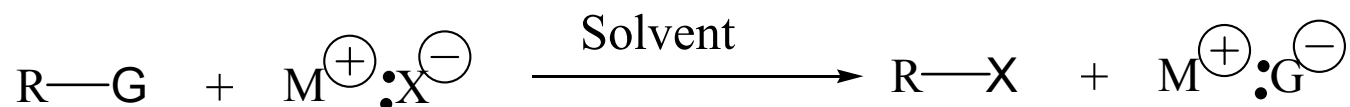
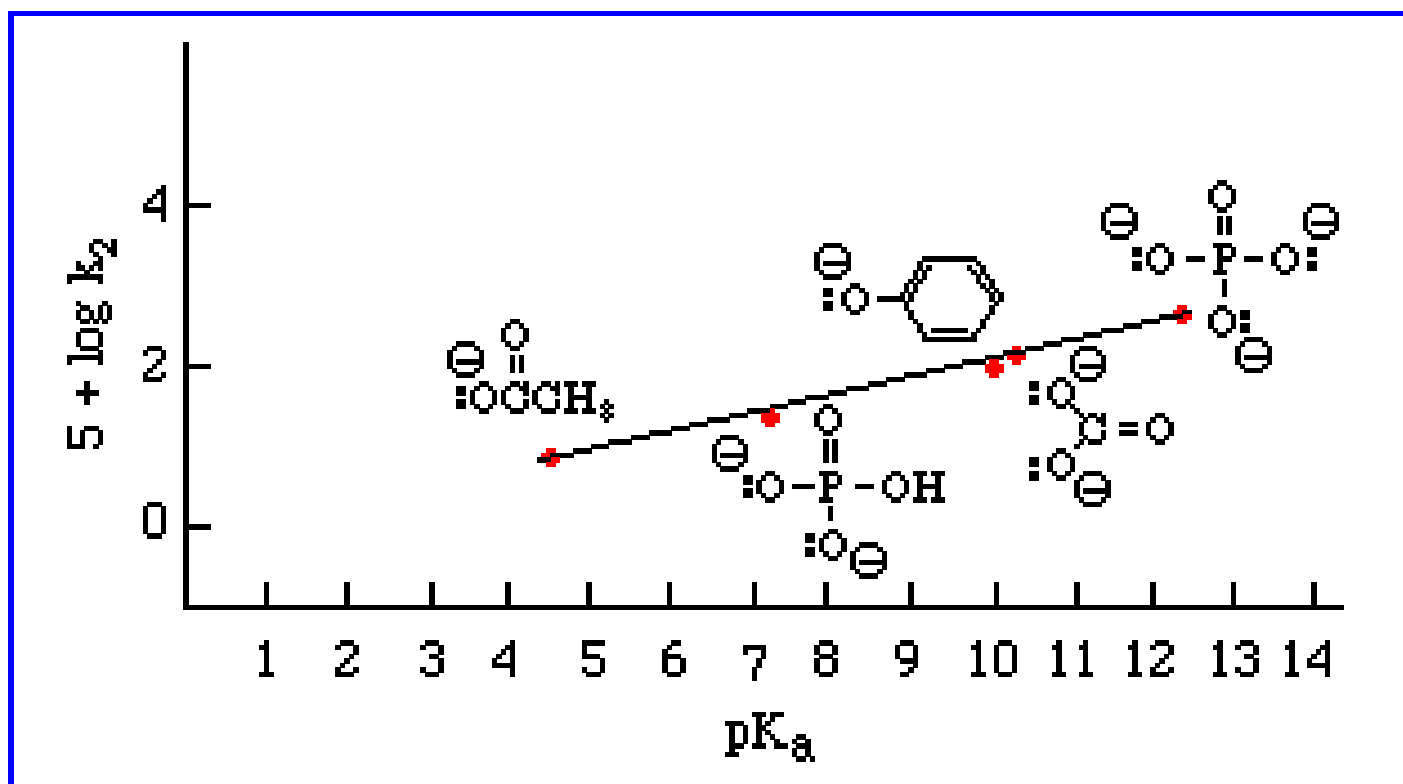


Table 1: Effect of Cation and Solvent on Nucleophile Solvation and S_N2 Reactivity



Reagent	Solvent	F ⁻	Cl ⁻	Br ⁻	I ⁻
Na ⁺ X ⁻	Acetone/H ₂ O	0.53	0.8	1	...
Na ⁺ X ⁻	CH ₃ OH	...	0.019	0.13	1
(CH ₃ CH ₂ CH ₂ CH ₂) ₄ N ⁺ X ⁻	Acetone	...	18.4	4.9	1
Li ⁺ X ⁻	Acetone	...	0.2	0.9	1
Li ⁺ X ⁻	DMF	...	9.1	3.4	1
(CH ₃ CH ₂ CH ₂ CH ₂) ₄ N ⁺ X ⁻	DMSO	1667	7.9	3.4	1
(CH ₃ CH ₂ CH ₂ CH ₂ CH ₂) ₄ N ⁺ X ⁻	None	...	620	7.7	1

The relationship between rate constants and nucleophile pK_a S_N2 reactions:



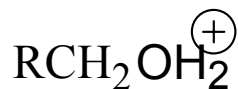
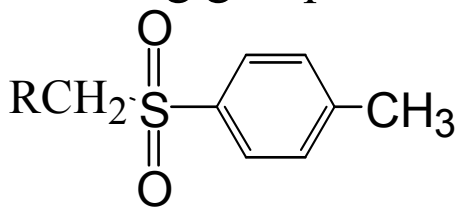
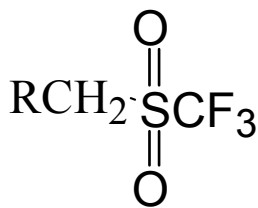
E. The Nature of Leaving Group



Carbon-halogen bond strength:

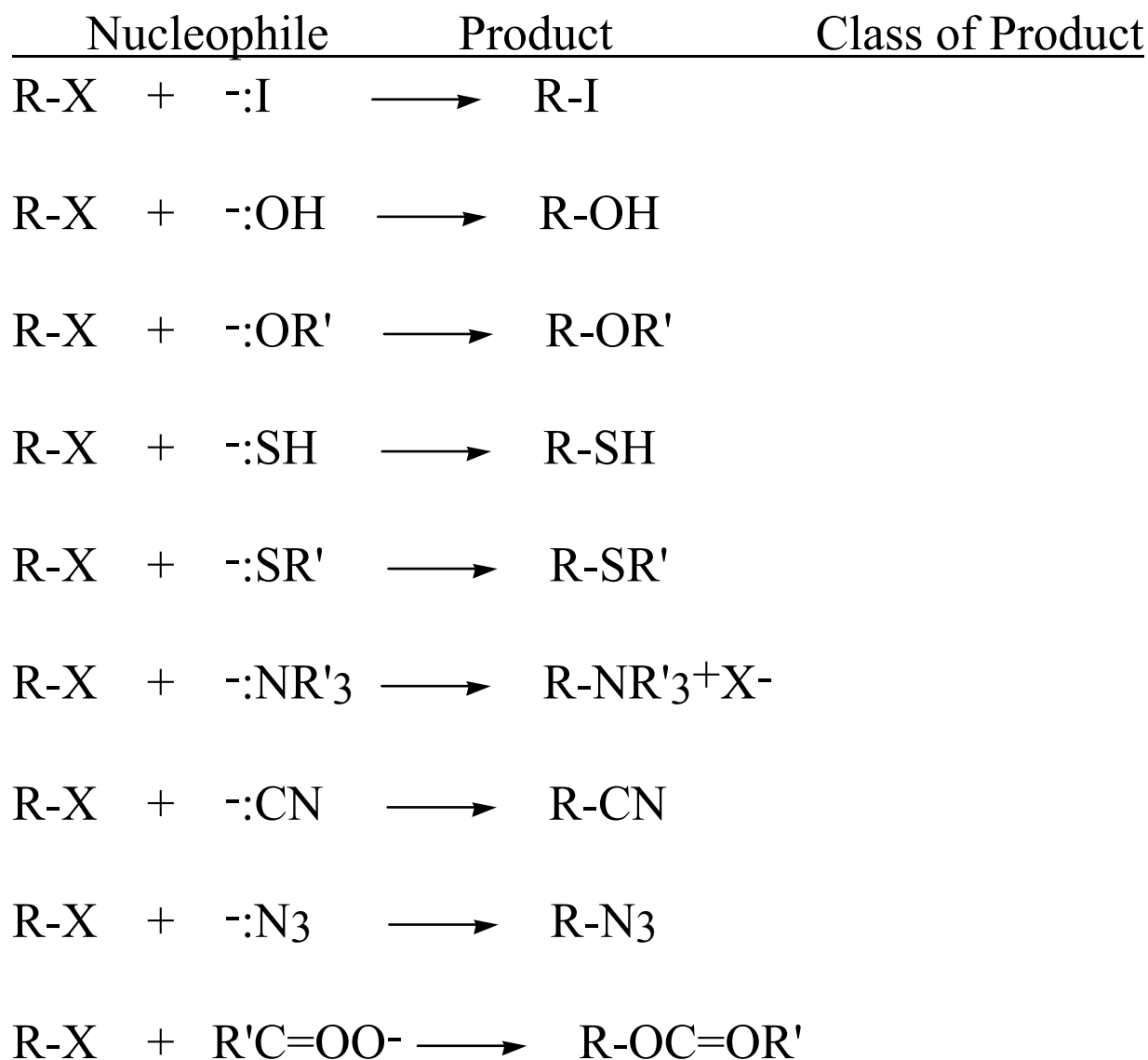
compound	bond strengths kcal/mol
CH_3F	
CH_3Cl	
CH_3Br	
CH_3I	

Leaving groups:



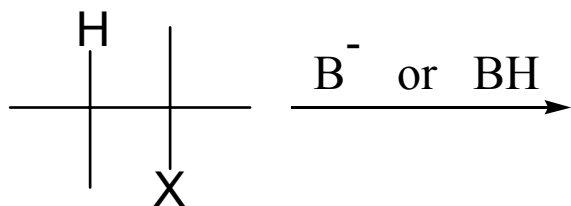
7. Organic Synthesis using S_N2 Reactions

A. S_N2 Reactions of Primary and Secondary Alkyl Halides
Alcohols, ethers, nitriles, esters, azides, thiols, thioethers, etc

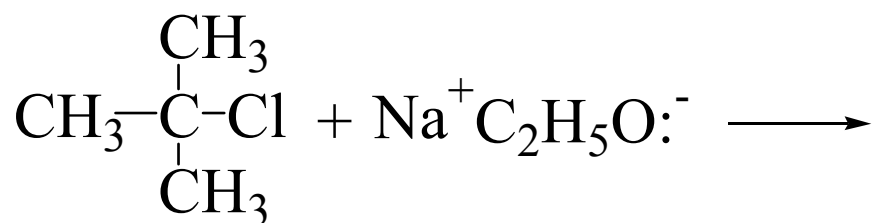


8. Elimination Reactions of Alkyl Halides

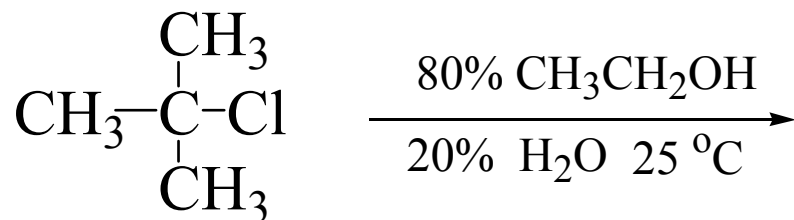
A. Dehydrohalogenation



Example:



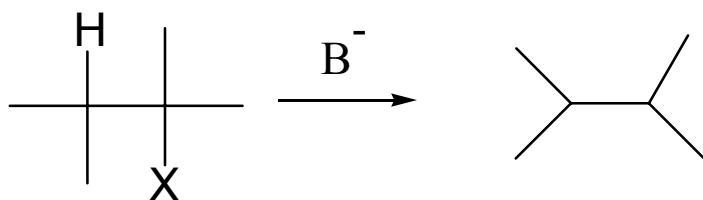
Rate =



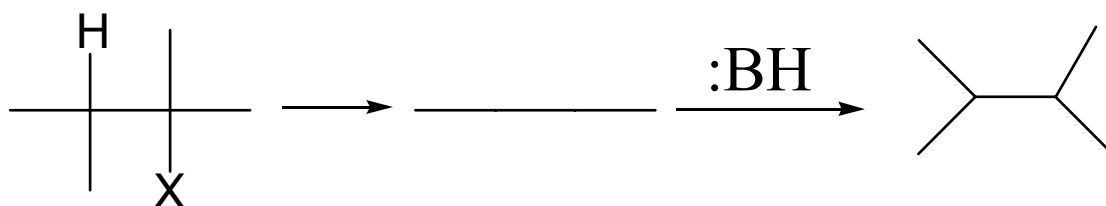
Rate =

B. Mechanism of Dehydrohalogenation

1) The E2 Reaction:



2) The E1 Mechanism



Products of elimination reactions are predicted by alkene stability:

