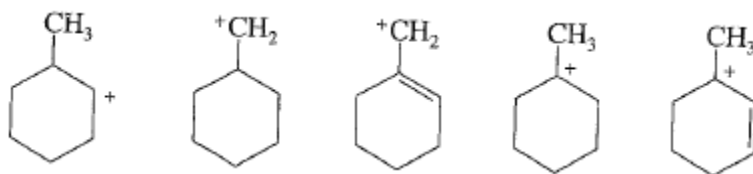
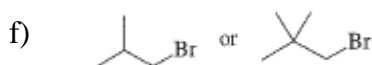
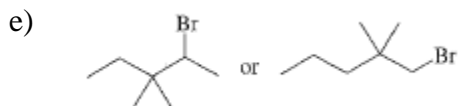
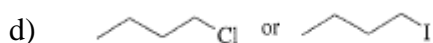
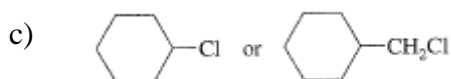
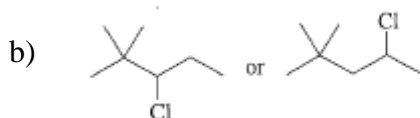
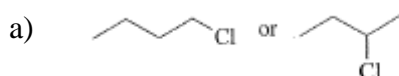


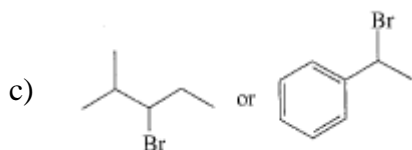
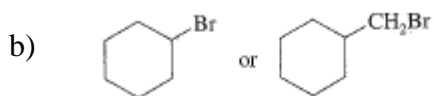
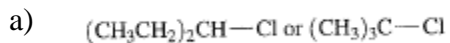
1. List the following carbocations in decreasing order of stability.

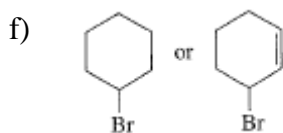
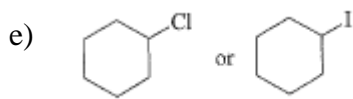
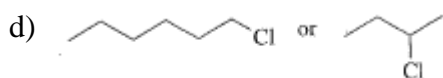


2. Which of the compounds in the following pair will undergo  $S_N2$  reaction faster? Give a reason for your answer.



3. Predict which compound will undergo solvolysis faster. Give a reason for your answer.



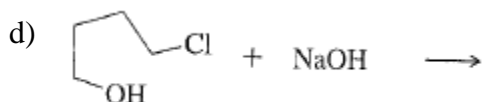
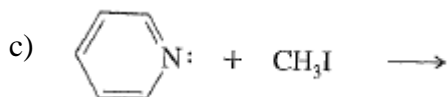
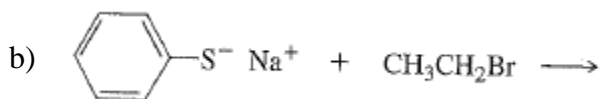
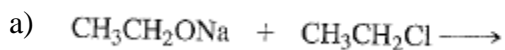


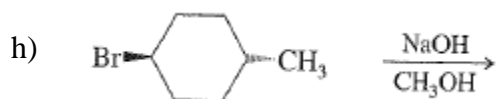
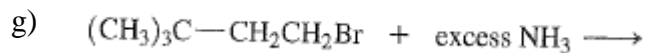
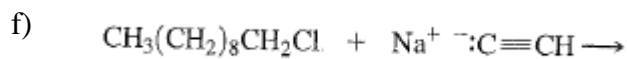
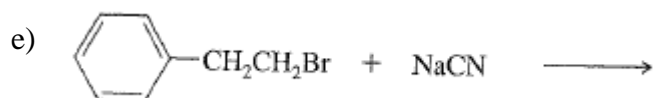
4. When ethyl bromide is added to potassium t-butoxide, the product is ethyl t-butyl ether as shown below:



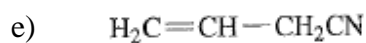
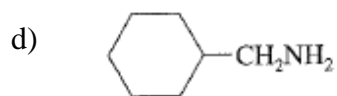
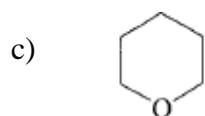
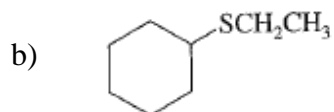
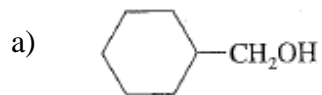
- a) What happens to the reaction rate if the concentration of ethyl bromide is doubled?
- b) What happens if the concentration of potassium t-butoxide is tripled?
- c) What happens if the temperature is increased?

5. Predict the products for the following  $\text{S}_{\text{N}}2$  reactions.

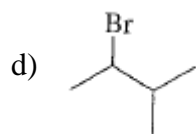
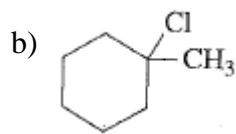
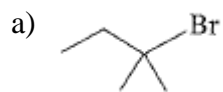




6. Show how each of the following compounds can be made by  $\text{S}_\text{N}^2$  reaction of an alkyl halide.



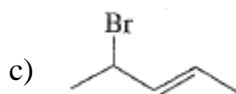
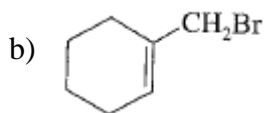
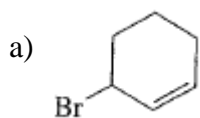
7. What are the products when each of the following compounds is heated in ethanol?



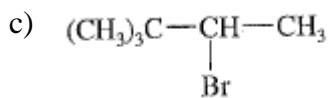
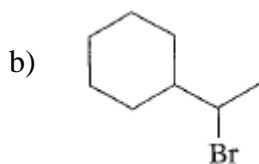
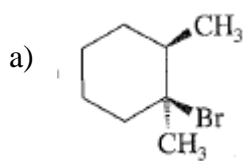
8. Give two synthesis of  $(\text{CH}_3)_2\text{CH-O-CH}_2\text{CH}_3$  and explain which one is better.

9. Write the resonance structures from the ionization of an aliphatic allylic halide (e.g.  $\text{CH}_2=\text{CH-CH}_2\text{Cl}$ ).

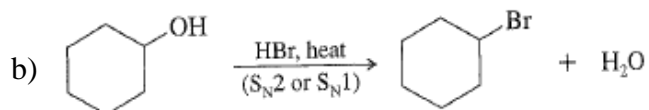
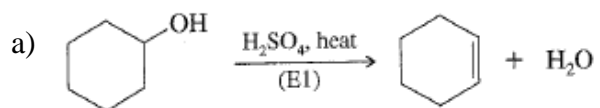
10. Show what products are obtained when the following compounds undergo solvolysis in ethanol.



11. Predict the E1 products for the following halides.



12. Protonation converts the hydroxyl group of an alcohol to a good leaving group. Suggest a mechanism for the following reactions.



13. When bromomethylcyclopentane undergoes solvolysis in methanol, five major products are formed. Give a mechanism to account for all these products.

