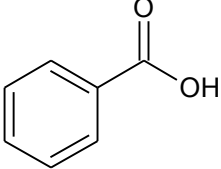
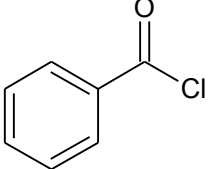
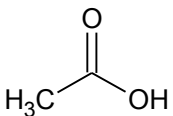
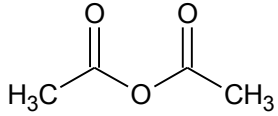
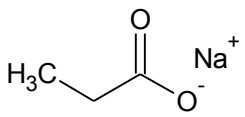
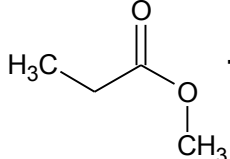
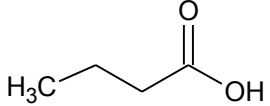
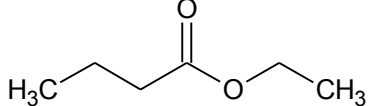
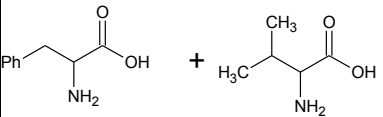
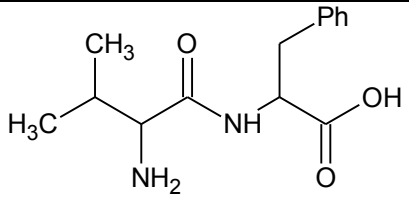
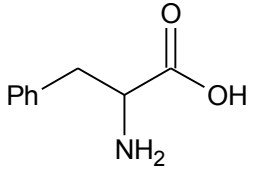
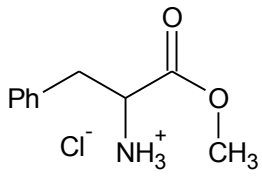
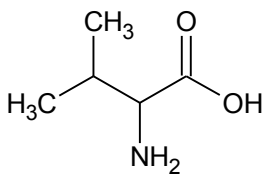
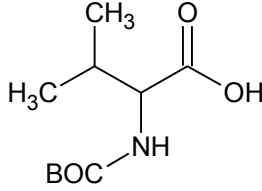
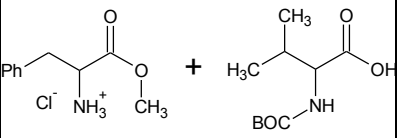
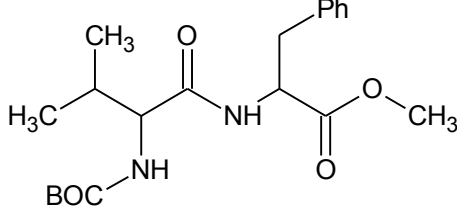


1	Oxidation of Primary Alcohol		Jones Reagent or $\text{K}_2\text{Cr}_2\text{O}_7, \text{H}^+$	
2	Oxidation of Aldehydes		Jones or $\text{K}_2\text{Cr}_2\text{O}_7, \text{H}^+$	
3	Oxidative Cleavage of Aryl Benzenes		KMnO_4 $\text{H}_2\text{O}, 95^\circ\text{C}$	
4	Oxidative Cleavage of Alkenes		KMnO_4 Acid, Δ	
5	Oxidative Cleavage of Alkenes		1. O_3 2. Zn, AcOH	
6	Oxidative Cleavage of Alkenes		1. O_3 2. H_2O_2	
7	Hydrolysis of Nitriles (Base Catalyzed)		1. $\text{NaOH}, \text{H}_2\text{O}, \Delta$ \rightleftharpoons 2. H_3O^+	
8	Hydrolysis of Nitriles (Acid Catalyzed)		H_2SO_4 \rightleftharpoons H_2O	

9	Carboxylation of Grignard Reagents		$\xrightarrow[2. \text{H}^+]{1. \text{CO}_2}$	
10	Carboxylation of Grignard Reagents		$\xrightarrow[2. \text{H}_2\text{SO}_4, \text{H}_2\text{O}]{1. \text{NaCN}, \text{DMF}}$	
11	Carboxylation of Grignard Reagents		$\xrightarrow[3. \text{H}^+]{1. \text{Mg}, \text{THF}; 2. \text{CO}_2}$	
12	Prep. Of Nitriles from Alkyl halides/ good L.G.		$\xrightarrow[\text{DMSO}]{\text{NaCN}}$	
13	Prep. Of Nitriles from Carbonyls		$\xrightarrow{\text{HCN}}$	 cyanohydrin
14	Prep. Of Nitriles from Amides		$\xrightarrow[80 \text{ }^\circ\text{C}]{\text{SOCl}_2, \text{benzene}}$	 + SO ₂ + 2 HCl
15	LAH Red'n of Nitriles		$\xrightarrow[2. \text{H}_3\text{O}^+]{1. \text{LAH}, \text{ether}}$	
16	Grignard Rxn of Nitriles		$\xrightarrow[2. \text{Dilute HCl}]{1. \text{PhMgBr}, \text{THF}}$	

17	Formation of Acid Chlorides from Carboxylic Acids		$\xrightarrow[\text{CHCl}_3]{\text{SOCl}_2}$	
18	Formation of Acid Anhydrides from -COOH	2 	$\xrightarrow{800\text{ }^\circ\text{C}}$	 + H ₂ O
19	Formation of Esters from -COOH (S _N 2)		$\xrightarrow{\text{CH}_3\text{I}}$	 + Na-I
20	Fischer Esterification (1985—Nobel prize 1902)		$\xrightleftharpoons[\text{HCl}]{\text{H}_3\text{C}-\text{CH}_2-\text{OH}}$	
21	Formation of Amides from -COOH		\longrightarrow	
22	Formation of Amides from -COOH (methyl ester protecting group)		$\xrightarrow{\text{CH}_3\text{OH}, \text{HCl}}$	
23	Formation of Amides from -COOH (Boc protecting group)		$\xrightarrow[\text{CH}_2\text{Cl}_2]{\text{Boc}_2\text{O}, \text{TEA}}$	
24	Peptide Formation		$\xrightarrow[\text{DMAP}]{\text{DCC}}$	

25	Deprotection (methyl ester removal)		$\xrightarrow{\text{LiOH, H}_2\text{O}}$	
26	Deprotection (Boc removal)		$\xrightarrow{\text{TFA}}$	
27	Formation of Alcohols		$\xrightarrow{\begin{matrix} 1. \text{LAH} \\ 2. \text{H}_3\text{O}^+ \end{matrix}}$	
28	Prep. Of Acid Halides		$\xrightarrow[\text{Pyr}]{\text{SOCl}_2}$	
29	Prep of Acid Halides		$\xrightarrow[\text{Ether}]{\text{PBr}_3}$	
30	Hydrolysis of Acid Halides		$\xrightarrow{\text{H}_2\text{O}}$	
31	Formation of anhydrides from acid halides		$\xrightarrow[\text{25 } ^\circ\text{C}]{\text{ether}}$	
32	Formation of Esters from acid halides (alcoholysis)		$\xrightarrow[\text{Pyridine}]{\text{Pyr.}}$	

33	Formation of Amides		$\xrightarrow[2]{\text{Cyclohexylamine}}$	
34	Hydride Red'n of Acid Halides		$\xrightarrow[2. \text{H}_3\text{O}^+]{1. \text{LAH}}$	
35	Hydride Red'n of Acid Halides		$\xrightarrow{\text{Li}(t\text{-OBu})_3\text{AlH}}$	
36	Grignard Reagents with Acid Chlorides		$\xrightarrow[2. \text{Dilute HCl}]{1. \text{H}_2\text{C}=\text{CHMgBr}, \text{THF}}$	
37	Gilman Reagent with Acid Chlorides		$\xrightarrow[\text{Ether}]{(\text{CH}_3)_2\text{CuLi}}$	
38	Friedel-Crafts Acylation of Acid Chlorides		$\xrightarrow[\text{AlCl}_3]{\text{H}_3\text{C-CH}_2\text{-COCl}}$	
39	Prep of Acid Anhydrides		$\xrightarrow{\text{ether}}$	

40	Prep of Cyclic Acid Anhydrides		$\xrightarrow{\Delta}$	
41	Prep of Cyclic Acid Anhydrides		$\xrightarrow{\Delta}$	
42	Hydrolysis of Acid Anhydrides		$\xrightarrow{H_2O}$	
43	Ester Formation from Anhydrides		$\xrightarrow{H_3C-CO-O-CO-CH_3, NaOH, H_2O}$	
44	Amide formation from Anhydrides		$\xrightarrow{H_3C-CO-O-CO-CH_3, NaOH, H_2O}$	
45	Friedel-Crafts Acylation of Anhydrides		$\xrightarrow{H_3C-CO-O-CO-CH_3, AlCl_3}$	
46	Friedel-Crafts Acylation of Cyclic Anhydrides		$\xrightarrow{\text{succinic anhydride}, AlCl_3}$	

47	Prep of Esters		$\xrightarrow{\text{H}_3\text{C}-\text{CH}_2-\text{OH}}$	 + HCl
48	Prep of Esters		$\xrightleftharpoons{\text{CH}_3\text{OH}, \text{H}^+}$	 + H ₂ O
49	Prep of Esters		$\xrightarrow{\text{H}_3\text{C}-\text{CH}_2-\text{OH}, \text{H}^+}$	 +
50	Hydrolysis of esters (base catalyzed) (saponification)		$\xrightarrow[2. \text{H}_3\text{O}^+]{1. \text{LiOH}, \text{H}_2\text{O}}$	
51	Hydrolysis of Esters (Acid Catalyzed)		$\xrightleftharpoons{\text{H}_3\text{O}^+}$	
52	Transesterification of Esters		$\xrightleftharpoons{\text{CH}_3\text{OH}, \text{H}^+, \text{OH}^-}$	 +
53	Amide formation from Esters		$\xrightarrow{\text{H}_3\text{C}-\text{CH}_2-\text{NH}_2}$	 + H ₃ C-OH
54	Alcohol Formation from Esters		$\xrightarrow[2. \text{H}_3\text{O}^+]{1. \text{LAH}}$	

55	Alcohol Formation from Esters		$\begin{array}{l} 1. \text{PhMgBr, THF} \\ 2. \text{Dilute HCl} \end{array}$	
56	Selective Red'n of Esters		$\begin{array}{l} 1. \text{DIBAL-H, -78 }^\circ\text{C} \\ 2. \text{H}_3\text{O}^+ \end{array}$	
57	Formation of Lactones from Esters		$\xrightleftharpoons{\text{H}^+}$	+ H ₂ O
58	Prep of Amides		$\begin{array}{l} \text{H}_3\text{C}-\text{CH}_2-\text{NH}_2 \\ \Delta \end{array}$	+ H ₂ O
59	Prep of Amides		$\begin{array}{l} \text{Cyclohexyl-NH}_2 \\ 2 \text{ Equivalents} \end{array}$	+
60	Prep of Amides		$\xrightarrow{\text{H}_3\text{C}-\text{CH}_2-\text{NH}-\text{CH}_3}$	+
61	Hydrolysis of Amides		$\begin{array}{l} \text{H}_3\text{O}^+ \text{ or } \text{OH}^- \\ \Delta \end{array}$	+
62	Red'n of Amides		$\begin{array}{l} 1. \text{LAH} \\ 2. \text{H}_3\text{O}^+ \end{array}$	
63	Formation of Lactams from Amides		$\xrightarrow{\Delta}$	+ H ₂ O

64	Acid Catalyzed keto-enol tautomerization		$\xrightleftharpoons{\text{HCl}}$	
65	Base Catalyzed keto-enol tautomerization		$\xrightleftharpoons{\text{OH}^-}$	
66	Acidic α -halogenation of CHO/ketones		$\xrightarrow[\text{ether}]{\text{H}^+, \text{Br}_2}$	
67	Basic α -halogenation of CHO/ketones		$\xrightarrow[\text{ether}]{\text{OH}^-, \text{Br}_2}$	
68	α -halogenation of carb. Acids		$\xrightarrow[2. \text{H}_2\text{O}]{1. \text{Br}_2, \text{PBr}_3}$	
69	LDA Formation		$\xrightarrow[\text{THF}]{\text{H}_3\text{C}-\text{CH}_2-\text{CH}_2-\text{CH}_2-\text{Li}}$	+
70	Rxn of Enolates		$\xrightarrow[2. \text{H}_3\text{C}-\text{CH}_2-\text{Br}]{1. \text{LDA, THF, } -78^\circ\text{C}}$	+ Br^- + Li^+