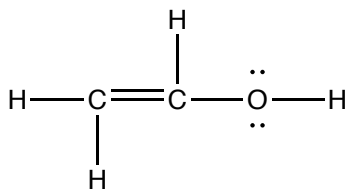


1. (14 pts.) Draw resonance structures for the following Lewis structures. Do not include any structures that would be considered insignificant contributors to the resonance hybrid.

1. \_\_\_\_\_

a.

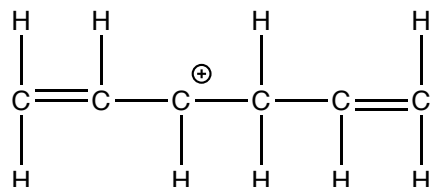


2. \_\_\_\_\_

3. \_\_\_\_\_

4. \_\_\_\_\_

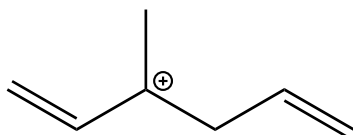
b.



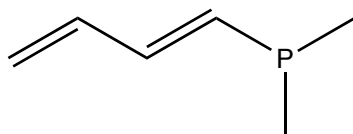
5. \_\_\_\_\_

2. (28 pts.) Draw resonance structures for the following skeletal structures. Do not include any structures that would be considered insignificant contributors to the resonance hybrid.

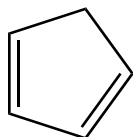
a.



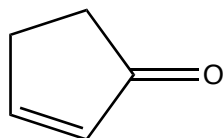
b.



c.



d.



3. (24 total) For the resonance structures drawn below:

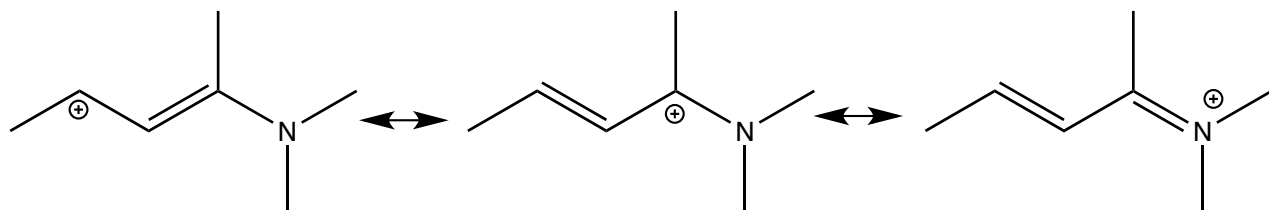
a. (3 pts. each) Draw the resonance hybrid

b. (2 pt. each) Circle the resonance structure(s) that the resonance hybrid would most resemble,

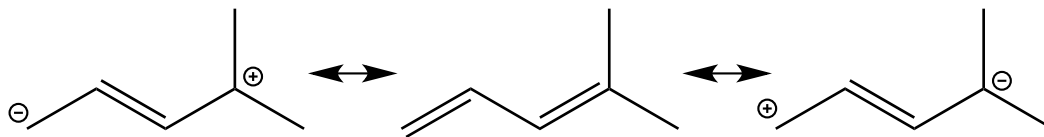
c. (2 pts. each) Rank the resonance structures in order of increasing energy (#1 for the lowest energy structure, #2 for the next lowest, etc.). If there is a tie, give the structures the same number, and

d. (1 pt. each) Label any structures that would be considered insignificant contributors to the resonance hybrid as such.

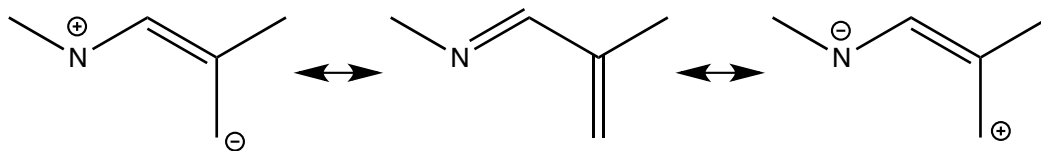
i.



ii.

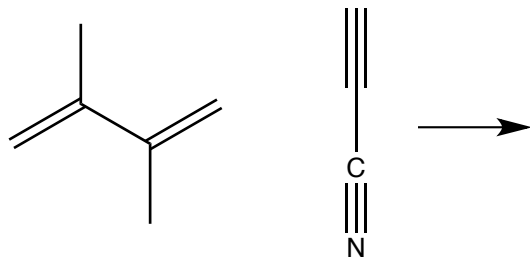


iii.

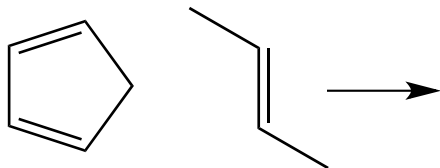


4. (20 pts.) Predict the products for the following reactions. Remember to indicate the stereochemistry of the products using wedge (▴) and dashed (▾) bonds where appropriate.

a.

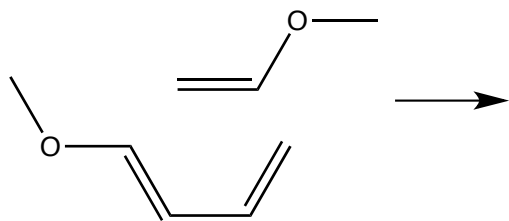


b.



5. (20 pts.) For the following reactions more than one structural isomer is produced in the reaction. Predict all possible products of the reactions and label the major and minor products. Provide support for/explain your choice. Ignore the stereochemical outcome of these reactions.

a.



b.

