

### Effectiveness of Nucleophiles

Effectiveness	Nucleophiles
Excellent	I <sup>-</sup> , HS <sup>-</sup> , RS <sup>-</sup>
Good	
Moderate	
Weak	
Poor	
What factors contribute to nucleophilicity?	

### Effectiveness of Leaving Groups

Effectiveness	Leaving Group
Excellent	I <sup>-</sup> , Br <sup>-</sup> , Cl <sup>-</sup>
Good	
Moderate	
Weak	
Poor	
What factors contribute to the effectiveness of a leaving group?	

### Effects of Substituents on Electrophilic Aromatic Substitution

		Substituents
<b>Ortho / Para Directing</b>	Strongly Activating	Alkoxide, amine
	Moderately Activating	
	Weakly Activating	
	Weakly Deactivating	
Reference		—H
<b>Meta Directing</b>	Moderately Deactivating	
	Strongly Deactivating	
What is the effect of an activating / electron-donating group?		
What is the effect of a deactivating / electron-withdrawing group?		

Determining the Mechanism of Reaction (S<sub>N</sub>1, S<sub>N</sub>2, E1, E2)

	S <sub>N</sub> 1	S <sub>N</sub> 2	E1	E2
Reaction mechanism	Two steps with carbocation intermediate			
Strength of nucleophile	Not relevant because it does not affect the rate determining step			
Leaving group ability	The weaker the base the better – involved in rate determining step			
Solvent	Protic polar			
3°, 2°, 1°	Mainly 3° but can be 2° too			
Stereochemistry	Racemic product			

Strength of Acids

Strength	Acid
Excellent	HClO <sub>4</sub> , H <sub>2</sub> SO <sub>4</sub> , HI, HBr, HCl, HNO <sub>3</sub>
Good	
Moderate	
Weak	
Poor	
What factors contribute to the strength of an acid?	

Strength of Bases

Strength	Base
Excellent	LiOH, NaOH, KOH, Ca(OH) <sub>2</sub> , Sr(OH) <sub>2</sub> , Ba(OH) <sub>2</sub>
Good	
Moderate	
Weak	
Poor	
What factors contribute to the strength of a base?	