Which is more favorable? Why? **One on right has negative charge on oxygen not carbon**

c) Draw the resonance hybrid of this molecule (use partial bonds and partial charges as required)

D-3 Draw a single REASONABLE resonance structure of these species. Use curved arrows. Show lone pairs and formal charges.

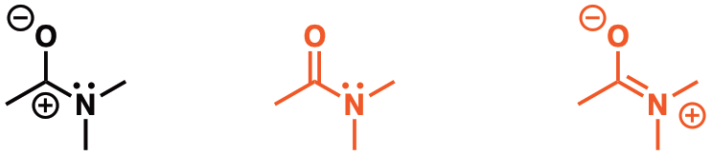
http://bit.ly/Res-MOC-11



Section E: Draw all resonance forms for a molecule, or all "reasonable" resonance forms.

E-1 Create two reasonable resonance drawings for this molecule:

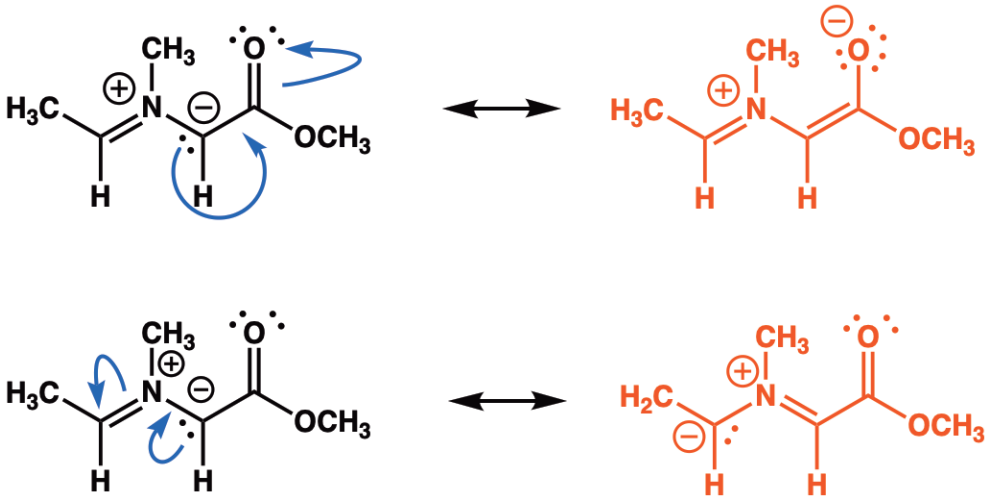
http://bit.ly/Res-MOC-12



Of the three resonance forms, which is the least important ("stable")? **One on far left is least stable, has empty octet on C**

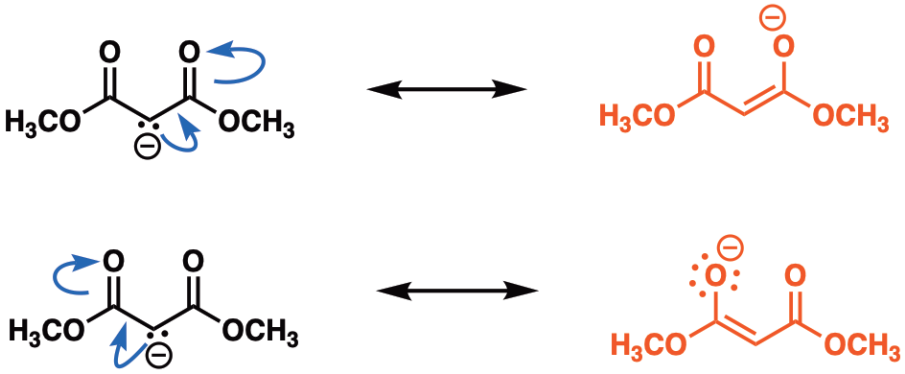
E-2 Draw two resonance structures and use curved arrow notation to show how they can be interconverted

http://bit.ly/Res-MOC-13



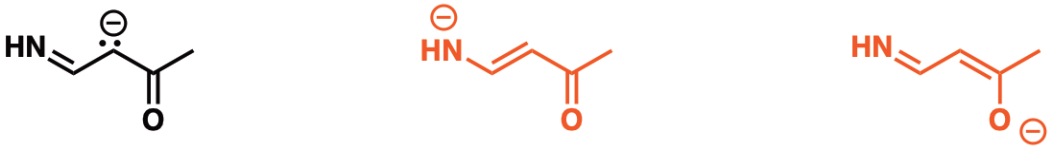
E-3 Draw two resonance structures and use curved arrow notation to show how they can be interconverted

http://bit.ly/Res-MOC-14



E-4 Draw two other contributing structures for this species

http://bit.ly/Res-MOC-15

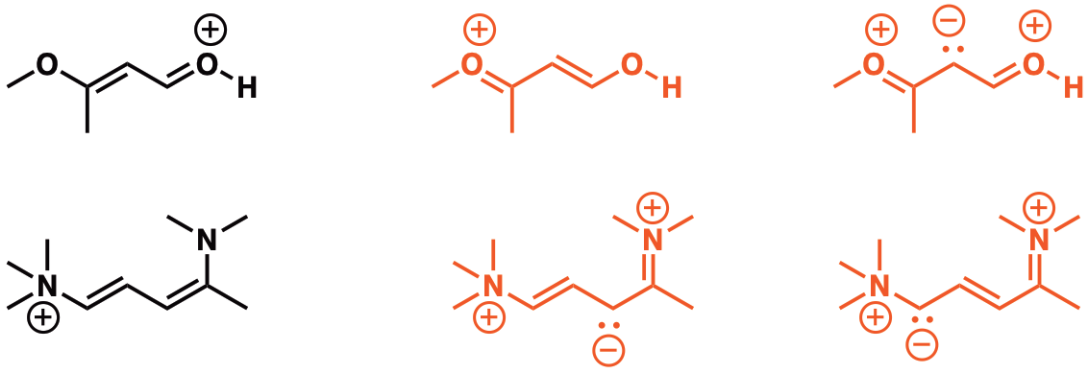


Which one is most important, and why?

One on far right, negative charge is on most electronegative atom

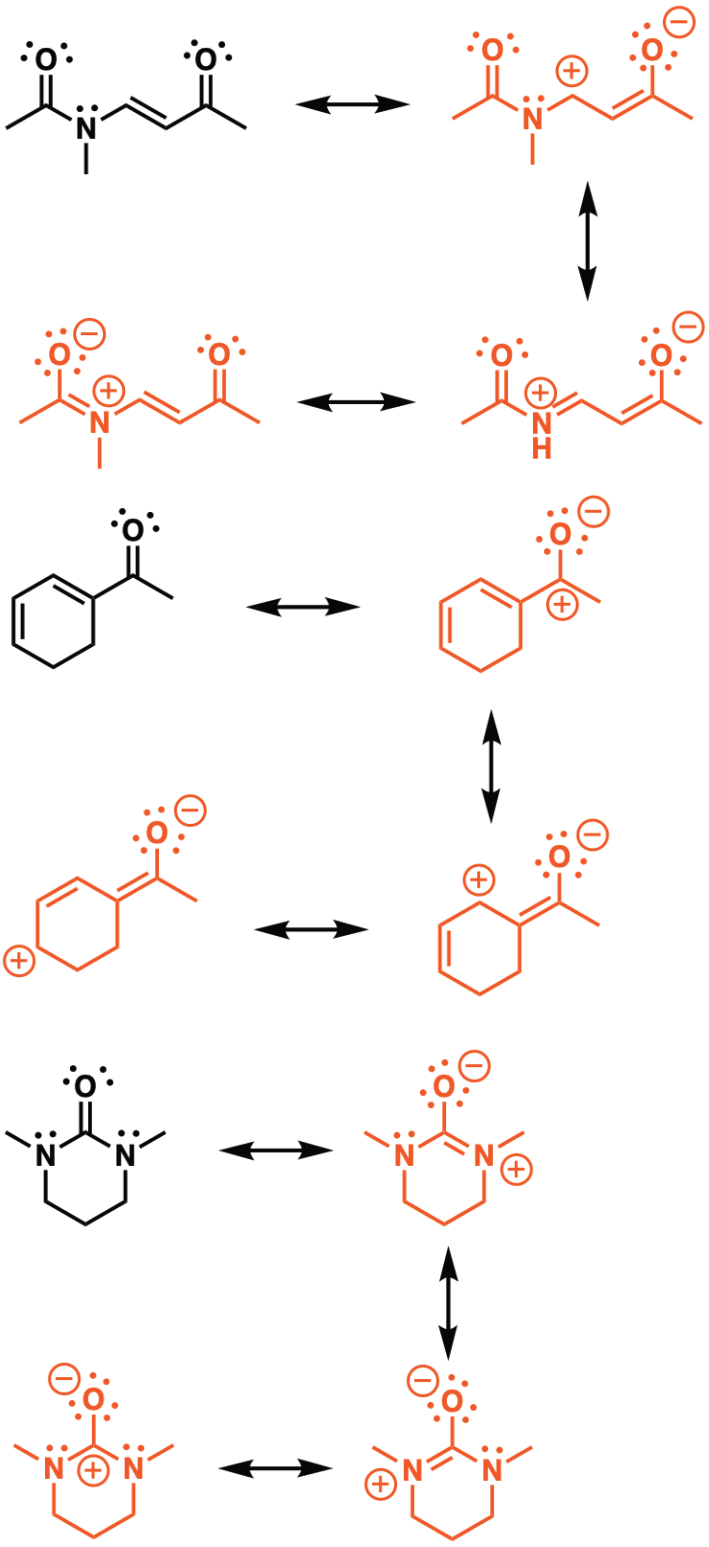
E-5 Draw the next two most important resonance forms of each molecule. Indicate formal charges.

http://bit.ly/Res-MOC-16



E-6 Provide three additional reasonable resonance structures for each of the following compounds.

http://bit.ly/Res-MOC-17



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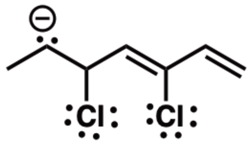
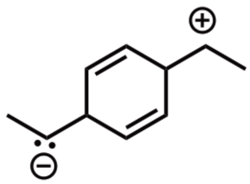
E-7 Draw all other reasonable resonance structures (if any)

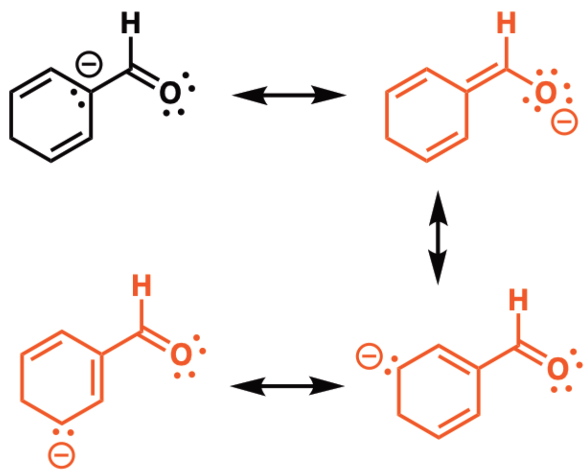
http://bit.ly/Res-MOC-18

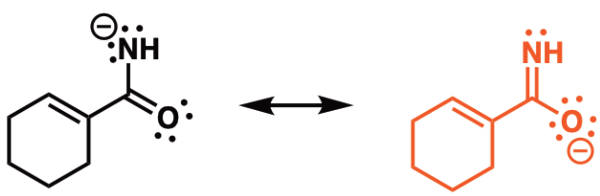


None!



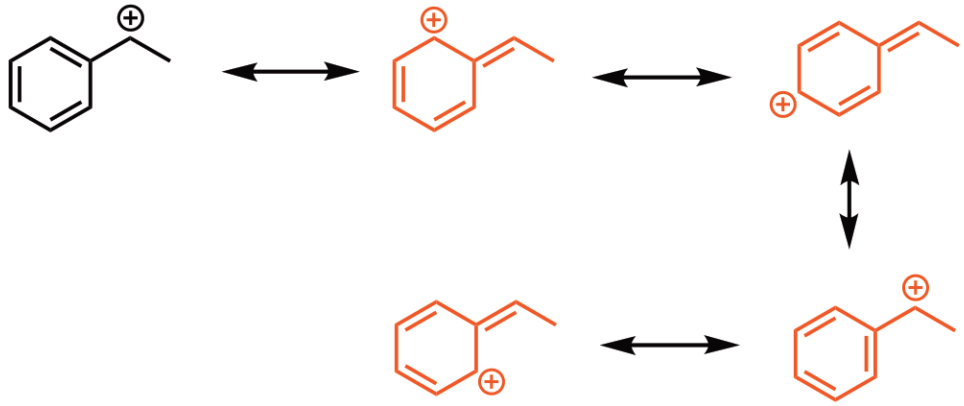
None!

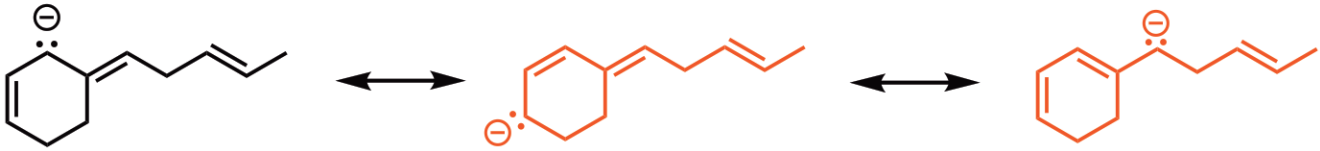




E-8 Draw all other reasonable resonance structures for these molecules.

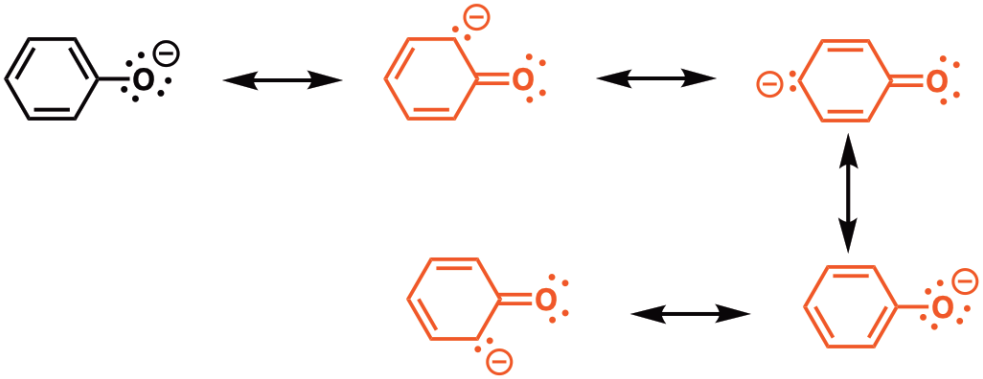
http://bit.ly/Res-MOC-19





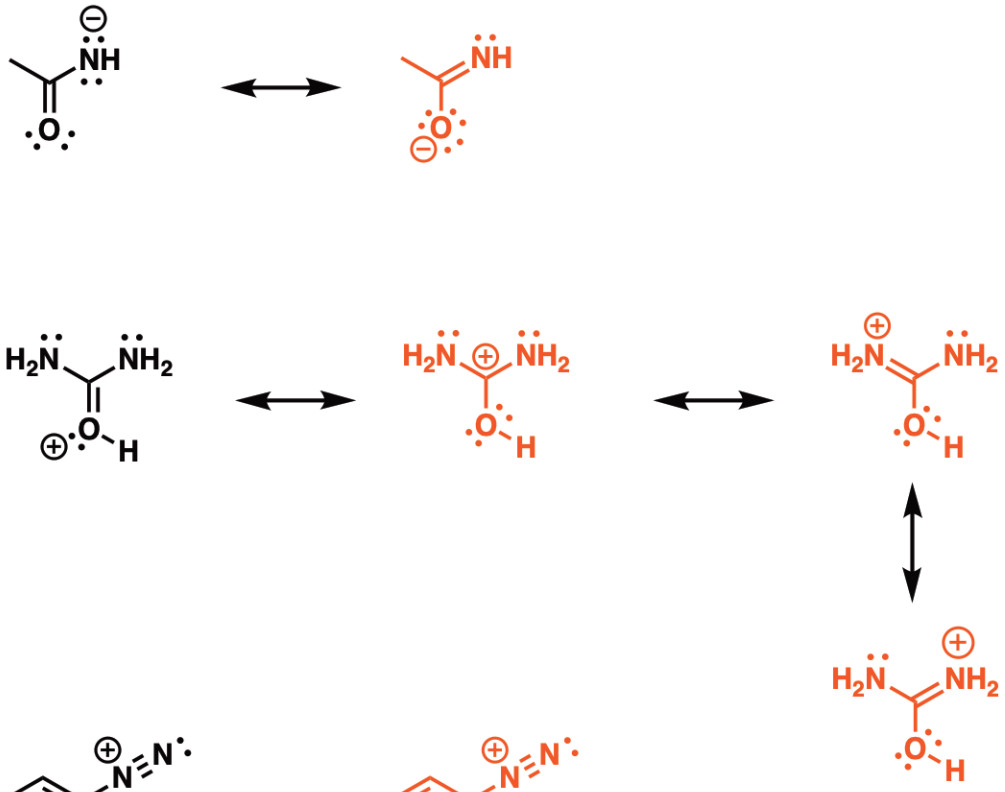
E-9 Draw the important resonance forms of this molecule:

http://bit.ly/Res-MOC-20



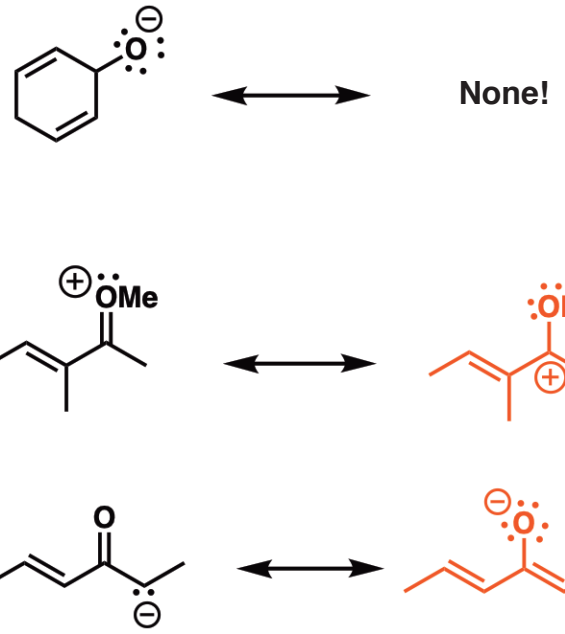
E-10 Draw important resonance forms of:

http://bit.ly/Res-MOC-21



E-11 Draw all other reasonable resonance structures.

http://bit.ly/Res-MOC-22



Section F - Draw Resonance Forms And Structure

http://bit.ly/Res-MOC-23

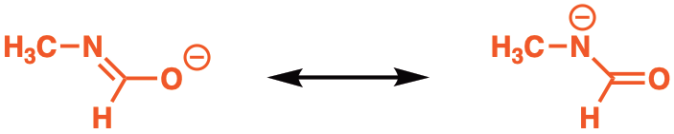
F-1 Draw the two most important contributing structures for nitromethane CH_3NO_2 which has N bonded to C and no bonds between oxygens.

F-2 Draw both resonance forms of diazomethane [CH_2N_2]. Show lone pairs and any formal charge.

http://bit.ly/Res-MOC-24

F-3 Draw the most important resonance forms of $CH_3\overset{\ominus}{N}CHO$ [hint: not cyclic]

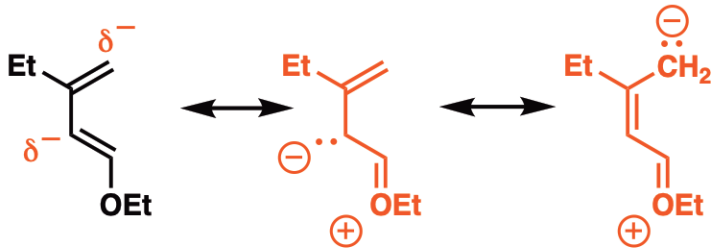
http://bit.ly/Res-MOC-25



Section G - Which Carbon Bears Partial Charge?

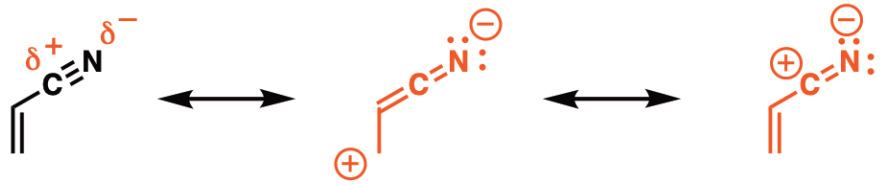
G-1 Which carbons bear partial negative charge? Justify with resonance structures.

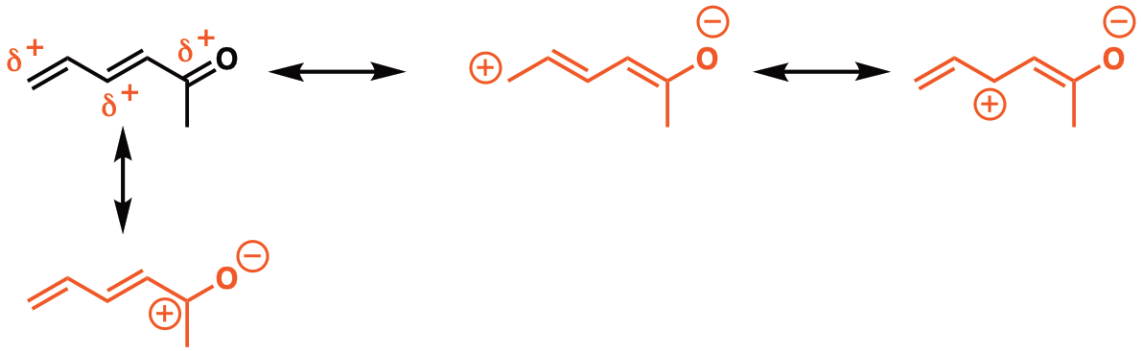
http://bit.ly/Res-MOC-26



G-2 Which carbons bear partial positive charge? Justify with resonance structures.

http://bit.ly/Res-MOC-27

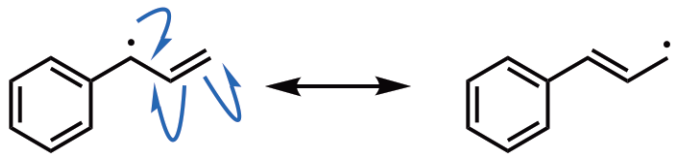




Section H - Draw Radical Resonance Forms

H-1 Show interconversion between these resonance forms using curved arrow notation. Which is more important?

http://bit.ly/Res-MOC-28

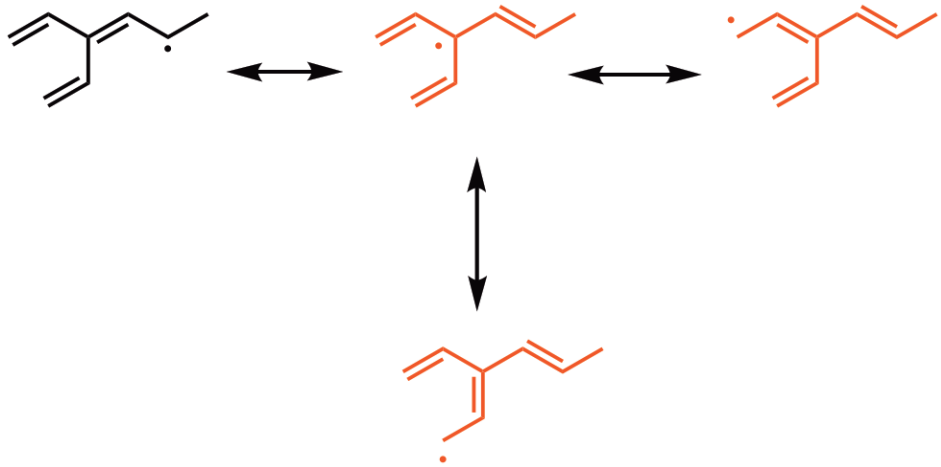


more important (secondary)

H-2 Draw all resonance forms for this molecule and indicate which is the most important.

http://bit.ly/Res-MOC-29

most important (tertiary)



H-3 Draw all resonance structures for the compound below.

http://bit.ly/Res-MOC-30