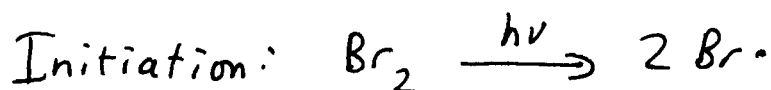
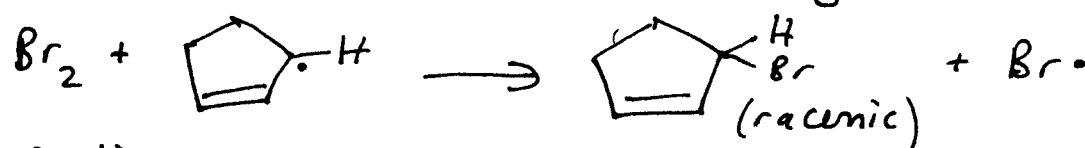
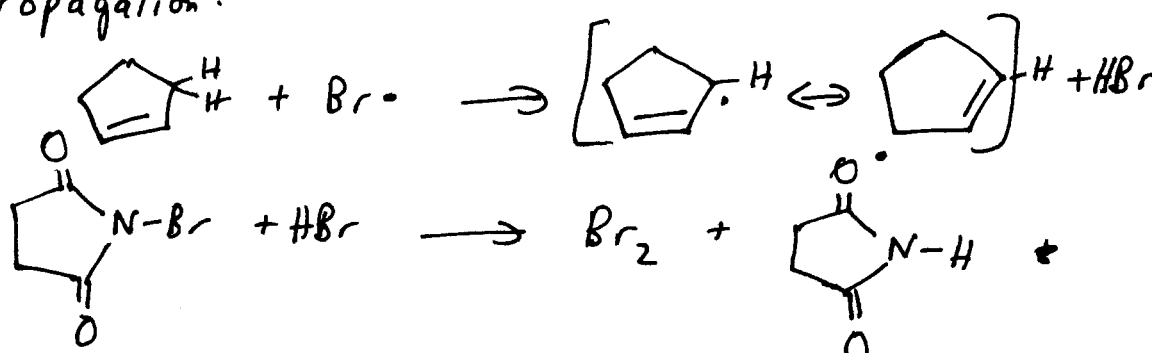


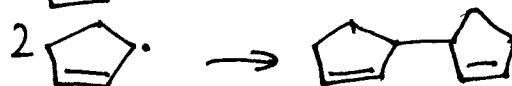
1. Show the full mechanism (initiation, propagation and termination) for the reaction of NBS with cyclopentene to give 3-bromo-1-cyclopentene. You may assume that the reaction is initiated by light, and that there is a trace of  $\text{Br}_2$  present which splits apart in the initiation step. Explain briefly why NBS is much more effective than  $\text{Br}_2$  for the free radical bromination of alkenes.



Propagation:

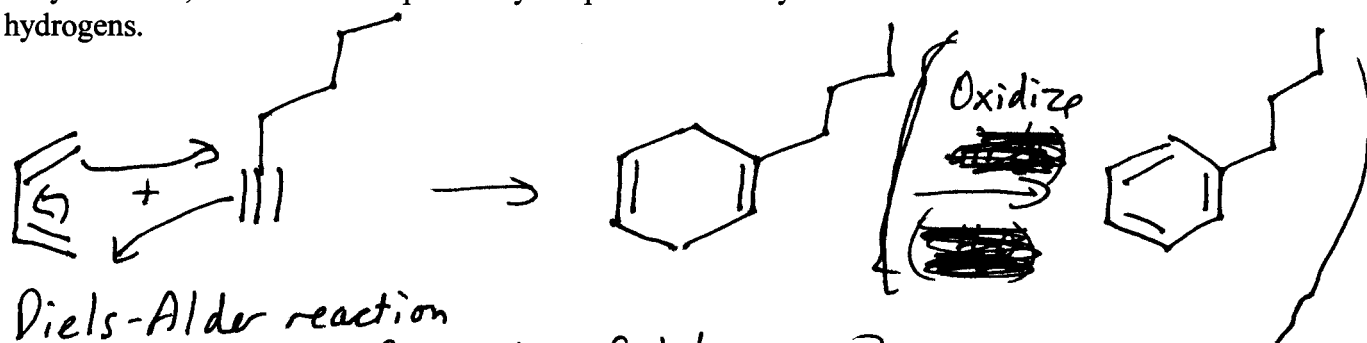


Termination:



NBS works by keeping  $[\text{Br}_2]$  very low -  $\text{Br}_2$  is only generated as fast as the radicals react - and these keeps the rate of  $\text{Br}_2$  addition to alkenes v. low.

2. Show the full mechanism (with curved arrows) and product for the reaction of 1-hexyne with 1,3-butadiene. Explain why the product is easily oxidized to lose two hydrogens.

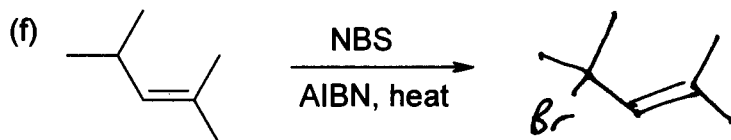
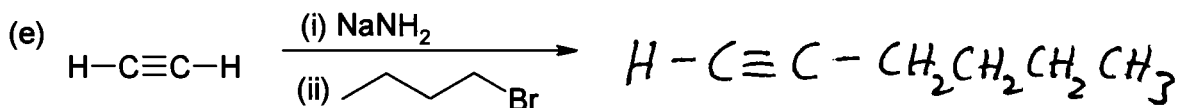
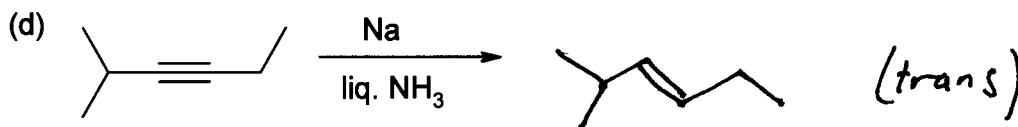
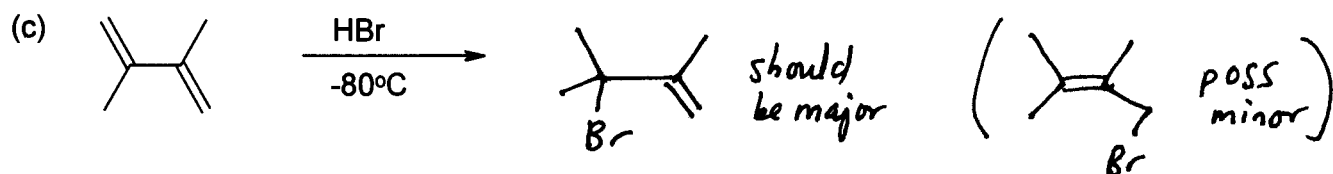
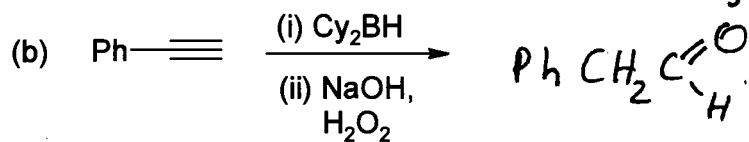
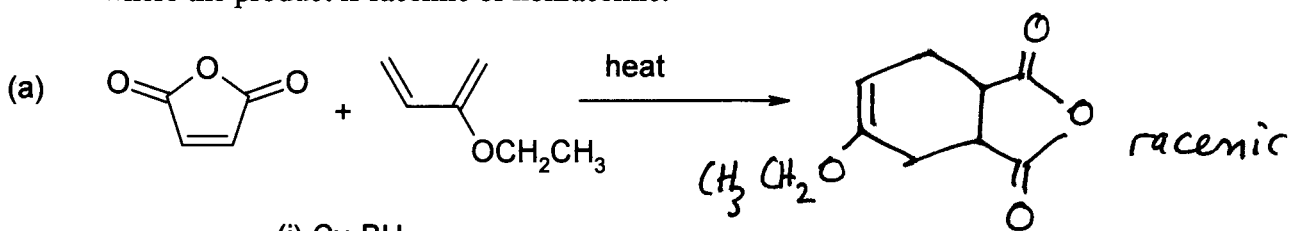


Diels-Alder reaction

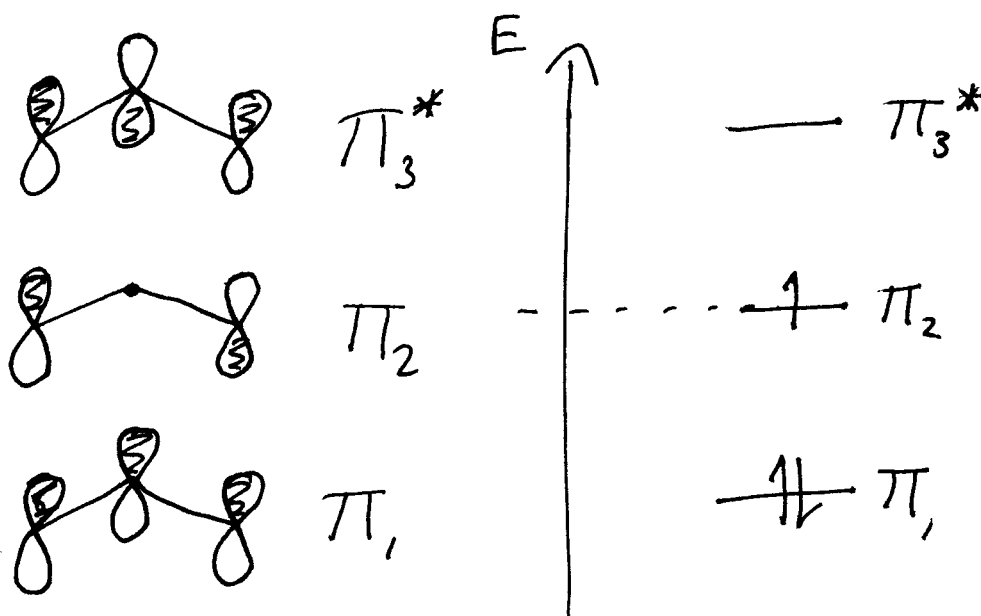
- similar to first step of lab expt. 2

If the product loses two Hs by oxidation it becomes aromatic - this provides a strong driving force.

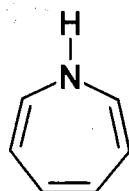
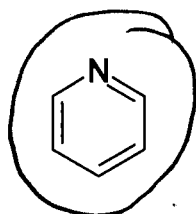
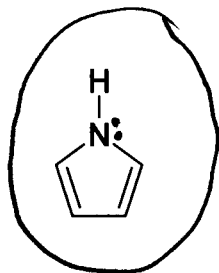
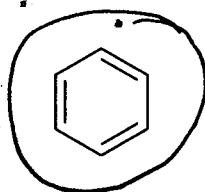
3. Predict the products of the following reactions. For chiral products, indicate where the product is racemic or nonracemic.



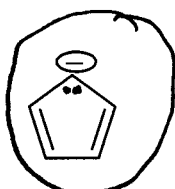
4. Draw the three molecular orbitals for the allyl radical, and draw the corresponding energy diagram to show how the electrons are arranged in the orbitals.



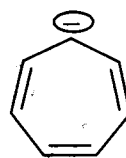
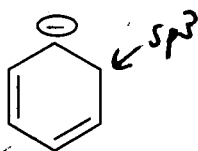
5. Circle all of the following compounds which are aromatic.



( $8\pi e^-$  if N goes  $sp^2$ )



$6\pi e^-$



( $8\pi e^-$  if  $C^-$  goes  $sp^2$ )

5. How might you accomplish the following multi-step syntheses? You must use the starting material shown at least once. You are expected to answer on the back page.

PTO

