

Listed below are the major topics of chapters 6-7. Keep in mind that this is only a review sheet. We've covered more material and more details than can be confined to a single page.

Chapter 6:

nucleophilic substitution, nucleophile, electrophile; use of curved arrows to draw reaction mechanisms

SN2: second order kinetics; one step, concerted mechanism; what does the SN2 TS and reaction coordinate look like?; backside attack leads to inversion of configuration; SN1: 1st order kinetics; multistep mechanism; the RDS leads to formation of a carbocation; carbocation stability $3^\circ > 2^\circ > 1^\circ > \text{CH}_3$; alkyl groups have an electron-donating inductive effect; SN1 leads to racemization

factors that influence the rates of SN1 versus SN2 reactions: (1) rate of SN2 is $\text{CH}_3 > 1^\circ > 2^\circ > (3^\circ)$ because of steric requirements of backside attack; rate of SN1 is $3^\circ > 2^\circ > (1^\circ, \text{CH}_3)$ because of carbocation stability; (2) weak bases make good leaving groups; OH is a terrible leaving group; (3) strong bases make good nucleophiles, exception occurs in protic solvents where nucleophilicity increases down a column; (4) SN2 is faster in polar aprotic solvents, SN1 is faster in polar protic solvents; use SN reactions in the context of organic synthesis

elimination leads to formation of alkenes; E2, second order kinetics, concerted mechanism; what does the E2 TS look like?; E1, first order kinetics, what is the mechanism?; evaluate whether an SN2, E2, SN1, E1 or combination is most likely to occur; a hindered base and/or elevated temperature tends to favor elimination

Chapter 7:

review nomenclature of alkenes and alkynes; additional aspects of elimination reactions: (1) Zaitzev Rule versus Hofmann Rule; (2) E2 elimination is fastest when the C-H and C-LG bonds are anti, use this to predict what alkene is produced; mechanism and reagents required for alcohol dehydration; carbocation rearrangements (alkyl or hydride shifts); preparation of alkynes by double elimination (know reagents and mechanism); preparation of larger alkynes from terminal alkynes (know reagents); hydrogenation of alkenes (know reagents, syn addition); trans alkenes are more stable than cis; alkyl groups stabilize the C=C; hydrogenation of alkynes to alkanes and cis or trans alkenes (know reagents); be able to use reactions in the context of short organic syntheses