

1. _____

1. (10 pts.) Order the following from best to worst leaving group. OH⁻, NH₃, F⁻, Cl⁻, I⁻.

2. _____

3. _____

2. (12 pts.) For each pair of nucleophiles, identify the better nucleophile. The reactions are being performed in CH₃OH.

4. _____

a. CH₃OH or CH₃ONa

b. I⁻ or Cl⁻

5. _____

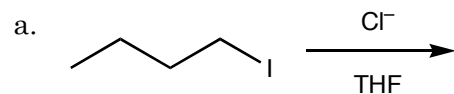
c. H₂O or H₂S

d. NH₃ or H₂O

6. _____

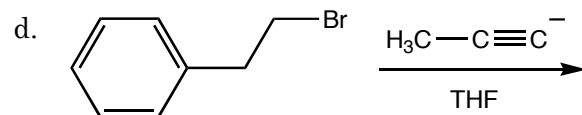
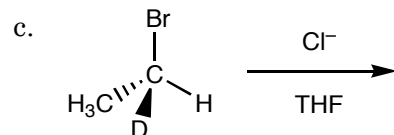
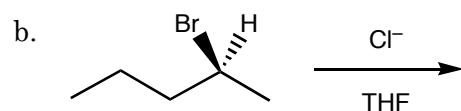
3. (5 pts. each) Predict the products of the following S_N2 reactions. Where appropriate, indicate the stereochemistry of the product.

7. _____

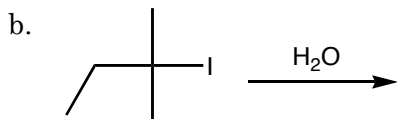
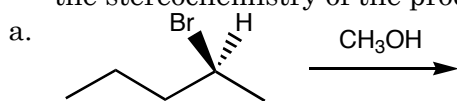


8. _____

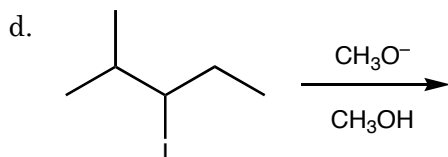
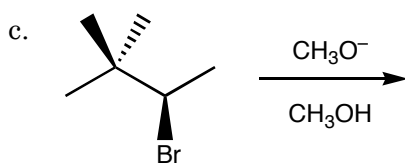
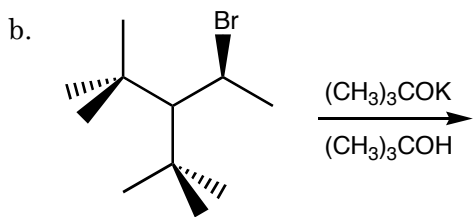
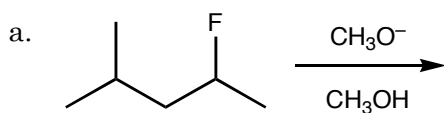
9. _____



4. (5 pts. each) Determine the products of the following S_N1 reactions. Where appropriate indicate the stereochemistry of the product.

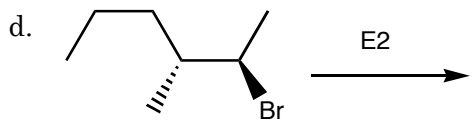
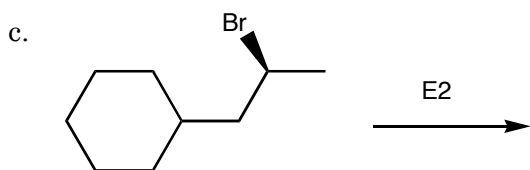
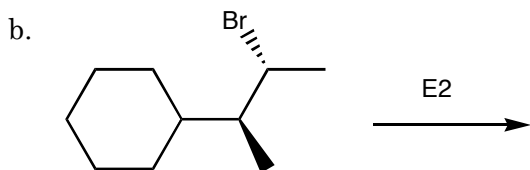
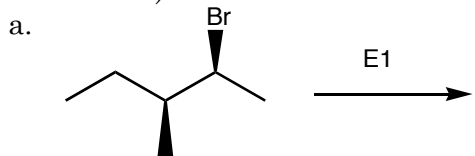


5. (5 pts. each) Determine the products of the following elimination ($E2$) reactions. If more than one product is possible, indicate which product is the major product (ignore stereochemistry).

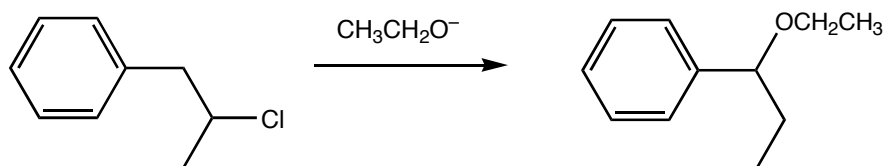


6. (10 pts) S_N2 mechanisms are encouraged by protic or aprotic solvents? Provide one example a protic and an aprotic solvent.

7. (5 pts each) Determine the products for the following elimination reactions. If both *Z* and *E* isomers are possible, determine which form will be produced in excess. (Ignore terminal alkenes)



8. (10 pts.) Draw a mechanism for the following reaction.



9. (10 pts.) Draw a mechanism for the following E1 reaction.

