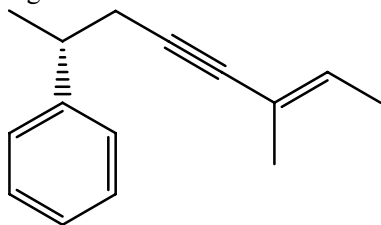
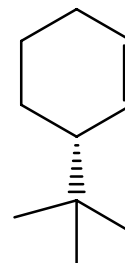
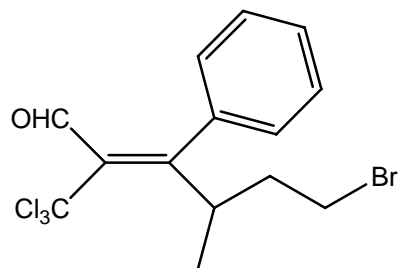
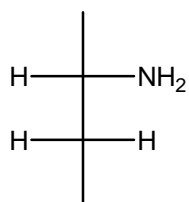
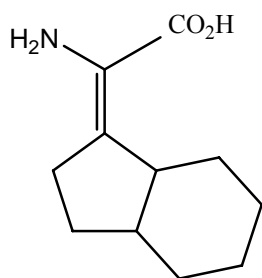


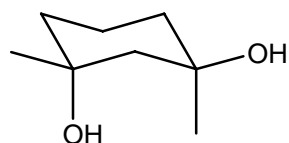
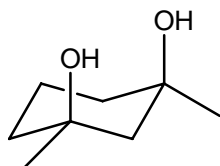
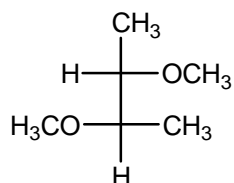
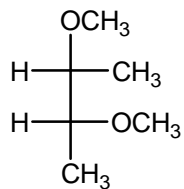
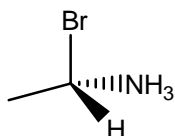
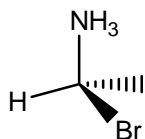
- 1) Please give the correct IUPAC name for the following compound (be sure to indicate *cis/trans* or R/S if needed). (3 pts)



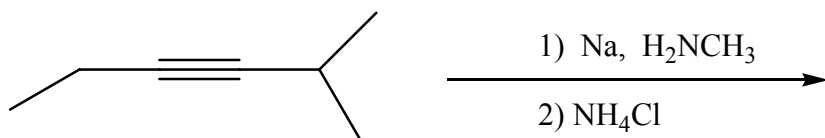
2. Using the Cahn-Ingold-Prelog convention for nomenclature, indicate whether the following molecules are E or Z or R or S, where appropriate. **Show your work.** (8 pts total)



3. a) Identify the following pairs of compounds as **enantiomers, diastereomers, or the same** compound.
b) Under each molecule, indicate if **each** overall molecule is **chiral or achiral**. (9 pts total)

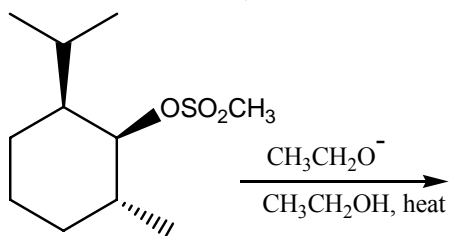
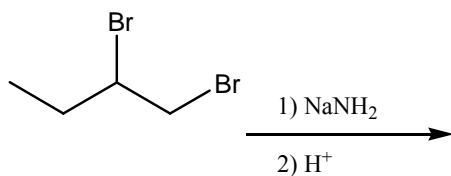
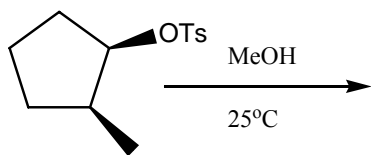
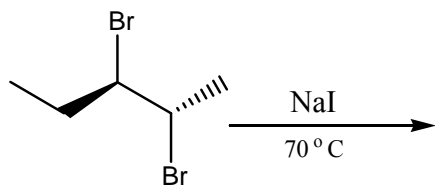
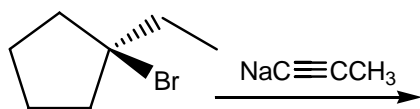
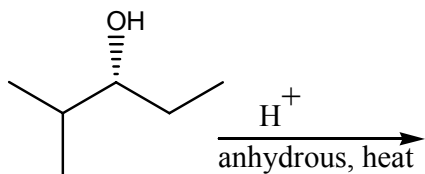
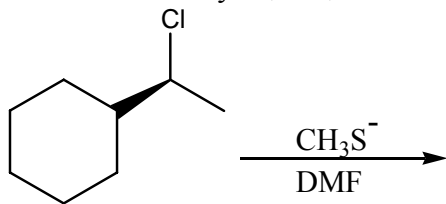


4. Conduct a conformational analysis of 2-bromopentane along the C2-C3 bond by drawing the Newman projections and rotating 360° . Be sure to label the axis of the energy diagram and label each conformation as staggered or eclipsed and indicate, anti and gauche, where appropriate. (8 pts)
5. Why does cyclobutane have a higher heat of combustion per CH_2 unit than cyclohexane? What does this tell us about the molecule and what causes this higher energy? (8 pts)
6. Which isomer of 1-bromo-3-tert-butylcyclohexane is more stable and **why**; the cis or the trans? **Show your work.** (9 pts)
7. Predict the product(s) of the following reaction and draw a detailed mechanism illustrating how the product is formed. Be sure to use appropriate arrows to indicate electron flow and label intermediates formed. (10 pts)

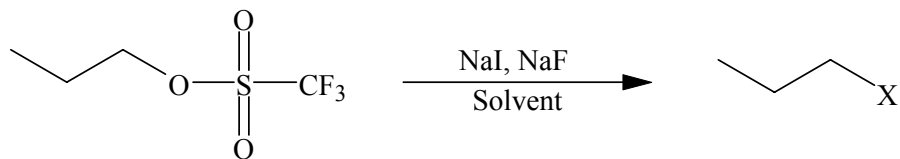


Bonus: What is the name of the reaction above?
pts

8. a) Predict all the possible products of the reactions below. b) Circle the major product formed. c) Indicate if it was formed by $S_N1/S_N2/E1/E2$. (3 pts each)



9. In the following competition experiment, 1-propyltriflate yields one alkyl halide if the reaction is run in ethanol (I) and another alkyl halide if the reaction is carried out in DMSO (II). Predict the correct products for the reaction carried out in solvent I and solvent II and explain why different products are produced. (10 pts)



10. Fill in the missing reagent(s) or product(s) in the following roadmap synthesis. (4 pts)



11. Please synthesize the following compounds starting with any alcohol or alkyl halide containing 4 carbons or less and any other inorganic reagent needed. (10 pts)

