# Resonance Exam Preparation Pack

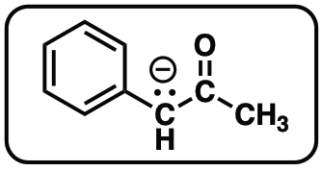
## Answer Key

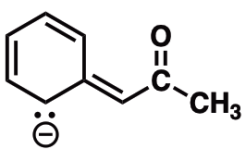
note - all problems can also be found here (link)

### Section A: Identifying Proper Resonance Forms

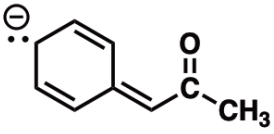
Link to answer
https://bit.ly/3APtZkv

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





A



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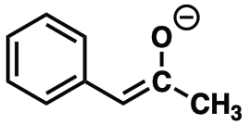
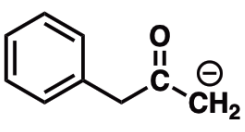


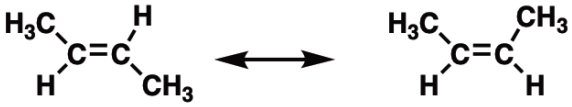
C



D

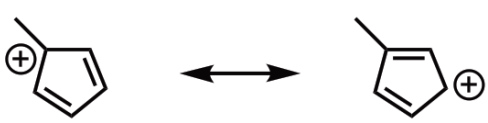
**A-2** Which of these represents a pair of resonance forms? https://bit.ly/2XQpx6p

A

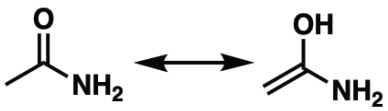


B

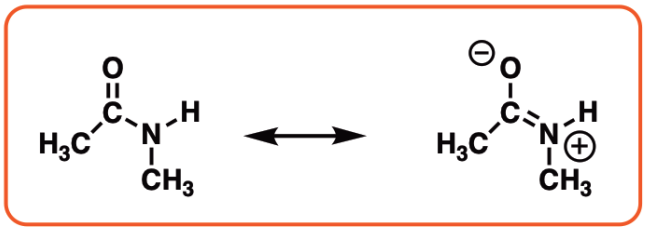
C

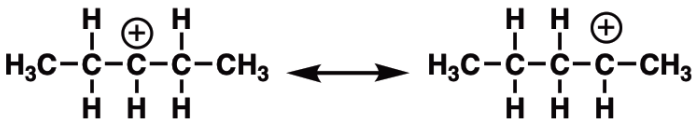


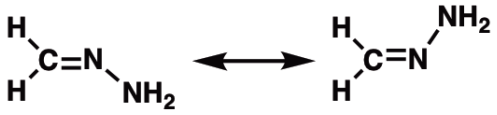
D



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



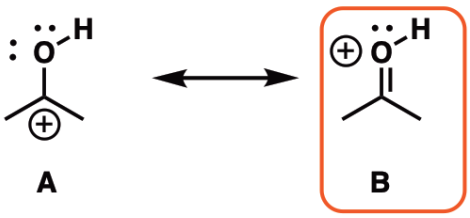


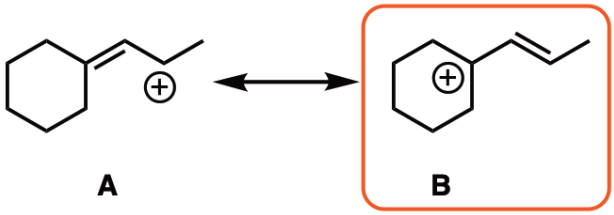


https://bit.ly/2XSeKZs

## Section B: Identifying Important Resonance Forms

**B-1** Which resonance form is more important?

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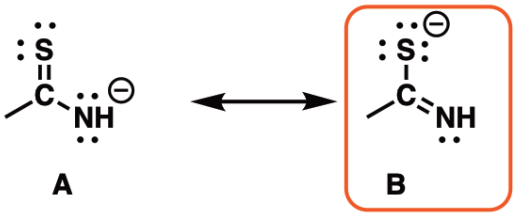
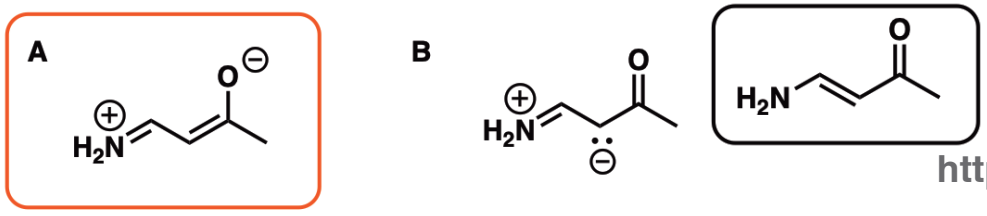
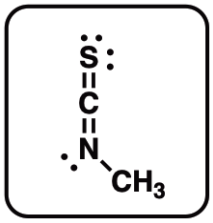



**B-2** Which resonance form contributes the most to the resonance hybrid of



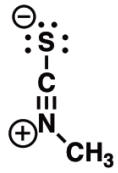

https://bit.ly/3AUhfZR

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

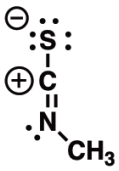


https://bit.ly/3kONfsX

A



B



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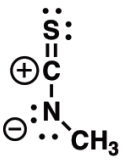
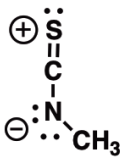


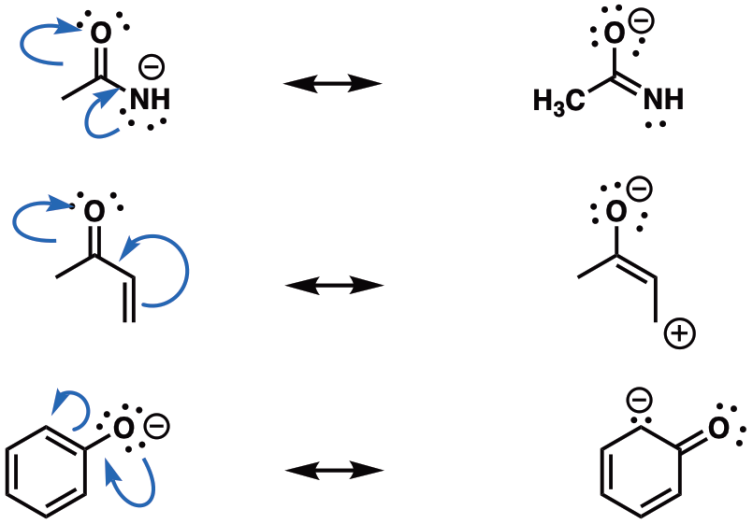
D



## Section C: Drawing Curved Arrows

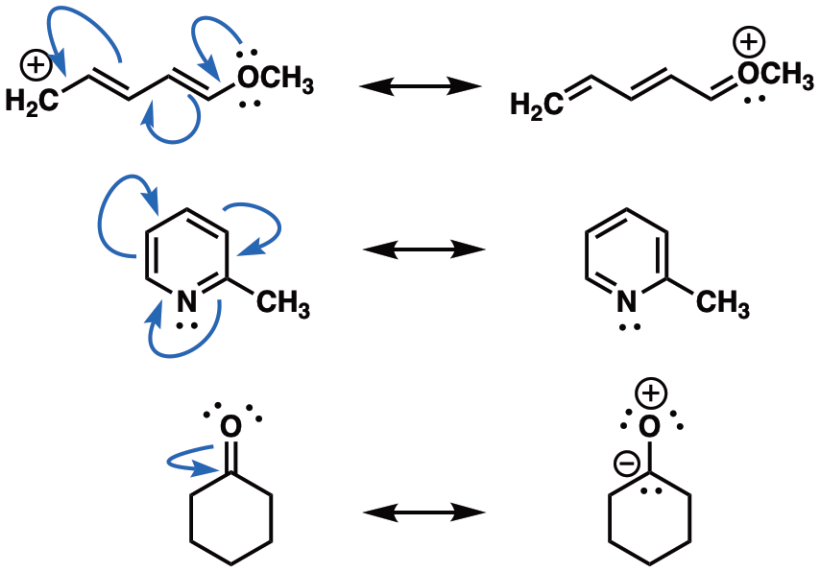
**C-1** Draw in the curved arrows to convert left-hand resonance forms to the right-hand resonance form.

https://bit.ly/3AL9ANr



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

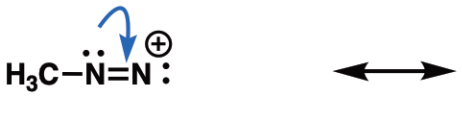
https://bit.ly/3kMpula



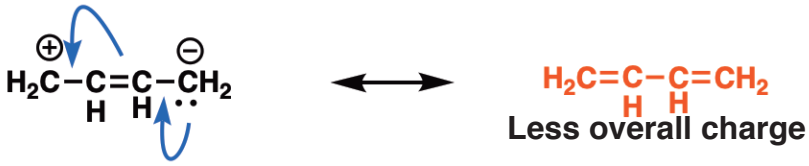
## Section D: Draw One Resonance Form For The Molecule

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

https://bit.ly/3zP0CNV



**No empty octets**



**Less overall charge**

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

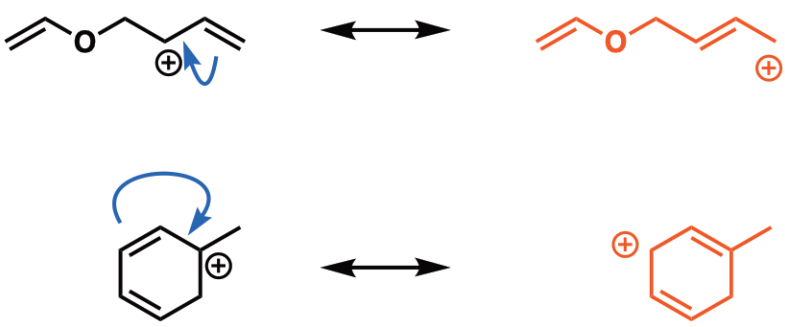
https://bit.ly/3kOEoHF

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.

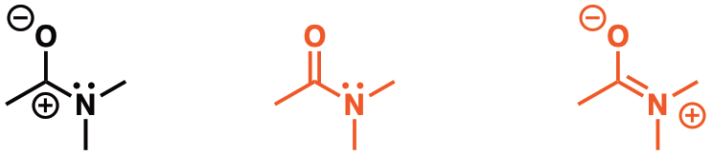
https://bit.ly/39l59qV



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

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

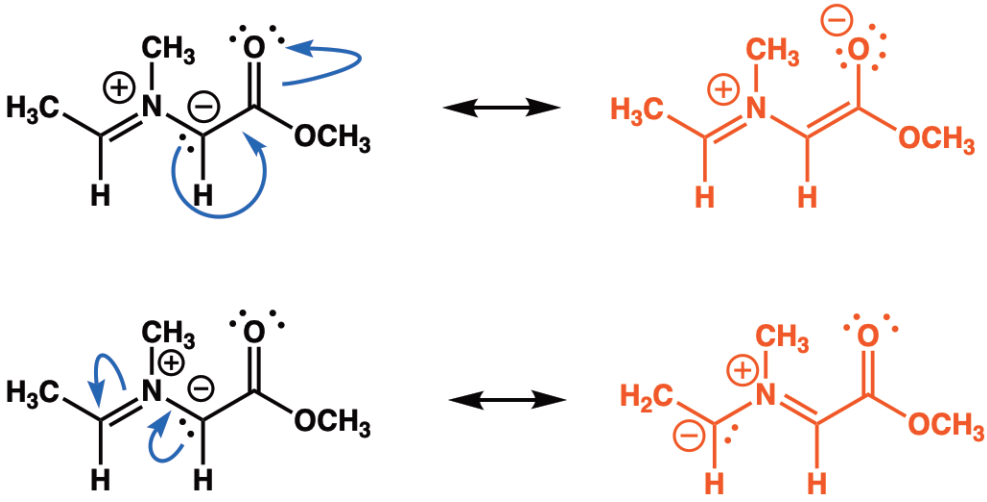
https://bit.ly/2XYTdhT



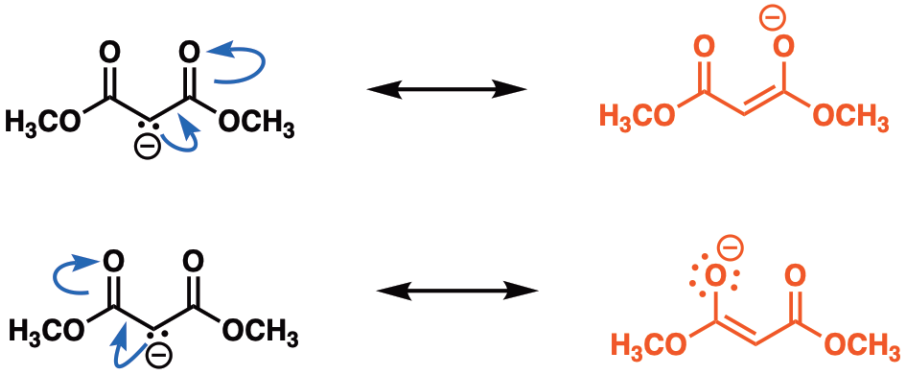
Of the three resonance forms, which is the least important ("stable")? **One on far left is least stable, has empty octet on C**

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

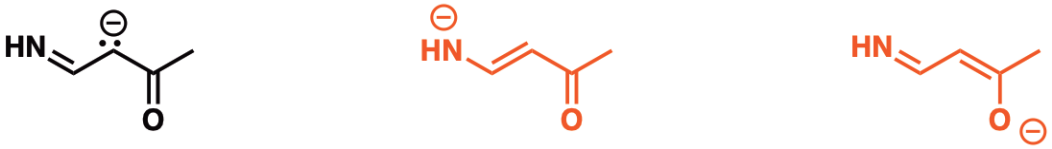
https://bit.ly/3kOEWNB



**E-3** Draw two resonance structures and use curved arrow notation to show how they can be interconverted https://bit.ly/3ukQpHI



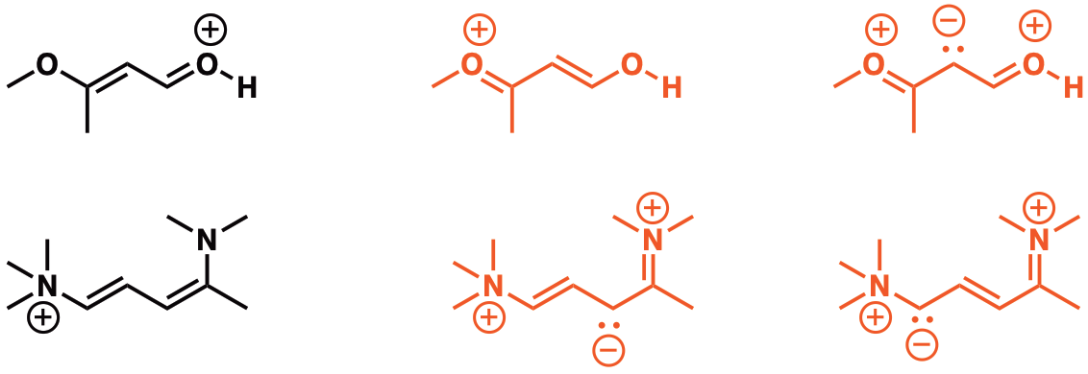
**E-4** Draw two other contributing structures for this species https://bit.ly/3APFok5



Which one is most important, and why?

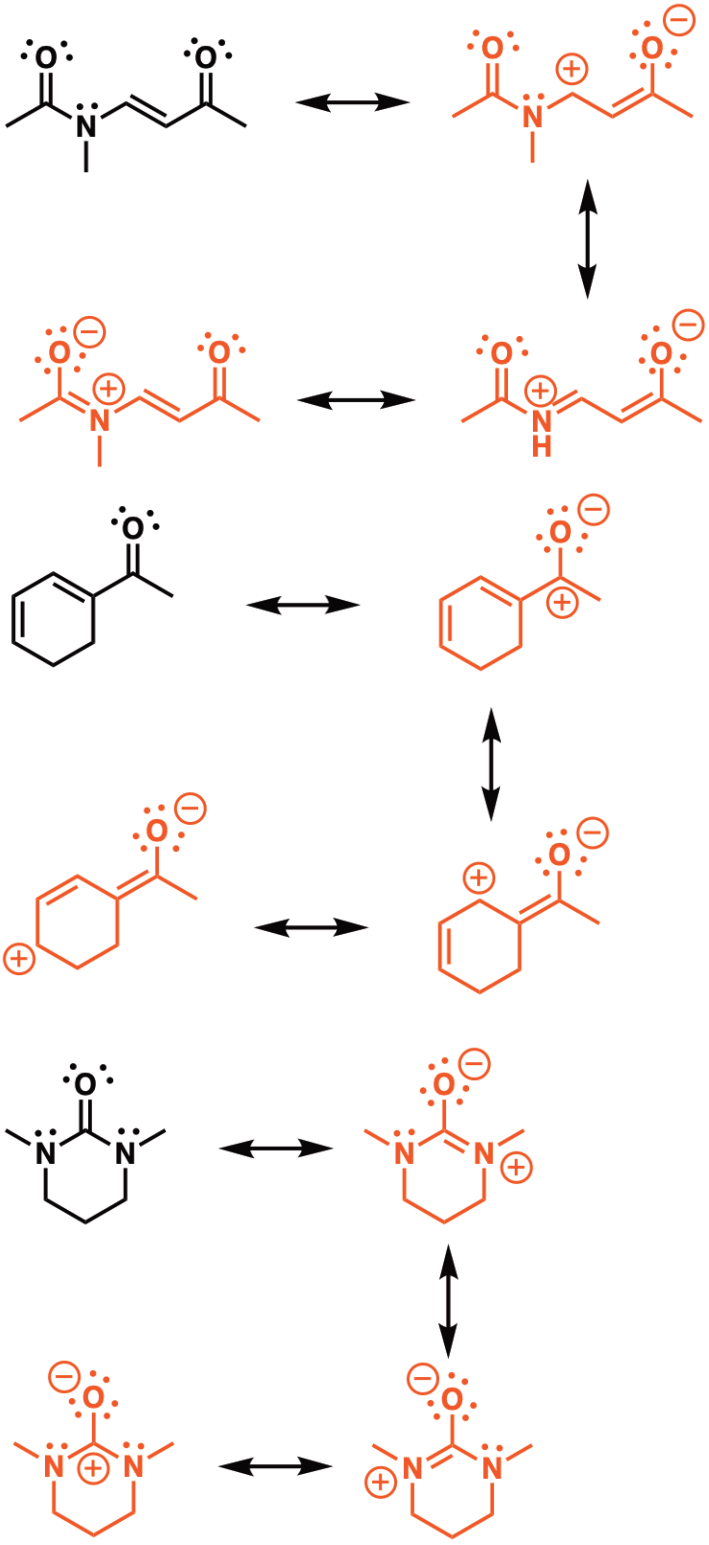
**One on far right, negative charge is on most electronegative atom**

**E-5** Draw the next two most important resonance forms of each molecule. Indicate formal charges. https://bit.ly/3urUQAH



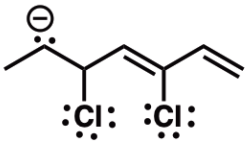
**E-6** Provide three additional reasonable resonance structures for each of the following compounds.

https://bit.ly/3kOt65Y

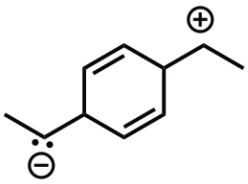


**E-7** Draw all other reasonable resonance structures (if any)

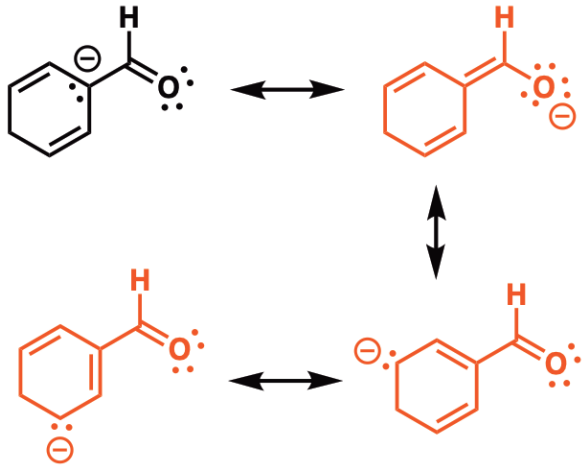
https://bit.ly/2XQqD21

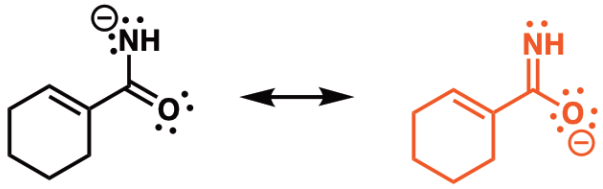


**None!**



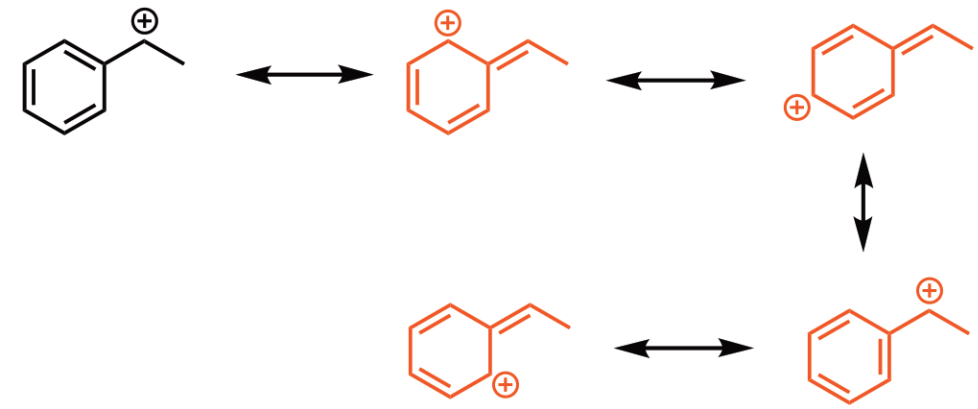
**None!**

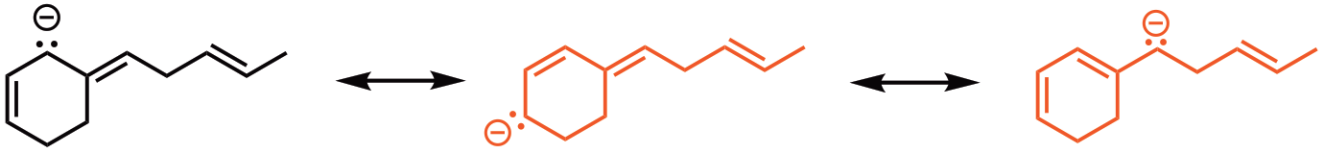




**E-8** Draw all other reasonable resonance structures for these molecules.

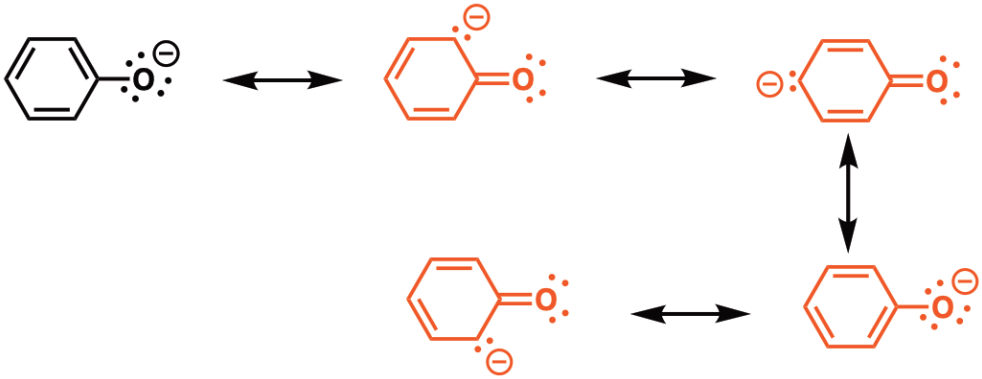
https://bit.ly/3zJQWUQ





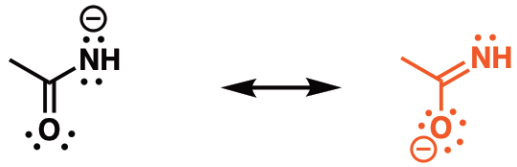
**E-9** Draw the important resonance forms of this molecule:

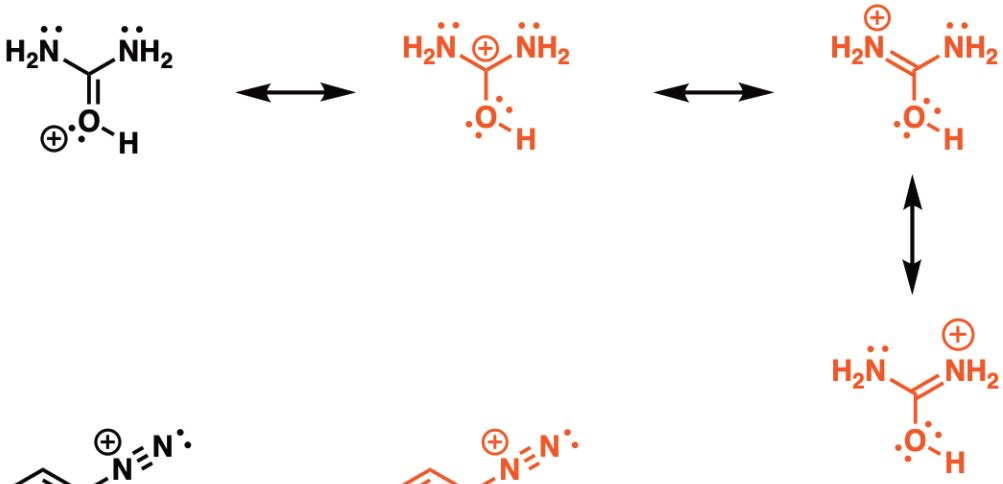
https://bit.ly/3uigkQq

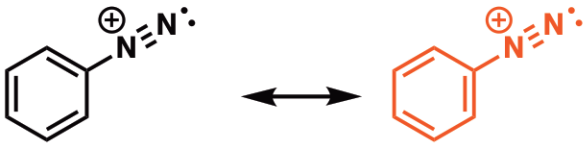


**E-10** Draw important resonance forms of:

https://bit.ly/2WoWI0C

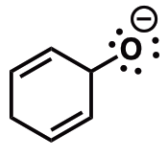




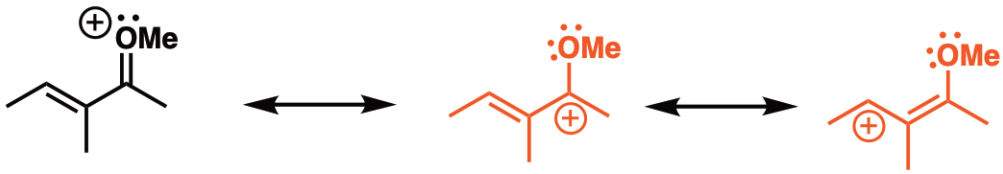


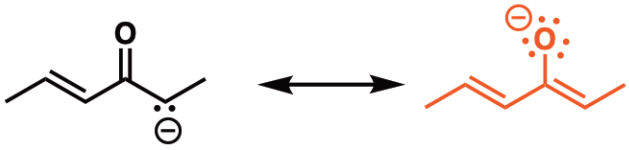
**E-11** Draw all other reasonable resonance structures.

https://bit.ly/3uiwIWF



**None!**





## Section F - Draw Resonance Forms And Structure

https://bit.ly/3zJR3zK

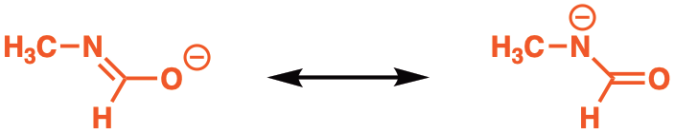
**F-1** Draw the two most important contributing structures for nitromethane $CH_3NO_2$ which has N bonded to C and no bonds between oxygens.

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

https://bit.ly/3zPkZug

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

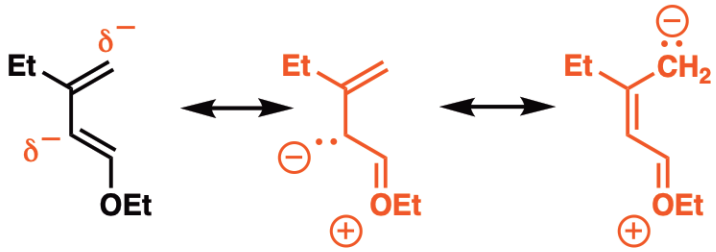
https://bit.ly/3zP6eYu



## Section G - Which Carbon Bears Partial Charge?

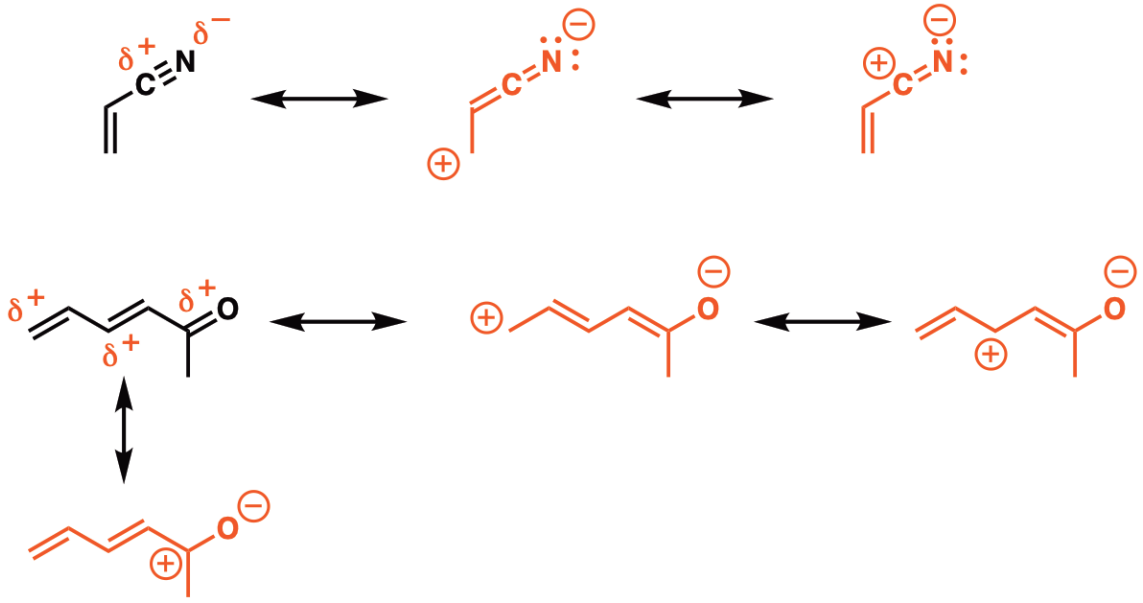
**G-1** Which carbons bear partial negative charge? Justify with resonance structures.

https://bit.ly/2Wkh4le



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

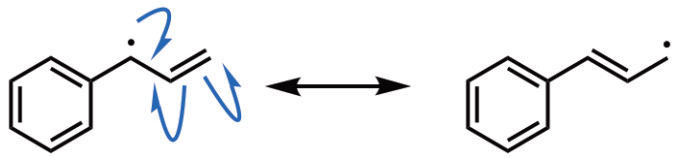
https://bit.ly/3zMNwAF



## Section H - Draw Radical Resonance Forms

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

https://bit.ly/3uix1LI

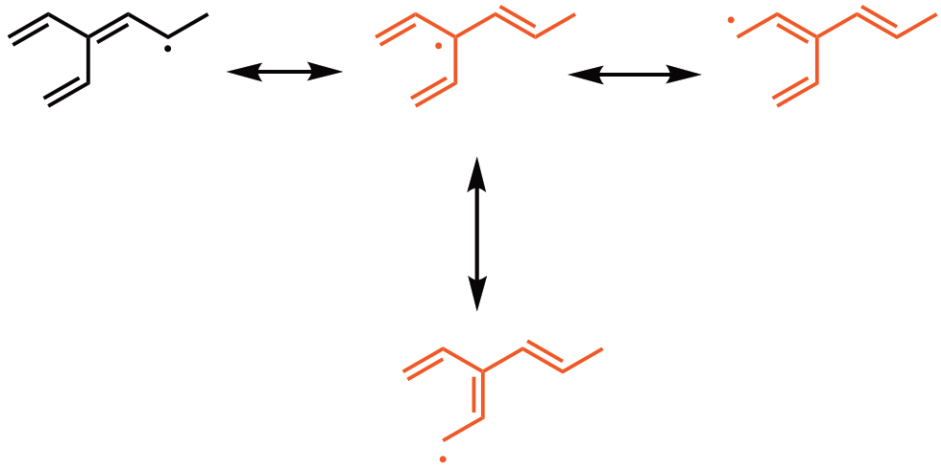


**more important (secondary)**

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

https://bit.ly/2XSaNE6

most important (tertiary)



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

https://bit.ly/3zJysE0