

## Ch 11. Nucleophilic Substitution and Elimination Reactions

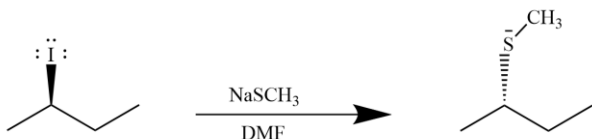
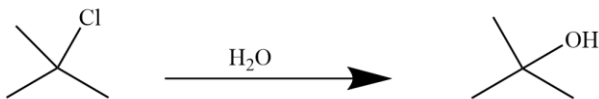
When a **nucleophile (or Lewis base)** reacts with an **alkyl halide**, two types of reactions can occur:

1. **Nucleophilic substitution of the halide**
2. **Elimination of the halide**

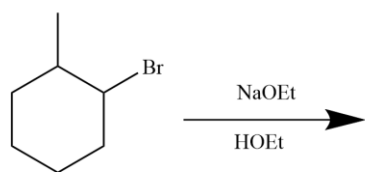
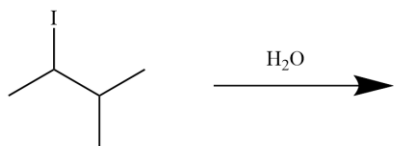
From these two reactions, there are two possible reactions that can occur:

1. **Nucleophilic substitution**
  - a. **SN1**: substitution, nucleophilic, unimolecular
  - b. **SN2**: substitution, nucleophilic, bimolecular
2. **Elimination**
  - a. **E1**: elimination, unimolecular
  - b. **E2**: elimination, bimolecular

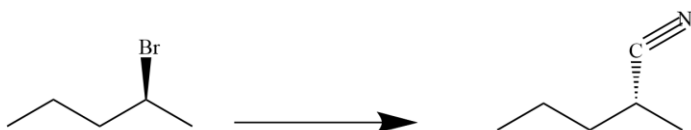
Identify the type of reaction (SN1, SN2, E1, or E2).



Fill in the product.



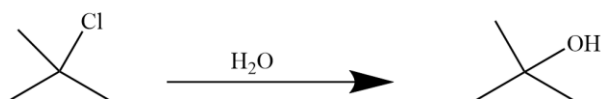
Fill in the reagents.



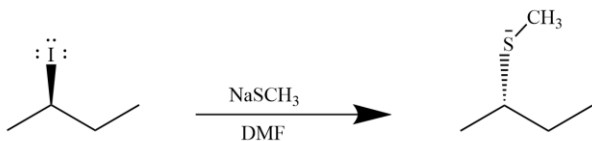
Solutions



E2 – NaOEt is a strong base and nucleophile, this eliminates E1 and SN1. From the product, it can be seen that a double bond is formed, eliminating SN2.



SN1 – H<sub>2</sub>O is a polar protic solvent, which means SN2 is not possible. In the product, OH replaces Cl which eliminates E1 and E2.



SN2 – NaSCH<sub>3</sub> is a strong nucleophile which eliminates SN1. However it is also a weak base which eliminates E2. There is no double bond formed, which eliminates E1. The inversion of stereochemistry is indicative of an SN2 reaction.

