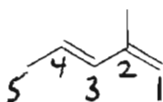
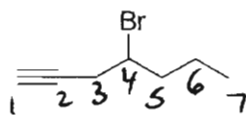


1. (6 points, 3 each) Provide IUPAC accepted names for the following compounds.



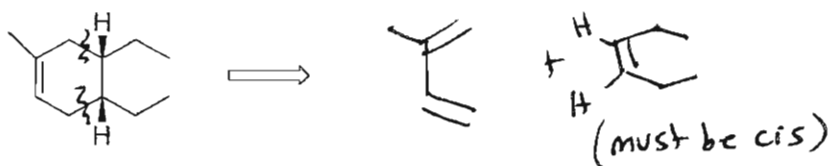
2-methyl-1,3-pentadiene



4-bromo-1-heptyne

2. (2 points) HOMO stands for _____. highest occupied molecular orbital

3. (8 points) What starting materials would be required to form the following product from a Diels-Alder reaction?



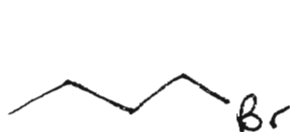
4. (4 points) 1-Hexene has a heat of hydrogenation of -125 kJ/mole (or -29.9 kcal/mole). 1,3,5-Hexatriene has a heat of hydrogenation of -335 kJ/mole (or -80.1 kcal/mole). Does the triene display resonance stabilization? If so, how much?

$$3(-125) = -375 \text{ vs. } -335$$

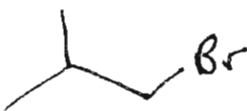
Yes. The triene has a resonance energy of 40 kJ/mole.

5. (10 points) Draw all the isomers of C_4H_9Br and arrange them in order of decreasing reactivity in the S_N2 reaction. Be careful not to duplicate structures.

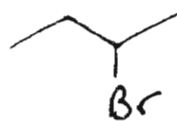
See recommended hw problem 11.33!



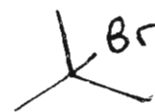
1°



1° with a little more steric hindrance



2°

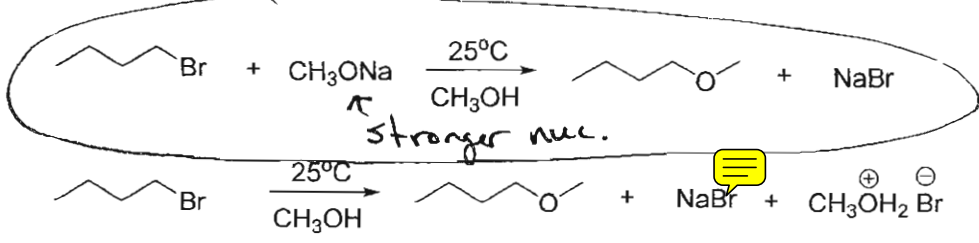


3°

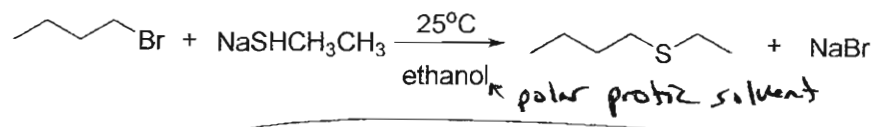
Most reactive

Least reactive

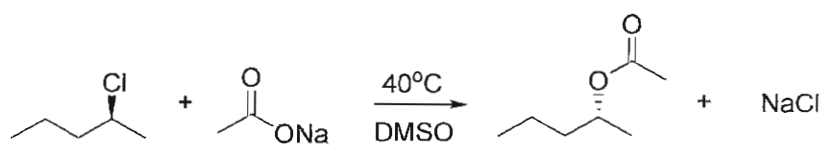
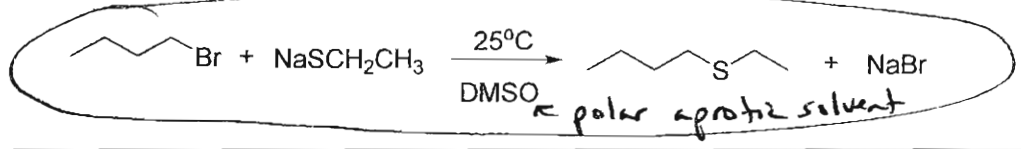
6. (10 points, 2 each) Circle the reaction in each pair that would proceed faster.



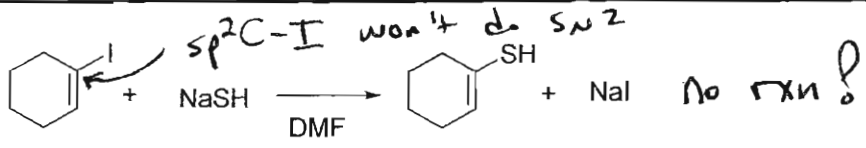
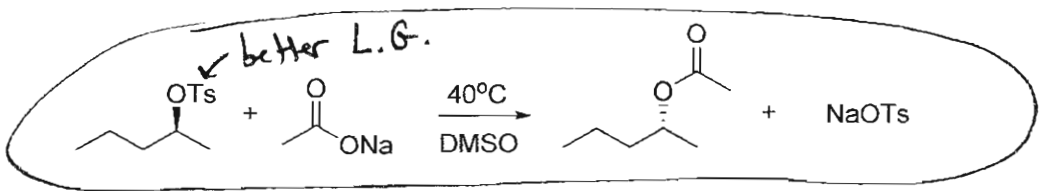
SN2



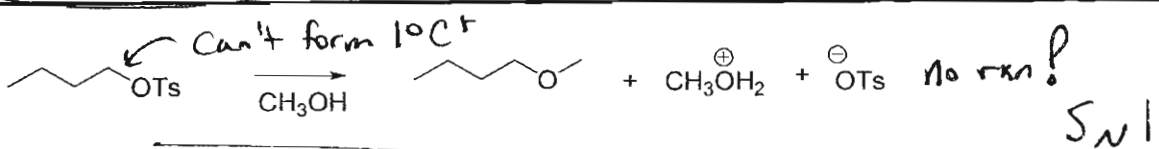
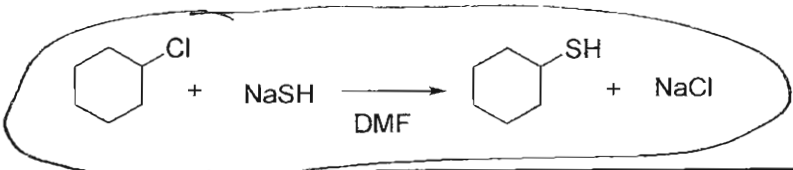
SN2



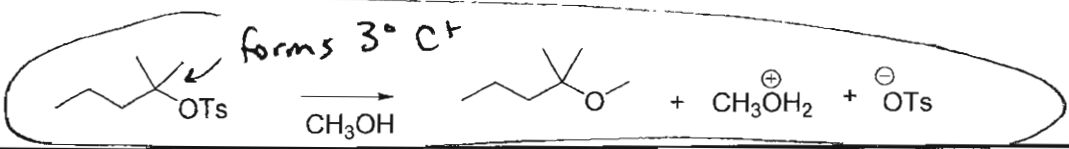
SN2



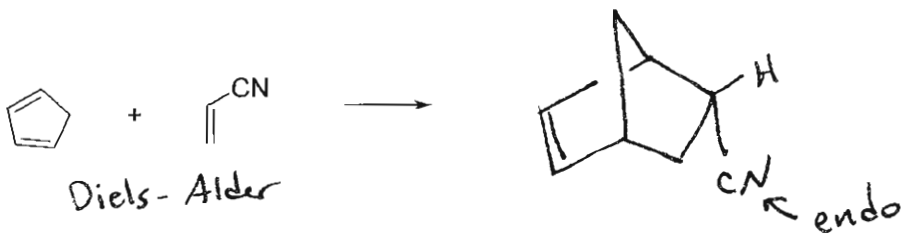
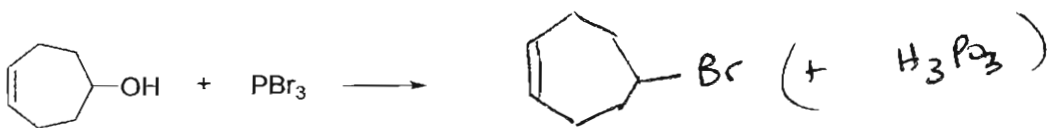
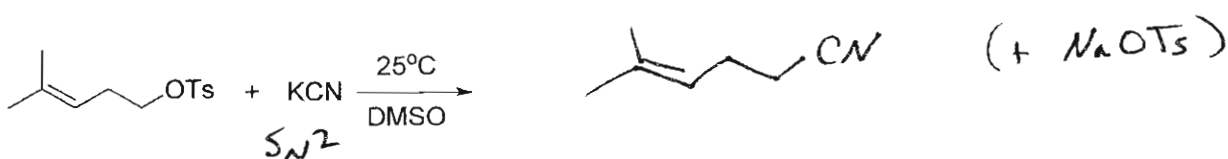
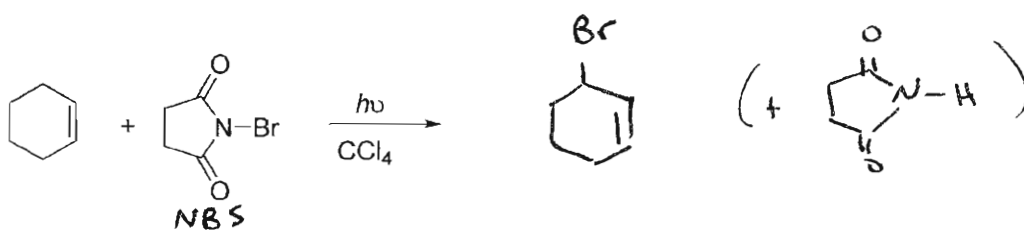
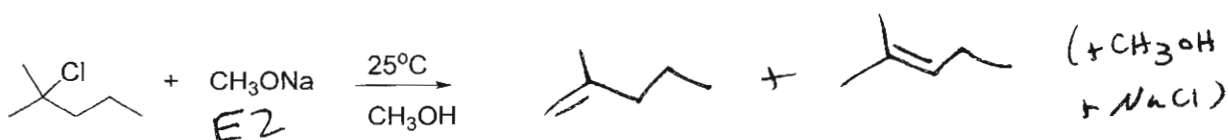
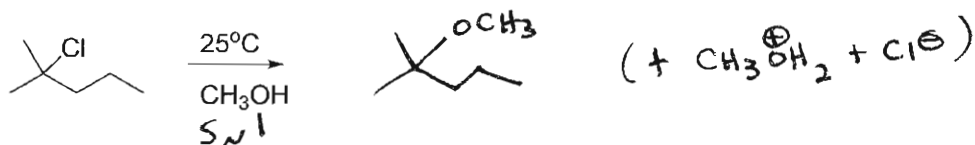
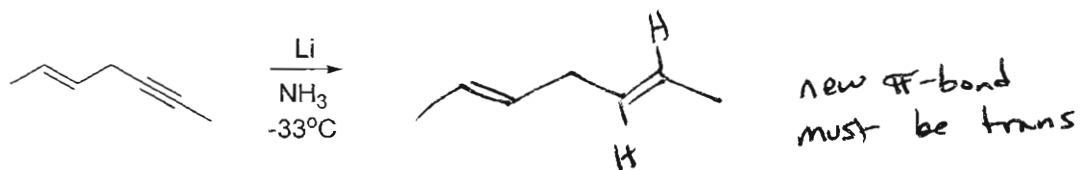
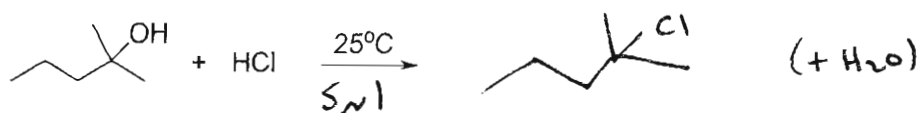
SN2

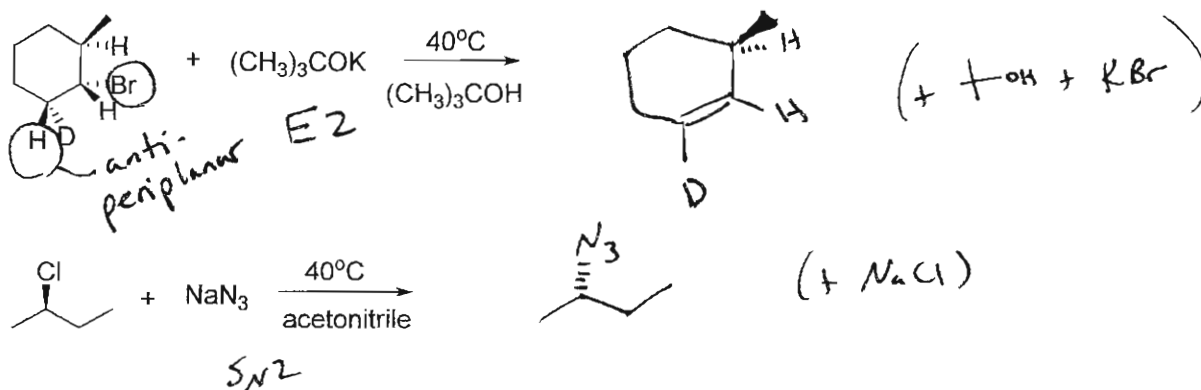


SN1

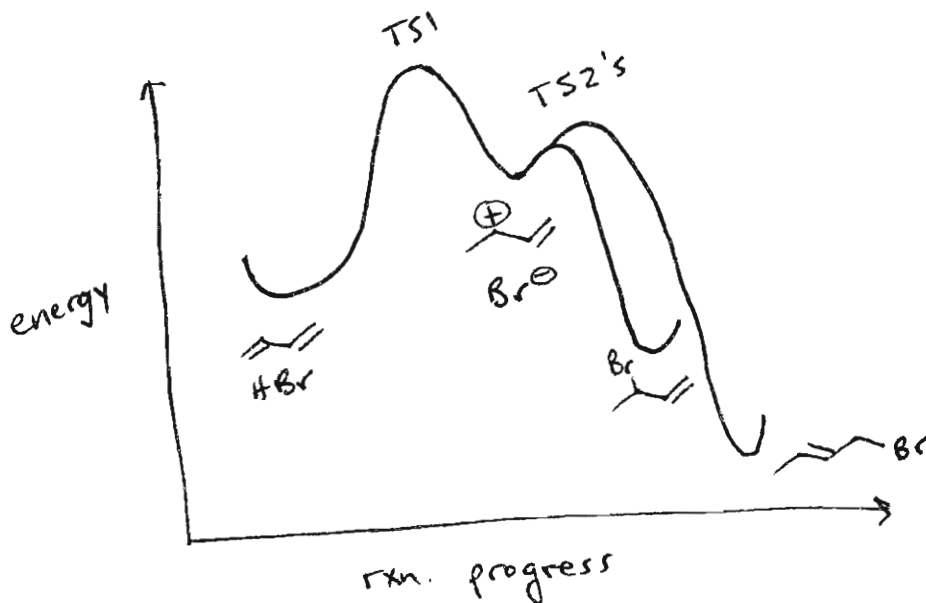
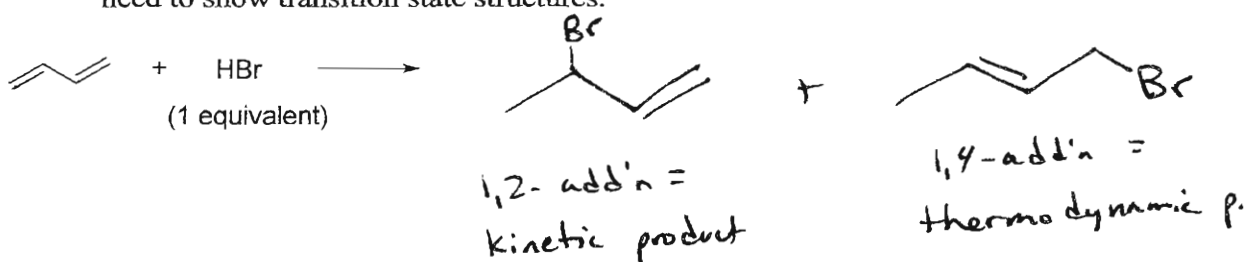


7. (30 points, 3 each) Provide structures for the major organic products of each of the following reactions. If more than one compound is expected, indicate which will be formed in greatest yield. Be careful to indicate product stereochemistry when necessary.



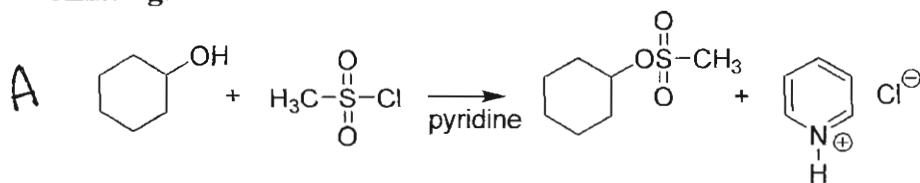


8. Two organic products are formed in the following electrophilic addition reaction.
- (3 points) Draw the products.
 - (1 point) Identify the kinetic product.
 - (1 point) Identify the thermodynamic product.
 - (5 points) Draw the reaction energy profiles for the formation of both products on the same energy diagram. Clearly label transition states and intermediates. Show the structure of any starting material, intermediate, or product on the diagram. You do not need to show transition state structures.

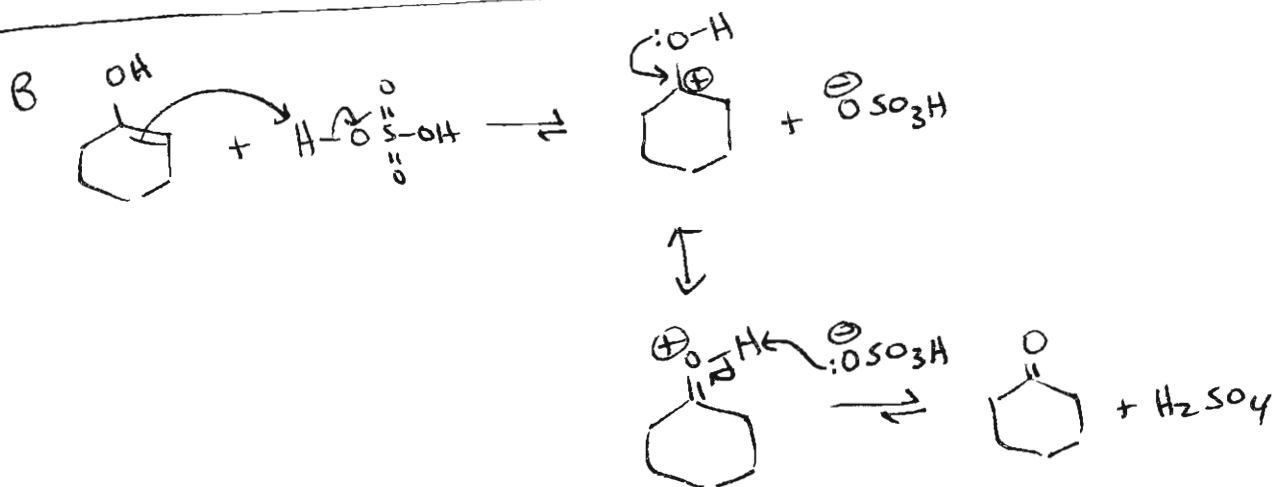
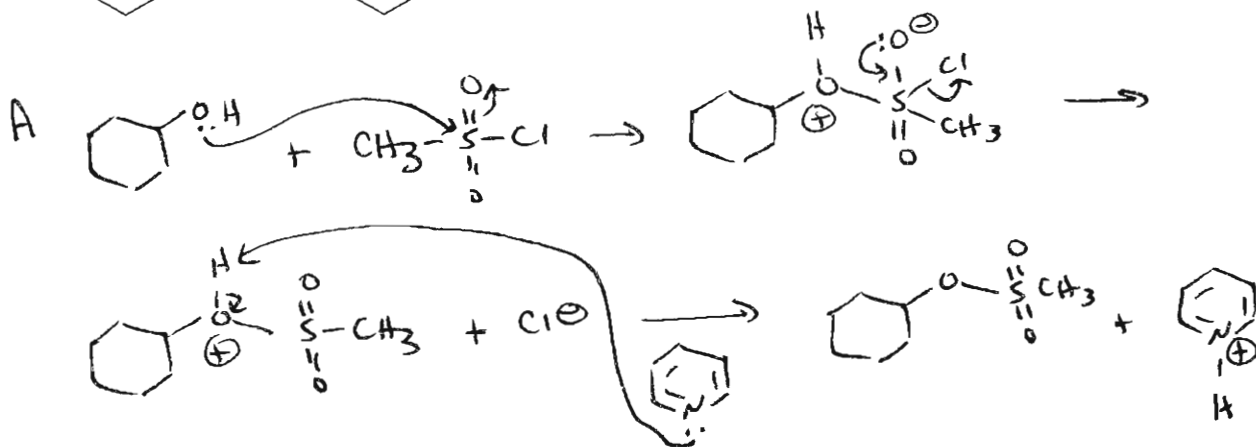
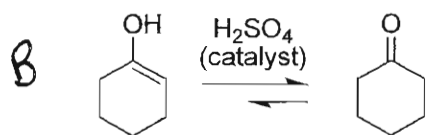


- Important features:
- TS1 is highest E
 - CC(Br)C=C is higher E than CC=CC(Br)C
 - TS2 to kinetic product is lower E.

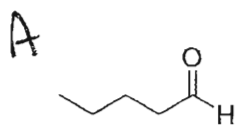
9. (10 points) Provide a complete electron-pushing mechanism for **one** of the following reactions. Include by-products as they are formed. **Clearly indicate which one you are omitting.**



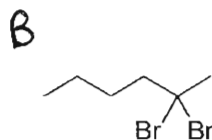
OR



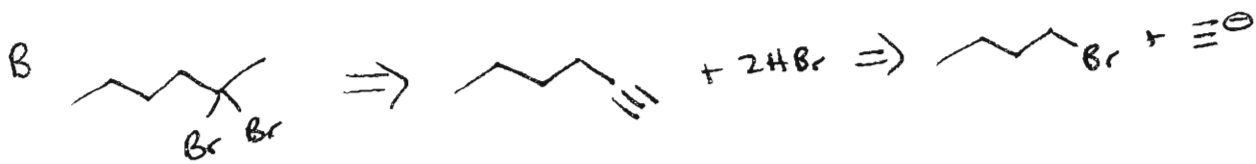
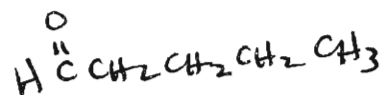
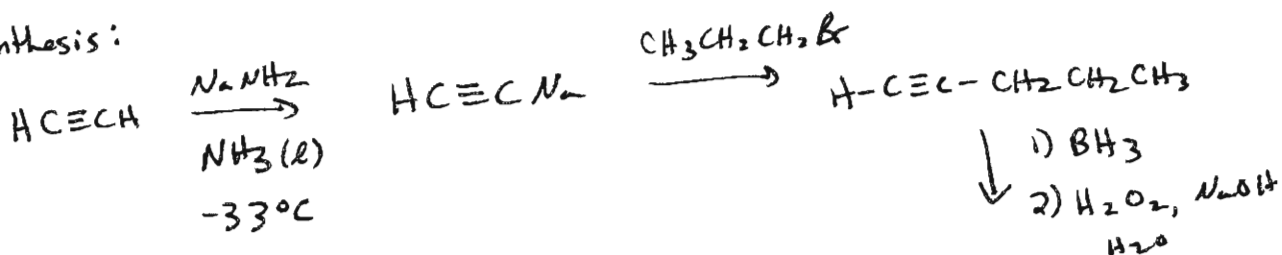
10. (10 points) Provide a synthesis for **one** of the following compounds. You may begin with any organic reagents containing four carbons or less and any inorganic reagents you need. Clearly indicate which one you are omitting.



OR



Synthesis:



Synthesis:

