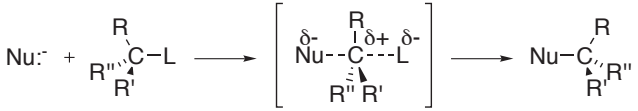
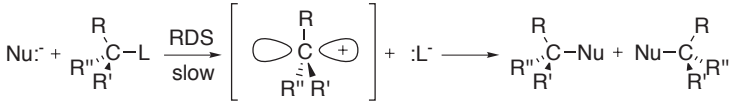
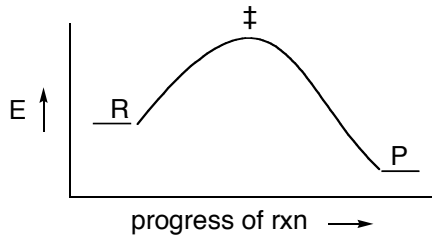
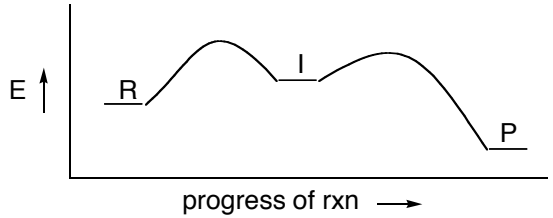
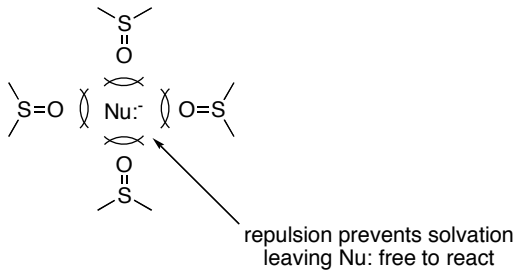
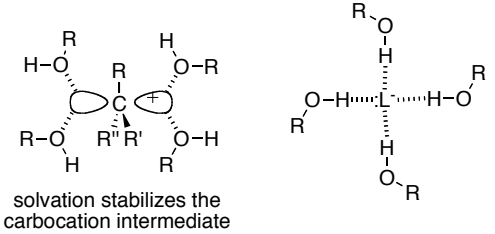
Summary of S_N1 and S_N2 Rxns

	S_N2 Rxns (concerted – 1 step)	S_N1 Rxns (two steps)
Rxn:		
Kinetics:	Rate = k[Nu][R-L] (2^{nd}-order rxn)	Rate = k[R-L] (1^{st}-order rxn)
Energy Profile:		
Substrate: (alkyl halide)	1° > 2° > 3° Steric hinderance raises the energy of the transition state and slows the rate of rxn.	3° > 2° ≈ allyl ≈ benzyl > 1° Alkyl groups stabilize the carbocation The more stable the carbocation intermediate, the faster the rate of rxn.
Nucleophile:	More reactive nucleophiles increase the rate of rxn. Good nucleophiles generally are negatively charged (e.g., OH^-, RO^-, RS^-).	Nucleophiles are not involved in the rate determining (slow) first step. Neutral nucleophiles (e.g. H_2O, ROH) often are used for solvolysis, and to reduce E2 elimination.
Leaving Group:	Good leaving groups lower the energy of the transition state and increase the rate of rxn. Good leaving groups are the conjugate bases of strong acids.	Good leaving groups favor formation of a carbocation and increase the rate of reaction. Good leaving groups are the conjugate bases of strong acids.
Solvent:	Polar aprotic solvents (e.g., DMSO, DMF, THF) increase the rate of rxn. These solvents leave the nucleophile unsolvated ("naked") and free to react with the substrate.	Polar protic solvents (e.g., H_2O, ROH, RCO_2H) increase the rate of rxn. These solvents solvate and stabilize both the carbocation intermediate and the leaving group.





Summary of Substitution vs. Elimination

	Substitution Favored	Elimination Favored
1.	Weakly basic nucleophiles:	Strongly basic nucleophiles:
	H_2O, ROH, Cl^-, Br^-, I^-, RS^-, N_3^-, CN^-, RCO_2^-	HO^-, RO^-, NH_2^-, NR_2^-
2.	Sterically unhindered haloalkanes:	Sterically hindered haloalkanes:
	1° haloalkanes	branched 1°, 2°, and 3° haloalkanes
3.	Sterically unhindered nucleophiles:	Sterically hindered nucleophiles:
	HO^-, CH_3O^-, $CH_3CH_2O^-$, NH_2^-	$(CH_3)_3CO^-K^+$, $[(CH_3)_2CH]_2N^-Li^+$ (LDA)
	(substitution may or may not occur)	