Answer on Question #42214, Chemistry, Organic Chemistry

Question:

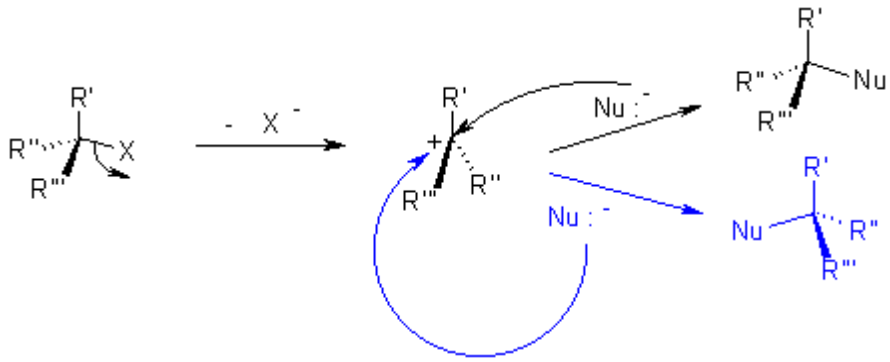
using curved arrows, give the accurate illustration and description of the mechanism of an Sn1 and of an Sn2 reaction. explain clearly the factors that influence the type of mechanism that occurs most readily foe primary and for tertiary haloalkanes

Answer:

The term S_N2 means that two molecules are involved in the actual transition state:

The departure of the leaving group occurs simultaneously with the backside attack by the nucleophile. The S_N2 reaction thus leads to a predictable configuration of the stereocenter - it proceeds with inversion (reversal of the configuration).

In the S_N1 reaction, a planar carbenium ion is formed first, which then reacts further with the nucleophile. Since the nucleophile is free to attack from either side, this reaction is associated with racemization.



In both reactions, the nucleophile competes with the leaving group. Because of this, one must realize what properties a leaving group should have, and what constitutes a good nucleophile. For this reason, it is worthwhile to know which factors will determine whether a reaction follows an S_N1 or S_N2 pathway.

In the S_N2 reaction, the addition of the nucleophile and the elimination of leaving group take place simultaneously. Therefore S_N2 occurs where the central carbon atom is easily accessible to the nucleophile (*e.g* primary haloalkanes). By contrast, the S_N1 reaction involves two steps. S_N1 reactions tend to be important when the central carbon atom of the substrate is surrounded by bulky groups (*e.g* tertiary haloalkanes), both because such groups interfere sterically with the S_N2 reaction (discussed above) and because a highly substituted carbon forms a stable carbocation.