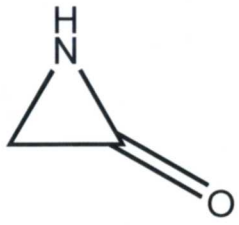
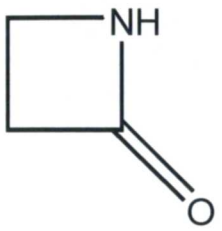
Carboxylic Acids and Derivatives Nomenclature - Examples

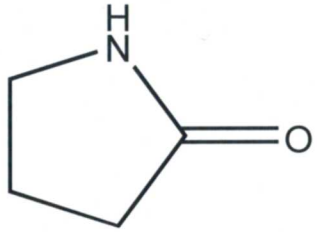
Lactams: cyclic amides



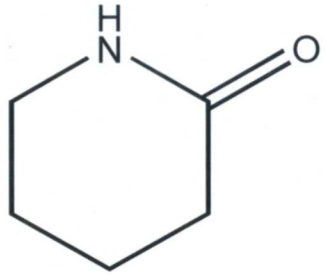
α-lactam



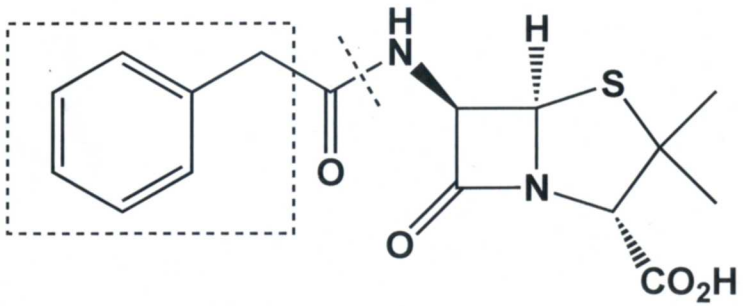
β-lactam



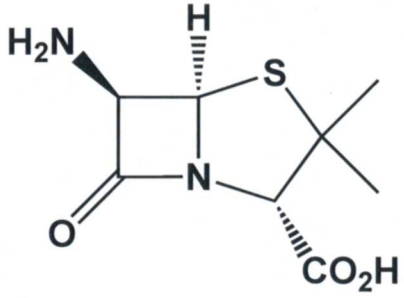
γ-lactam



δ-lactam



penicillin G

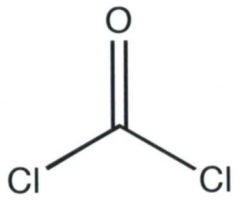


6-aminopenicillanic acid

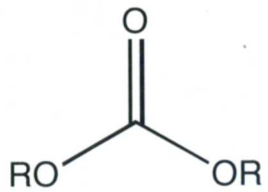
Carbon Dioxide Derivatives:

Carbonic acid

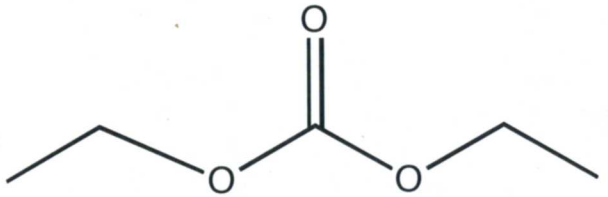
Sodium Bicarbonate ($NaHCO_3$)



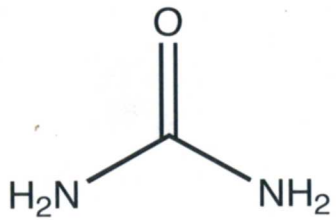
Phosgene - a bis-acyl chloride : a war gas



Carbonates (bis-esters)



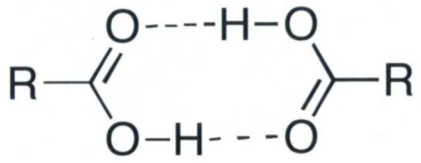
diethyl carbonate



Urea (bis-amide)

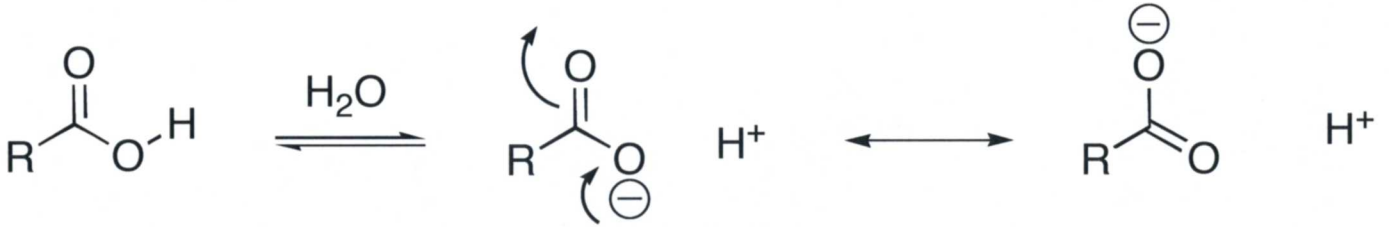
Properties of Carboxylic Acids

acidic, hydrogen bond, polar, form dimers in organic solvents

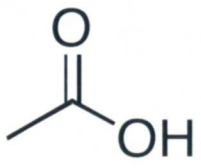


high BP and MP - dissolve in water if small

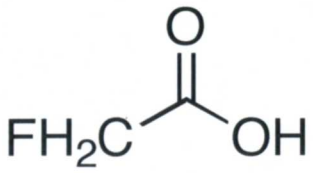
ionize readily - pKa ca 4-5



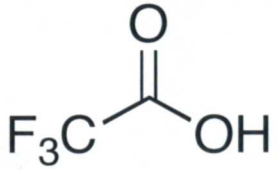
Substituent Effects on Acidity



pKa = 4.5

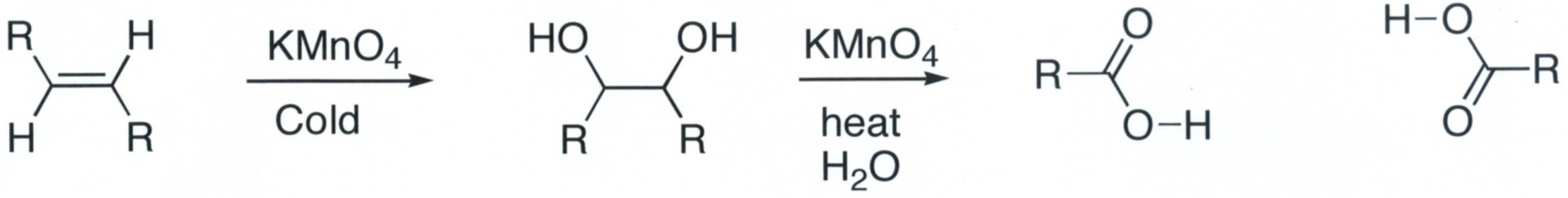


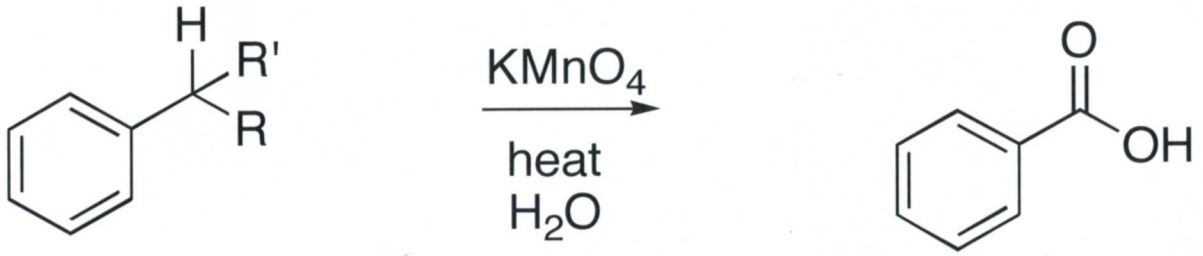
pKa = 2.6

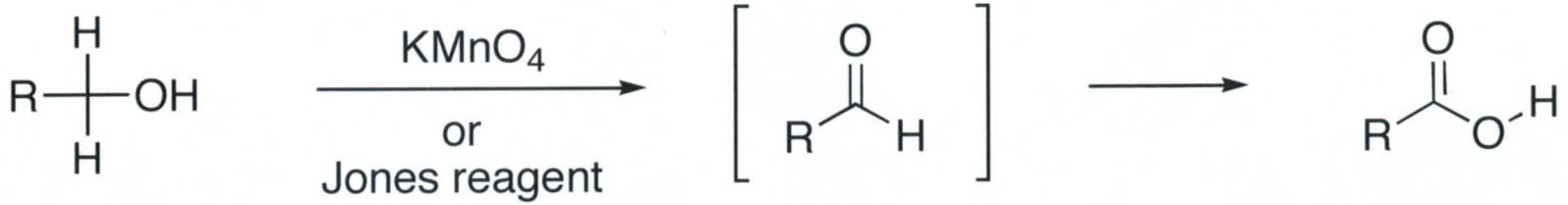


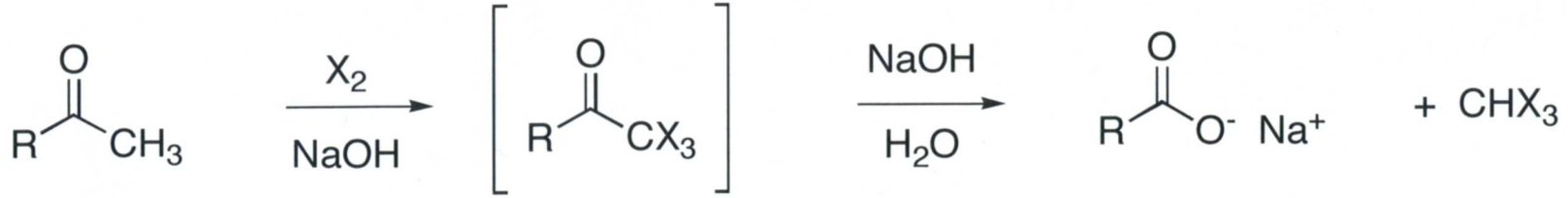
pKa = 0.2

Preparation of Carboxylic Acids (review)



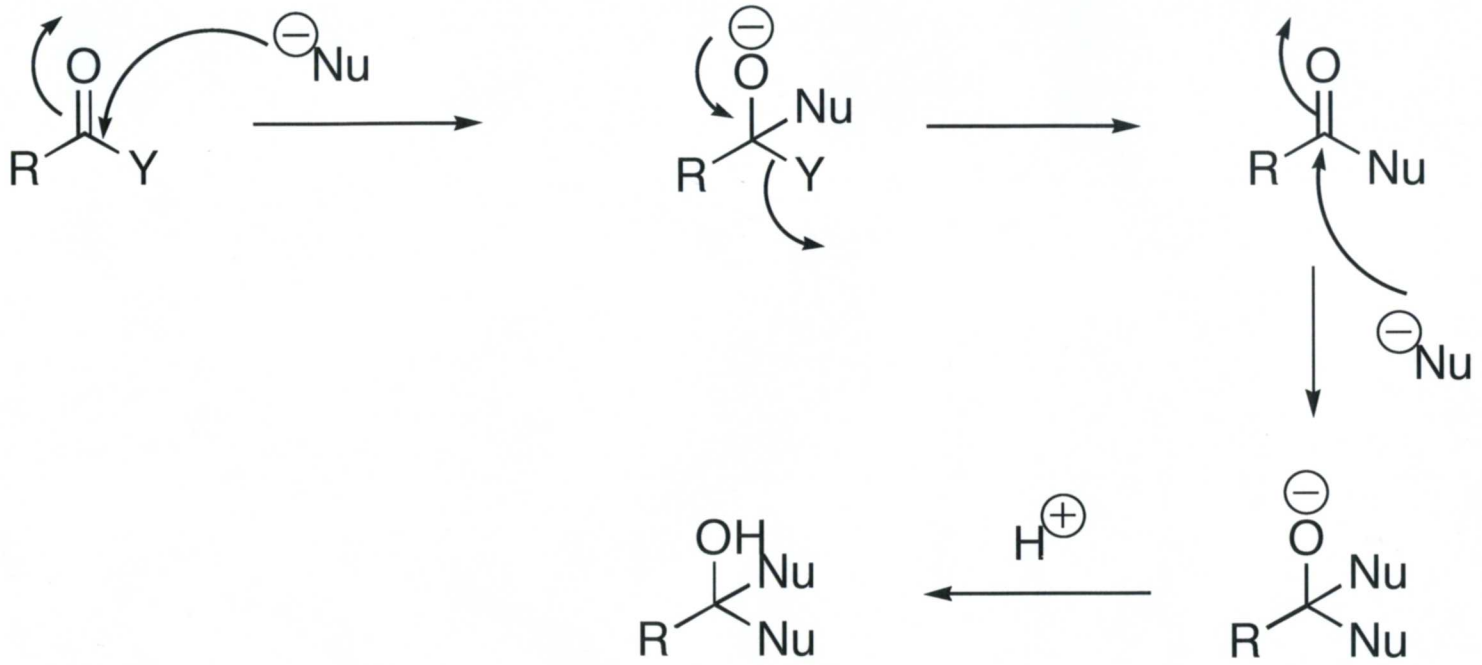






Reactions of Carboxylic Acids and Derivatives: Strong Nucleophiles

anion (H^-) or alkyl anion (R^-) remember: **NOT reversible**



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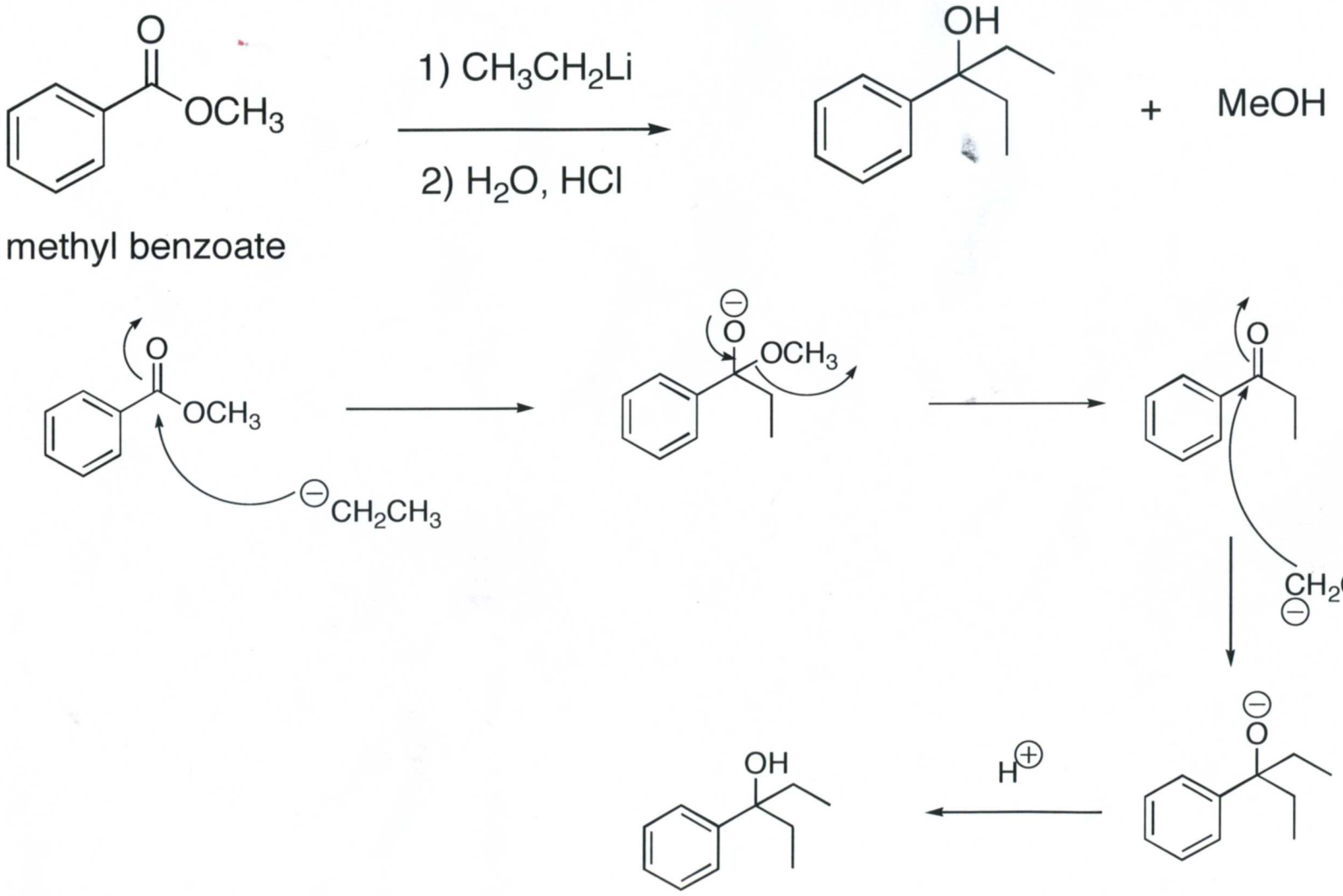
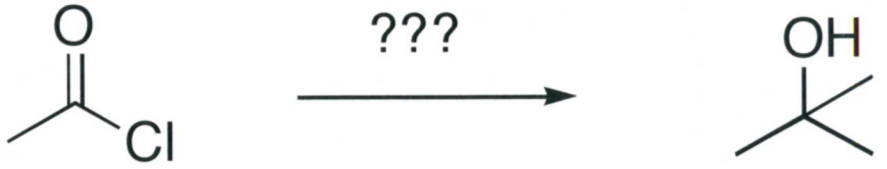


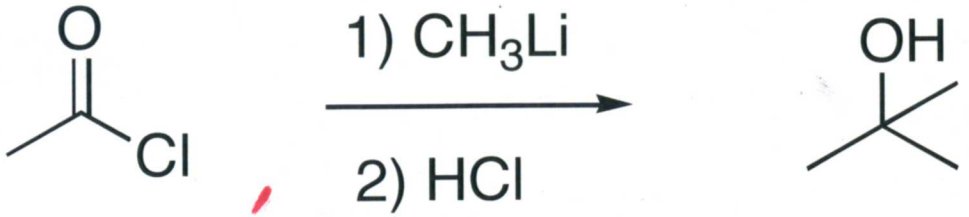
Reactions of Carboxylic Acids and Derivatives: Strong Nucleophiles

what reagent to use for transformation below ?



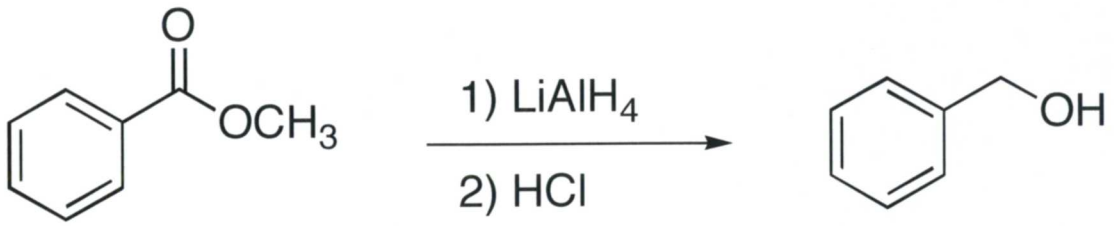
analyze this: *what has changed between the two molecules?*

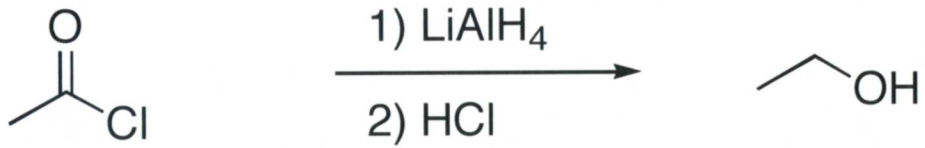
Add	Reagent	Remove
H+	HCl	
CH_3^-	CH_3Li	
CH_3^-	CH_3Li	
		- Cl



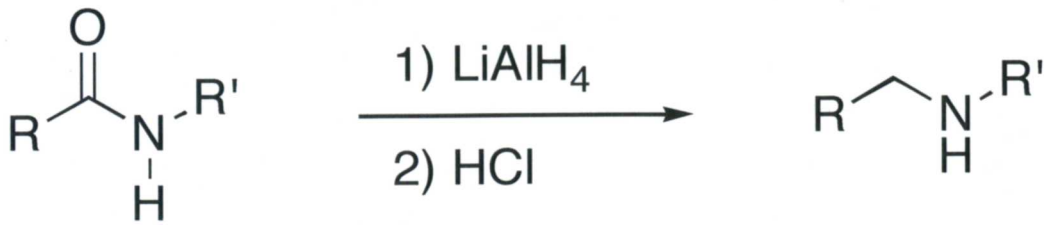
Reactions of Carboxylic Acids and Derivatives: Strong Nucleophiles

H^- ($LiAlH_4$) as nucleophile: mechanism analogous to alkyl anion



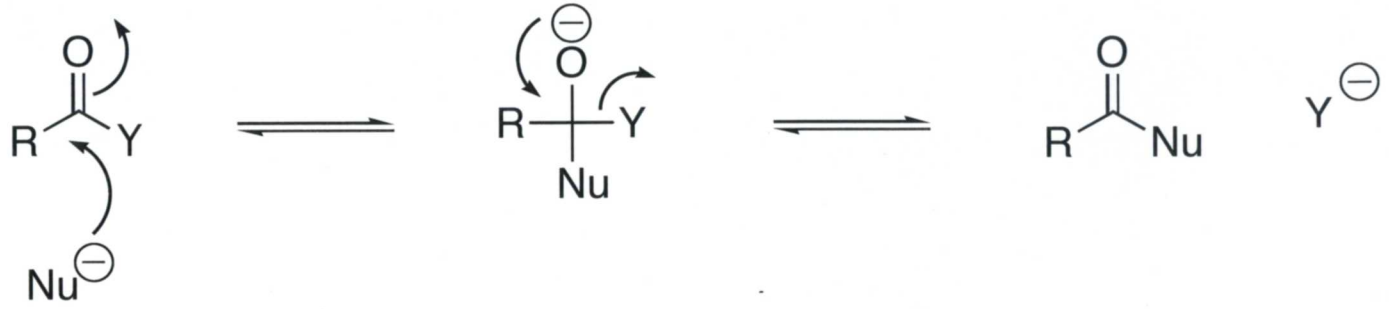


"Exception" for $LiAlH_4$ amides give amines



General Reaction of Carboxylic Acid Derivative & Weak Nucleophile

basic conditions: lone pair of electrons from nucleophile attacks carbonyl group



acidic conditions: lone pair from nucleophile attacks protonated carbonyl group

H - Y

Reactivity of Carboxylic Acid Derivatives: General Scheme