



OCHEM I

SUBSTITUTIONS&ELIMINATIONS

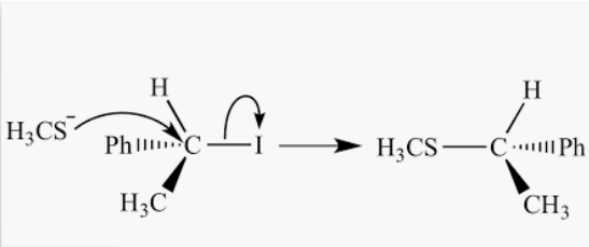
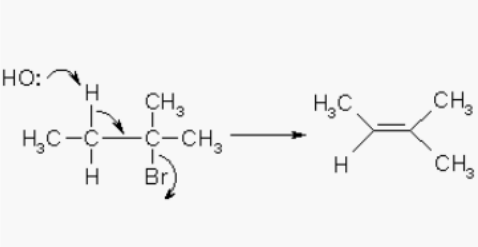
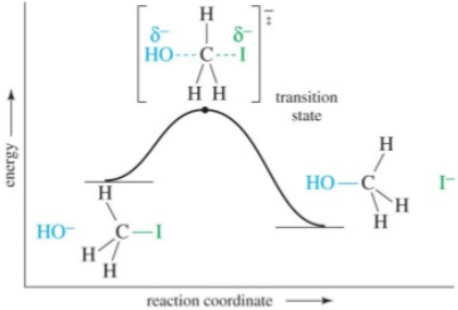
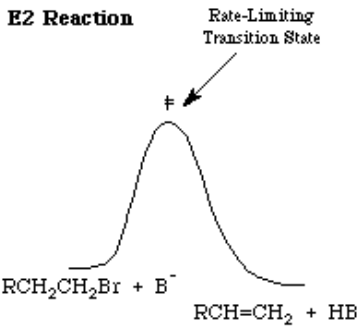
	SN1	E1
Kinetics	Rate = $k[R-LG]^1$ First order, Two steps	Rate = $k[R-LG]^1$ First order, Two steps
Solvent	Polar protic Ex. Water, acetic acid (CH ₃ COOH), ethanol (EtOH), Methanol (MeOH, CH ₃ OH)	Polar protic Ex. Water, acetic acid (CH ₃ COOH), ethanol (EtOH), Methanol (MeOH, CH ₃ OH)
Leaving Group	Weakest Base Ex. $I^- > Br^- > Cl^-$	Weakest Base Ex. $I^- > Br^- > Cl^-$
Substrate	Tertiary \gg Secondary <u>No</u> Primary Goes through carbocation intermediate -> subject to carbocation rearrangements	Tertiary \gg Secondary <u>No</u> Primary Goes through carbocation intermediate -> subject to carbocation rearrangements
Mechanism		
Nucleophile	Weak/Uncharged Ex. H ₂ O, H ₂ SO ₄ , EtOH	Weak/Uncharged Ex. H ₂ O, H ₂ SO ₄ , EtOH
Product	50:50 racemic mixture	Zaitsev alkene (double bond) formed
Graph		
Extra Notes	If "warm" conditions <u>both</u> SN1 and E1 will be the product	Heat favors elimination





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	SN2	E2
Kinetics	Rate = $k[R-LG]^1[Nu]^1$ Second order overall, One step	Rate = $k[R-LG]^1[Nu]^1$ Second order overall, One step
Solvent	Polar aprotic Ex. DMF, DMSO, THF, Acetone, HMPA	Polar protic or Polar aprotic (Typically polar protic)
Leaving Group	Weakest Base Ex. $I^- > Br^- > Cl^-$	Strongest base with a pKa higher than 11
Substrate	Primary \gg Secondary <u>No</u> Tertiary	Tertiary \gg Secondary $>$ Primary
Mechanism		
Nucleophile	Strong and Charged Ex. NaCN, KOH Note: Na and K are spectator ions, a placeholder for charge, making CN ⁻ , which is strong and charged	Strong and Charged base
Product	<u>Inversion</u> of Stereochemistry	Zaitsev or Hoffman alkene (double bond) formed
Graph		
Extra Notes	Nucleophile is attacking sigma star	Big bulky base will make the less substituted product (Hoffman)





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