12.2: Background

SN2 reactions occur via the backside attack of a carbon leaving group bond. From a molecular orbital perspective, the highest occupied orbital (HOMO) of the nucleophile (typically a lone pair of electrons) overlaps with the carbon-leaving group antibonding orbital (The lowest unoccupied molecular orbital or LUMO).

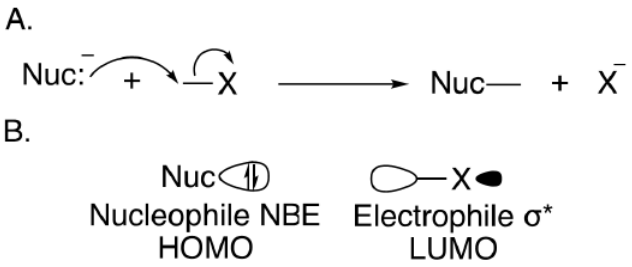

Figure 1A. Generic SN2 reaction. **B.** The frontier molecular orbitals overlapping to cause an SN2 reaction.

Typically, HO- or RO- are not effective enough leaving groups to allow an SN2 reaction to occur without some type of activation. Cyclic ethers containing a significant amount of angle strain, however, allow SN2 reactions to occur. The angle strain inherent in 3 and 4 membered cyclic ethers, known as epoxides and oxetanes respectively, increase the reactivity of the ether as an electrophile. In the exercise that follows, you will be examining the reaction of both a 3-membered epoxide, and a 4-membered oxetane of the same molecular formula to examine the effect of angle strain upon the substitution reaction.