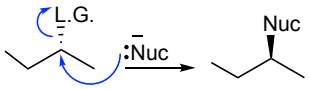
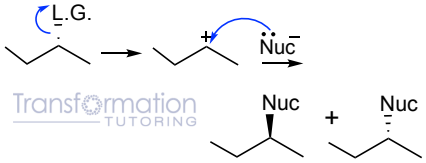
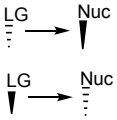
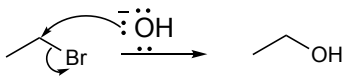
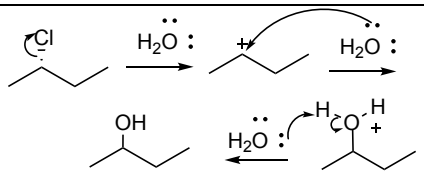
In a nucleophilic substitution reaction a nucleophile replaces a leaving group.

	SN2	SN1
Number of steps and mechanism	1 step Mechanism: The leaving group leaves and the nucleophile attacks the carbon with the leaving group from the back	2 steps (sometimes 3) 1. The leaving group leaves, creating a carbocation (C+) = rate limiting step 2. Nucleophile attaches to the carbocation 3. Solvent takes off the hydrogen from the nucleophile (deprotonation)
General Mechanism		
Stereochemistry	Inversion 	Racemization Two products are produced: one with the same stereochemistry (retention) and one with opposite stereochemistry (inversion)
Substrate preference	Prefers primary, ok with secondary, never tertiary. Why? Nucleophile attacks from the back and if there are too many groups in the back, it will not be able to reach the carbon.	Prefers tertiary, ok with secondary, never primary unless resonance stabilized. Why? Wants the most stable carbocation methyl < 1°alkyl < 2°alkyl=1°allylic < 3°alkyl=2°allylic < 3°allylic increasing stability of carbocations
Nucleophile	Strong, usually negatively charged. Examples: CN-, OH-, RO-, I-, RS-	Weak, usually neutral. Examples: H_2O, ROH, HCl
Solvent	Polar, aprotic solvent (allows for Nu to be more reactive) Examples: DMSO, Acetone, DMF, THF	Polar protic solvent (stabilizes the carbocation) Examples: H_2O, CH_3OH, CH_3COOH
Leaving Group	Good leaving groups I, Br, Cl, OTs, OH_2	Good leaving groups I, Br, Cl, OTs, OH_2
Kinetics	Bimolecular: the rate of reaction depends on both substrate and nucleophile	Unimolecular: rate depends on substrate only
Rearangements	Not Possible	Possible
Example		

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