Library of Organic Chemistry Active Learning (LOCAL) Resources

Comparison of S_N1 and S_N2 Mechanisms

Consider a substitution reaction:

\[ RX + \text{Nu:} \xrightarrow{S_{N1} \text{ or } S_{N2}} \text{RNu} + X^- \]

- Alkyl Halide Electrofile (E^+)
- Nucleophile
- Leaving Group (LG)

S_N1

\[ \bigcirc \]

S_N2

\[ \bigcirc \]

both

S_N1 & S_N2

Categorize each of the following items as being related to S_N1, S_N2, or both.

- carbocation
- bimolecular
- good LG
- MeOH Nu:
- backside attack
- a bond forms in rate-determining step
- more than one transition state
- 3° RX
- steric
- aprotic solvent
- unimolecular
- H_2O Nu:
- solvolysis
- MeI = fastest
- no reaction on 1° RX
- unhindered E^+
- only one transition state
- no reaction on vinyl RX
- HO^- Nu:
- Rate = k[RX]
- weak Nu:
- inversion of stereochemistry
- NaOMe Nu:
- protic solvent
- 2° RX
- strong Nu:
- Rate = k[RX][Nu:]
- t-BuBr = fastest
- no reaction on 3° RX
- rearrangement
- a bond breaks in rate-determining step
- racemization
- 1° RX