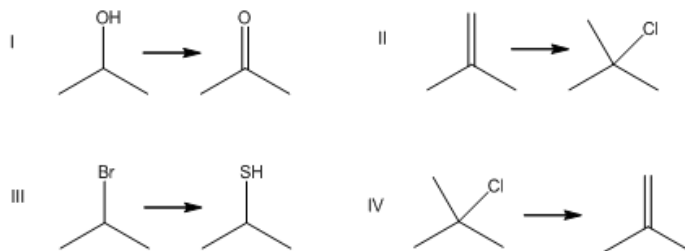


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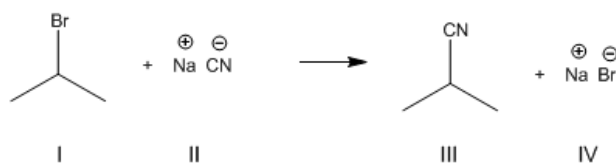
Substitution reactions

1. Which of the following is a substitution reaction?



2. What is a nucleophile? Describe its structural property. Which substances can act as a nucleophile?

3. For the following reaction, label the nucleophile, electrophile, and the leaving group:



4. Which is the best leaving group?

- Br^-
- Cl^-
- F^-
- I^-

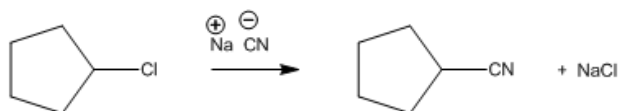
5. Nucleophilic substitution reactions are an important class of organic reactions that allow the interconversion of functional groups. Two different mechanisms are possible. Try to figure out differentiating factors between both mechanisms.

6. $\text{S}_{\text{N}}1$ and $\text{S}_{\text{N}}2$ – what do the numbers mean?

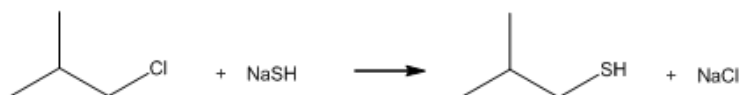
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Substitution reactions

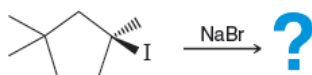
7. Provide a curved arrow mechanism for the following S_N2 reaction



8. Draw the potential energy diagram and the transition state for the following S_N2 reaction:



9. Draw the products of the following S_N1 reaction:



10. The reaction of $(\text{CH}_3)_3\text{CCl}$ (*tert*-butyl chloride) and NaOH (sodium hydroxide) follows a nucleophilic substitution.

- Try to write the chemical equation of this reaction!
- Try to identify and to formulate the reaction mechanism. Name the carbocation.
- Draw the potential energy diagram.