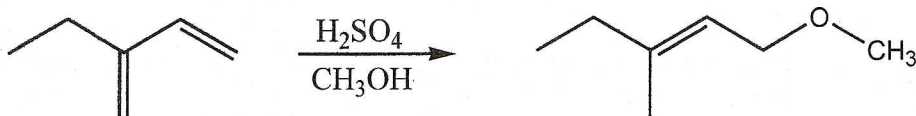


108 pts available

6 pts

I. 1. Use curved arrow formalism to show a plausible, step-by-step mechanism that accounts for the formation of the compound shown. Show all likely intermediates.

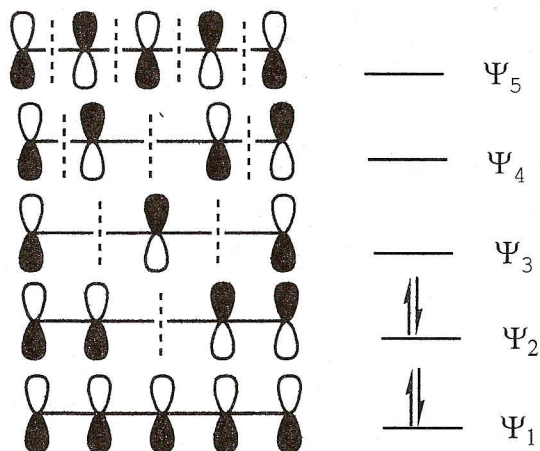


4 pts

2. The above product was not the only one that formed in the reaction. Draw the structure of one other different product that is also likely to form from one equivalent of the reactant.

4 pts

II. 1. Consider the pi molecular orbitals and the electron configuration shown. Draw a Lewis structure of a compound or reactive intermediate that would have this electron configuration.



4 pts

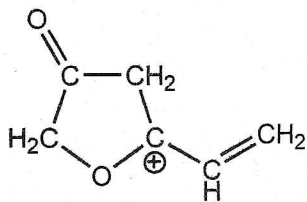
2. Write HOMO next to the HOMO in the diagram.
Write LUMO next to the LUMO in the diagram.

3 pts

3. In the diagram, circle every molecular orbital name (the Ψ part) that is properly classified as an antibonding orbital.

9 pts total

III. 1. Draw each additional significant resonance contributor for the compound shown.
2. identify the major contributor among all the contributors (write "major" under it)

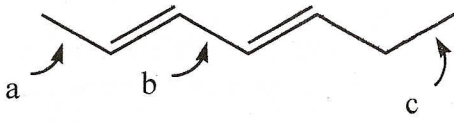


4 pts each IV - Circle the best answer for each.

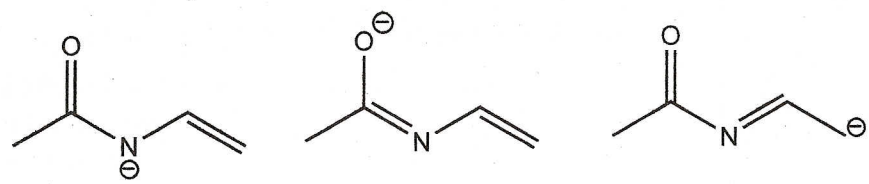
48 pts total

1. Which of the labeled bonds is the shortest?

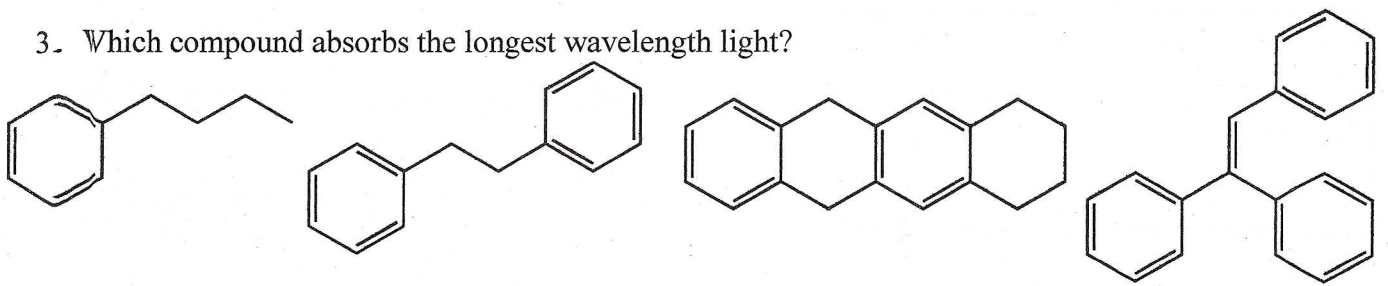
- a b c a, b, & c all same



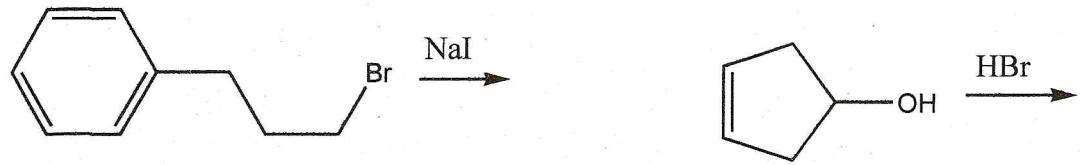
2. Which is the major contributor of the resonance structures shown.



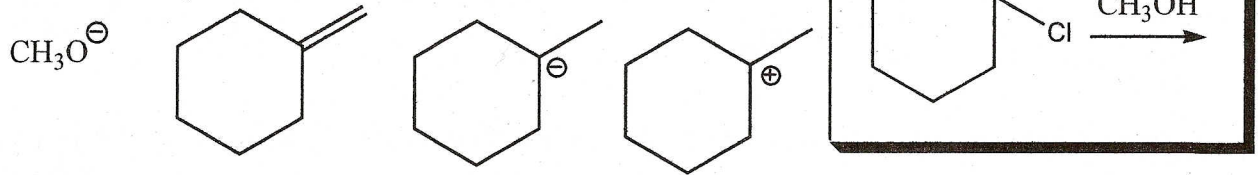
3. Which compound absorbs the longest wavelength light?



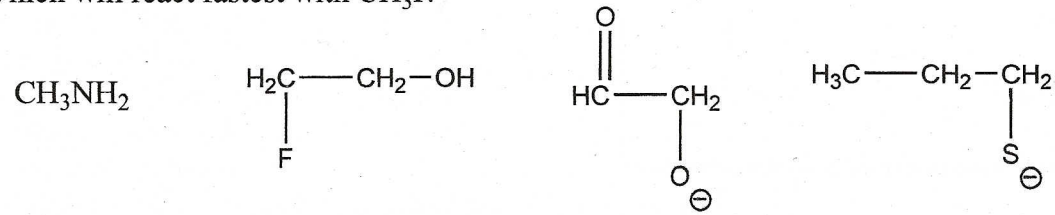
4. Which reaction will have the greatest selectivity for forming a single product?



5. Which is a likely intermediate for the reaction shown?



6. Which will react fastest with CH3I?

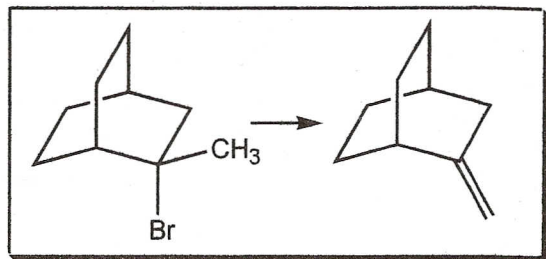


7. Which describes resonance?

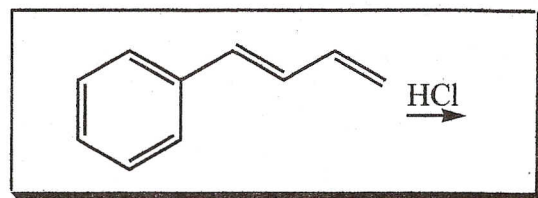
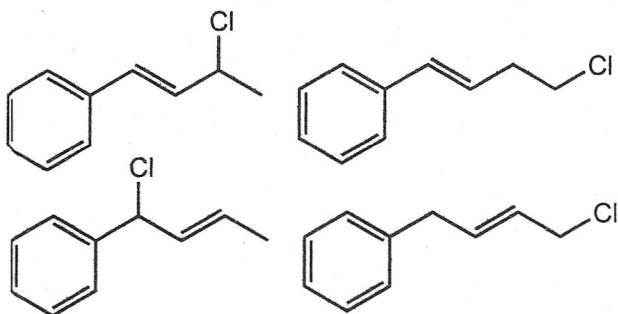
- a. each resonance contributor is NOT an accurate model of the structure
- b. the molecule rapidly switches back and forth between the resonance contributors in an equilibrium
- c. electrons delocalize through the sigma bonds as described by each resonance structure
- d. both a and b
- e. both b and c

8. Which reactant is best for giving the product shown?

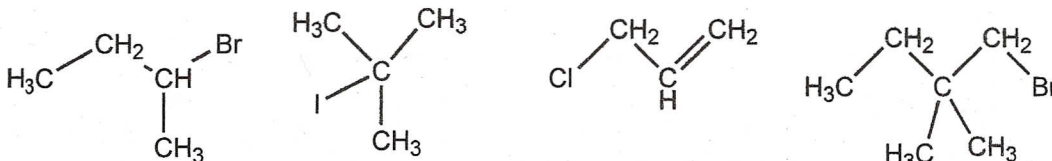
- sodium hydroxide
- sodium amide
- sulfuric acid
- potassium tert-butoxide
- hot methanol



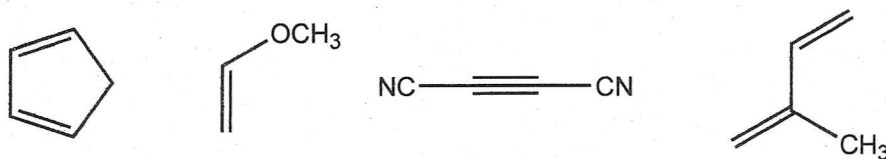
9. Which is the thermodynamically favored product?



10. Which reacts fastest in an S_N2 reaction?

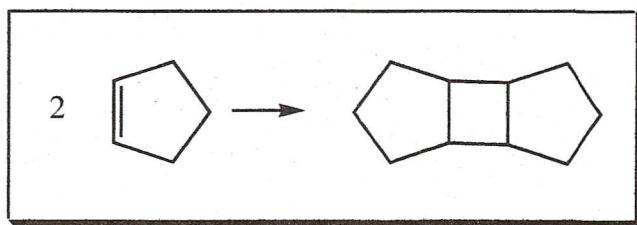


11. Which reacts fastest as a dienophile in a Diels-Alder [4+2] cycloaddition with 1,3-butadiene?



12. You wish to perform the [2+2] cycloaddition shown. Which conditions are required for a successful reaction?

- cool to -78 deg C
- heat to reflux
- shine UV light on it
- shine visible light on it
- shine IR light on it
- there are no conditions that would favor this reaction



5 pts each
30 pts total

V. Fill in, as appropriate, the structure of the major product(s), the structure of the starting material, or necessary reactants for each step of a synthesis. Show stereochemistry for diastereoselective reactions.

