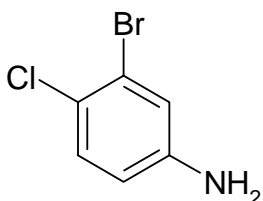


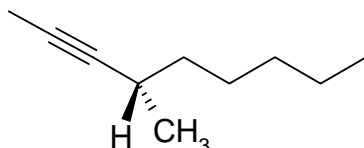
YOUR NAME ANSWER KEY

150 points total. You may use molecular models for this exam.

1. (14 points) Give a systematic name for each of the following, including stereochemistry where appropriate:

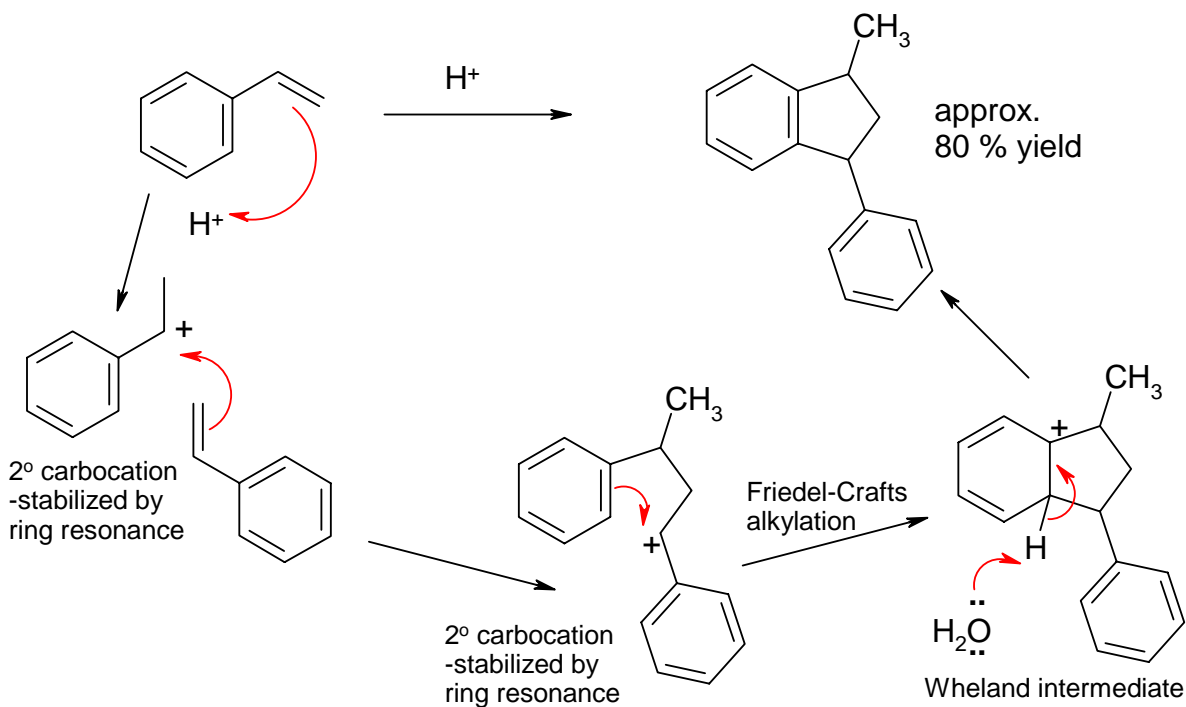


3-bromo-4-chloroaniline

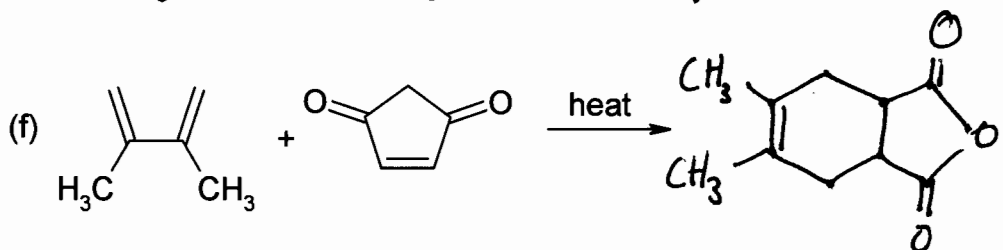
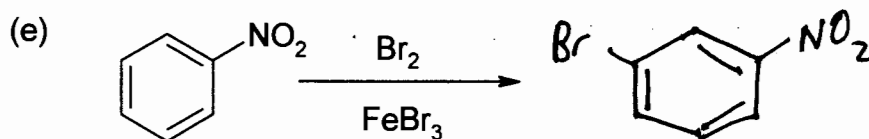
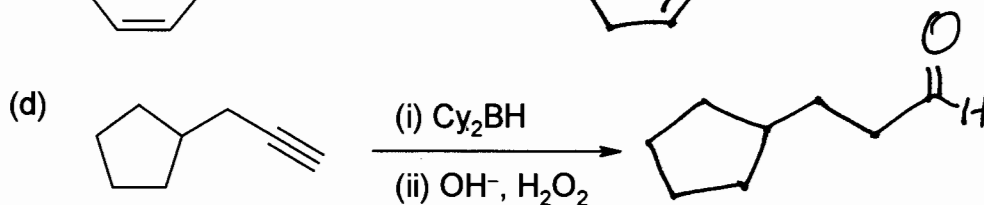
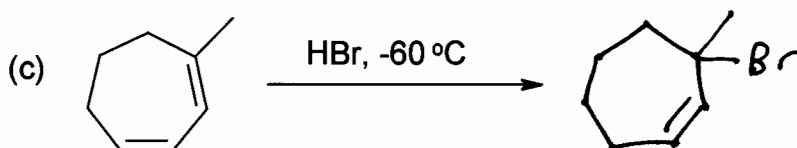
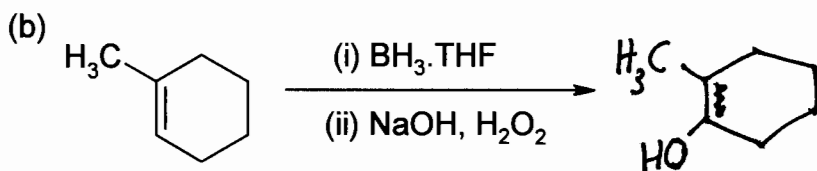
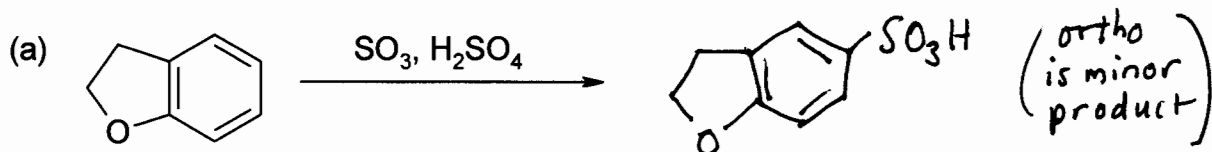


(4S)-methyl-2-nonyne

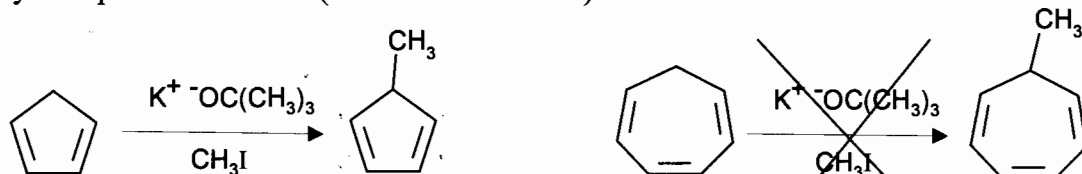
2. (20 points) On heating with aqueous sulfuric acid, styrene reacts to form a dimer in good yield. Write a reasonable mechanism, showing all intermediates involved.



3. (42 points) Predict the major organic product(s) for each of the following reactions. Include the stereochemistry of the product where appropriate- if racemic just say so.



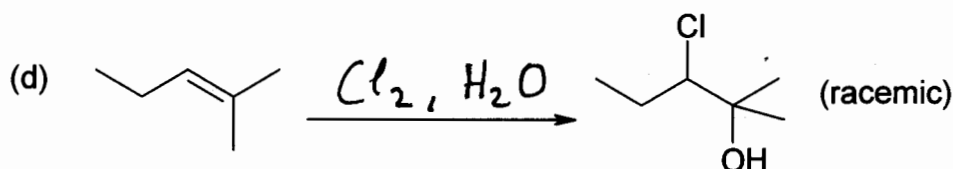
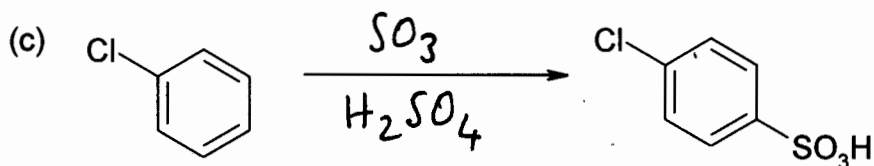
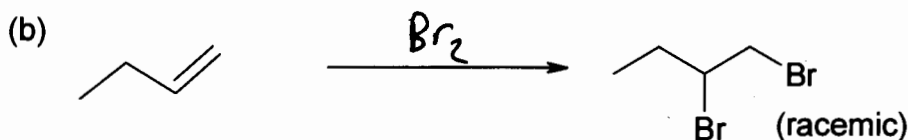
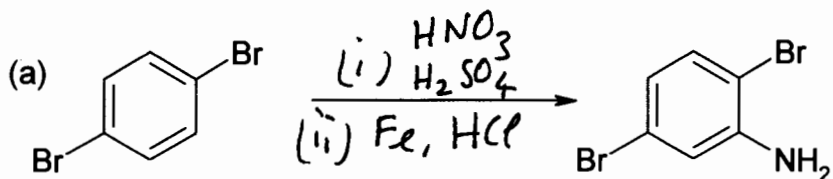
4. (14 points) Explain why cyclopentadiene can be methylated as shown, whereas cycloheptatriene can not (it fails to react at all):



In the presence of base, cyclopentadiene readily loses a proton because the resultant anion is aromatic, and so very stable. This anion can undergo an S_N2 reaction as shown.

By contrast, if cycloheptatriene were to lose a proton, the resultant anion would not be aromatic, indeed if flat it would be anti-aromatic. This will only form with a base much stronger than $K^+ -OC(CH_3)_3$.

5. (28 points) What reagents would you use to effect the following transformations? Include any important conditions (solvent, temperature) when needed.



6. (32 points) How might you accomplish either one of the following syntheses? You must use the starting material shown at least once; other than this, you may use any legitimate reagent containing two carbons or fewer. If you have time to answer both parts, I will grade the better of the two. You may use the back page.

