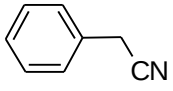
Alkyl Halide Structure

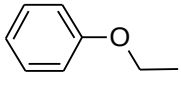
1. Draw the structure of a primary alkyl chloride, C_3H_7Cl

Nucleophilic Substitution Reactions of Alkyl Halides

2. Write an equation for each of the following substitution reactions:
   a. 1-bromobutane + sodium iodide
   b. *t*-butyl bromide + methanol

3. Select an alkyl halide and a nucleophile that will give each of the following products:

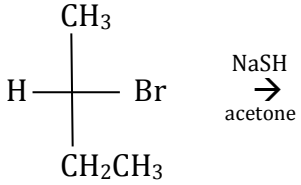
a. 

b. 

Stereochemistry of Nucleophilic Substitution Reactions

4. Draw the following equation in a way that shows clearly the stereochemistry of the reactants and products:
   (*S*)-3-bromo-3-methylhexane + methanol $\xrightarrow{S_N1}$ 3-methoxy-3-methylhexane

5. Draw a Fischer projection formula for the product of the S_N2 reaction:

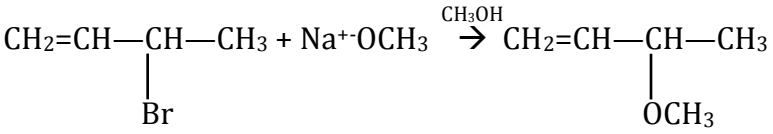


Nucleophilic Substitution and Elimination Reaction Mechanisms

6. Determine the order of reactivity of $(CH_3)_2CHCH_2Br$, $(CH_3)CBr$, and $CH_3CHBrCH_2CH_3$ in substitution reactions with 50% aqueous acetone.

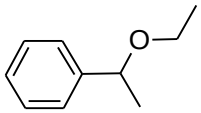
7. Tell what products you expect, and by what mechanism they are formed for
   1-chloro-1-methylcyclohexane + ethanol

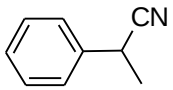
8. Explain the different products of the following reaction by considering the mechanism by which the reaction proceeds. As part of your explanation, use the curved arrow formalism to draw a mechanism for the reaction:



Nucleophilic Substitution and Elimination Reactions in Organic Synthesis

9. Provide equations for the synthesis of the following compounds from 1-bromo-1-phenylethane:

a. 

b. 

10. Devise a synthesis of $CH_3OC(CH_3)_3$ from an alcohol and an alkyl halide.

11. Combine a nucleophilic substitution with a catalytic hydrogenation (from Alkenes & Alkynes) to synthesize *cis*-2-pentene from propyne and bromoethane.