

## **Nucleophilic Substitution vs Elimination Reaction**

Eliminations of alkyl halides to yield alkenes occur by three mechanisms: E2 reactions, E1 reactions, and E1cB reactions, which differ in the timing of C-H and C-X bond-breaking. In the E2 reaction, C-H and C-X bond-breaking occur simultaneously when a base abstracts H<sup>+</sup> from one carbon while the leaving group departs from the neighboring carbon. The reaction takes place preferentially through an anti periplanar transition state in which the four reacting atoms—hydrogen, two carbons, and leaving group—are in the same plane. The reaction shows second-order kinetics and a deuterium isotope effect, and occurs when a secondary or tertiary substrate is treated with a strong base. These elimination reactions usually give a mixture of alkene products in which the more highly substituted alkene predominates (Zaitsev's rule).