		1	2	3	4	5	6	7	8	9	10	11
		R–MgX ***Grignard***	***Ester enolate***	***Ketone enolate***	***Enamine***	***β–keto ester enolate***	R–NH$_2$ ***amine (primary amine)***	M–CN ***Cyanide***	R–OH/ R–OM ***alcohol/ alkoxide***	H$_2$O/ M–OH ***water/ hydroxide***	NaBH$_4$ ***Sodium borohydride***	LiAlH$_4$ ***Lithium aluminum hydride***
A	***Aldehyde***	***2° alcohol***	***Aldol Reaction***	***Aldol Reaction***		***Knoevenagel Condensation***	***Imine (aldimine)***	***Cyanohydrin***	***Acetal*** *Requires acid catalysis to form*	***Hydrate*** *(usu. thermodynaically disfavored, except for electron poor aldehydes) If aldehyde is enolizable, hydroxide can form enolate.*	***1° alcohol***	***1° alcohol***
			heating under basic conditions will lead to elimination of OH - ***Aldol condensation also note*** *that reaction can be reversible under basic conditions :* ***Retro-aldol reaction***									
B	***Acyl chloride***	***3° alcohol***	***β–keto ester***				***Amide (Schotten-Bauman reaction)***	***Acid nitrile***	***Ester***	***Carboxylic acid***	***2° alcohol***	***2° alcohol***
C	***Anhydride***	***3° alcohol***					***Amide***	***Acid nitrile***	***Ester***	***Carboxylic Acid***	*Borderline*	***1° alcohol***
D	***Ketone***	***3° alcohol***	***Aldol Reaction***	***Aldol Reaction***			***Imine (ketimine)***	***Cyanohydrin***	***Acetal*** *Requires acid catalysis*	***Hydrate*** *see above: even less favored than with aldehydes due to sterics*	***2° alcohol***	***2° alcohol***
			Note: best when ketones are identical or when only one can enolize (to avoid scrambling)									
E	α, β **unsaturated ketone (enone)**	*Varies with conditions: 1,2 adduct is kinetic pdt.*	***Michael Reaction***	***Michael Reaction***				*Note: in both cases, very prone to the reverse reaction (elimination)*		*Note: Easily reversible*	*Varies with conditions: 1,2 adduct is kinetic product, 1,4 adduct is thermodynamic.*	
F	***Ester***	***3° alcohol***	***β–keto ester*: Claisen Condensation**	***1,3 diketone*: Claisen Condensation**	*Borderline*	*Borderline*	***Amide***	NR	***Transesterification*** *Can be done under basic or acidic conditions.*	***Saponification*** *(basic conditions) Can also hydrolyze with aqueous acid*	NR	***1° alcohol***
G	***Carboxylic acid***	*Deprotonation*	*Deprotonation*	*Deprotonation*	*NR*	*Deprotonation*	***Usually requires dehydration agent (e.g. DCC)***	NR	***Fischer esterification*** *(requires acid, heat)*	—	NR	***1° alcohol***
H	***Amide***	*Deprotonation*	*1° and 2° amides: deprotonation 3°amides: NR*	*1° and 2° amides: deprotonation 3°amides: NR*	NR	NR	NR	NR	*Borderline reaction: requires strong acid, alcohol as solvent, heat*	***Amide Hydrolysis*** *Requires strong conc. acid, heat*	NR	***Amine***
I	***Alkyl halide***	Mix of addition /deprotonation	***Enolate Alkylation***	***Enolate Alkylation***	***Stork enamine reaction***	*note: capable of alkylating a second time*	***Amine*** ***caution! product is a good nucleophile; can obtain multiple alkylations***		***Williamson Ether Synthesis*** *requires basic conditions*	*requires basic conditions*	NR	***Alkane***