REACTION OF SYNTHETIC IMPORTANCE FOR COMPOUNDS CONTAINING CARBONYL GROUPS

[1]Reeyuti Patel, [2]Dr. Madhuri Hinge

Pharmaceutical Quality Assurance Department,
ROFEL Shri G. M. Bilakhia College of Pharmacy
Vapi, India

Abstract- **The present review work contains information about carbonyl compounds, methods of synthesis, reactions, properties, using as catalysis in various reaction in most organic reactions, Types of carbonyl compounds are aldehydes, ketones, carboxylic acids, esters, and amides. Carbonyl compounds undergoes different types of reaction like reduction, oxidation, esterification, condensation, etc. It includes reactions of synthetic importance of carbonyl compound and these can be used to improve product quality and quantity in industries. The work comprises special reaction according to types of compounds, viz; Dakin reaction, Fiest-binary furan synthesis, Japp Klingerman reaction etc. This review has many synthetic applications including synthesis of different compounds in areas like academics, industries, laboratories etc.**

Keywords- **Carbonyl, Aldehyde, Ketone, Carboxylic Acid, Ester, Amide.**

I.INTRODUCTION

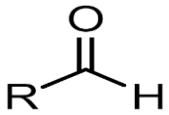
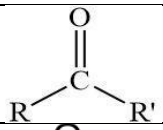
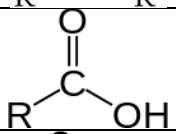
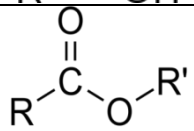
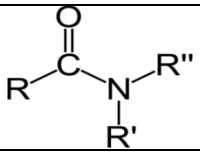
The C=O entity itself is known as the "Carbonyl Group" while the members of this group is called "Carbonyl Compounds". The term 'carbonyl' can also refer to carbon monoxide as the ligand within an organometallic or inorganic compound. Carbonyl Compounds are an integral part of organic chemistry and their primary members are called aldehyde, ketone, and carboxylic acid.[1]

➢ ***Properties of Carbonyl Compounds***

- These are polar in nature.
- These compounds are insoluble in water, although they can dissolve other polar molecules.
- These chemicals are referred to as chemically reactive compounds because they have the ability to influence a chemical reaction.

Carbonyl Compounds are given in below table;

Table1carbonylcompound

CARBONYLCOMPOUNDS	STRUCTURE
Aldehyde	
Ketone	
CarboxylicAcid	
Ester	
Amide	

II.DIFFERENT TYPES OF CARBONYL COMPOUND AND THEIR SYNTHETIC REACTION

1. ALDEHYDE

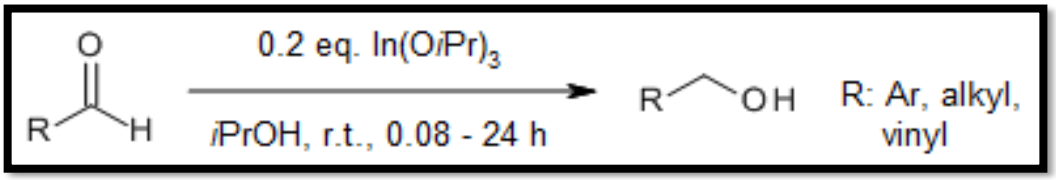
An aldehyde is an organic compound in which the carbonyl group is attached to a carbon atom at theend ofacarbonchain. In aldehyde at least one of the attached groups must be a hydrogen atom. [2]
It shows the different types of reaction which are describe below:

1) Reduction: Reduction reaction are usually affected chemically or by the addition of molecular hydrogen to one or more unsaturated groups under theinfluenceofacatalyst. [3]

➢ ***Reduction*:**Inthismethodcarbonylcompound(aldehydeorketone)arereducetotherespectivealcoholbytreatmentwithaluminiumisopropoxidein isopropanol solution.[4]

➢ **Meerwein-Ponndorf-Verley Reduction**

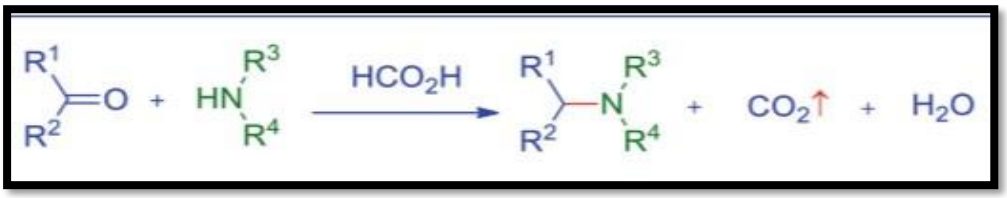
Example: Indium Tri(isopropoxide)-Catalyzed Selective Meerwein-Ponndorf-Verley Reduction of Aliphatic and Aromatic Aldehydes[5]



Meerwein-Ponndorf-VerleyReduction

➢ ***LeucartReaction:***Thisisareductiveaminationandinvolvesheatingofanaldehyde or ketone with ammonia, a primary or a secondary amine, and formicacid,ammonium formateor formamide.[2]

Reaction[6]

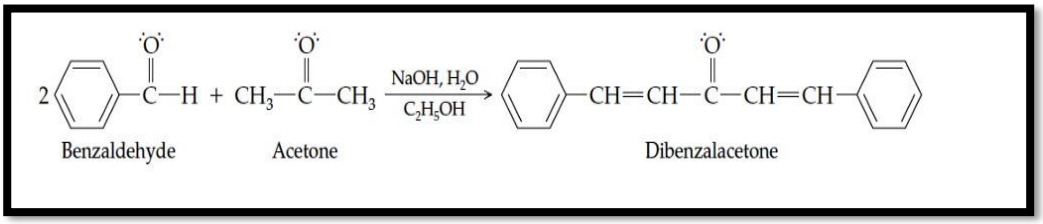


LeucartReaction

2) Condensation: Reactioninvolvingbondingbetweentwoormoremolecules, often with the loss of a small molecules such as water, hydrochloric orhydrobromicacid or an alcohol arereferred toascondensation reactions.[7]

➢ ***ClaisenSchmidtReaction:***Condensationofaromaticaldehydeslackingαhydrogenwithaliphaticaldehydeorketonesintheprescenceofdilutemineral leads to the formation of aldol, elimination of molecule of water results in the formation of αβ unsaturated aldehyde or ketone.[7]

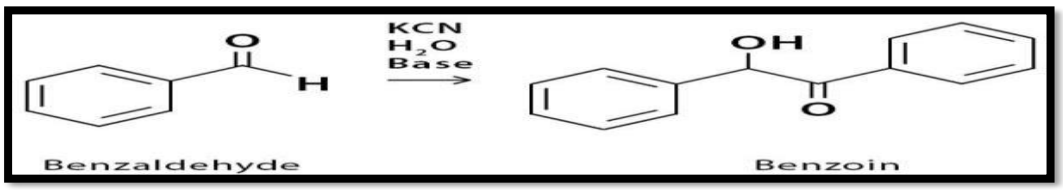
Example: Synthesis of dibenzalactone from benzaldehyde[8]



ClaisenSchmidtReaction

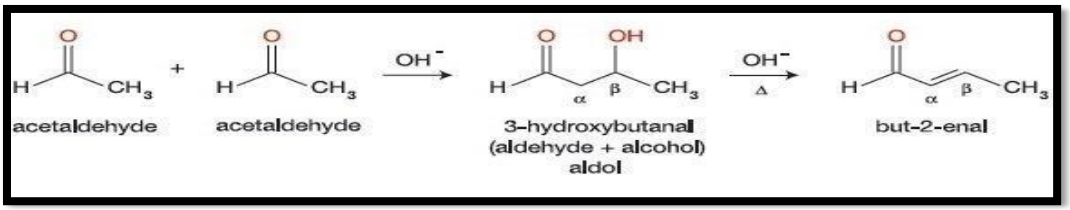
➢ ***BenzoinCondensation:***Thereactioninvolvingtheself-condensationofaromaticaldehyde in the presence ofcatalyst is referred to as Benzoin Condensation. [9]

*Example:*SynthesisofBenzoinfrom Benzaldehyde [9]



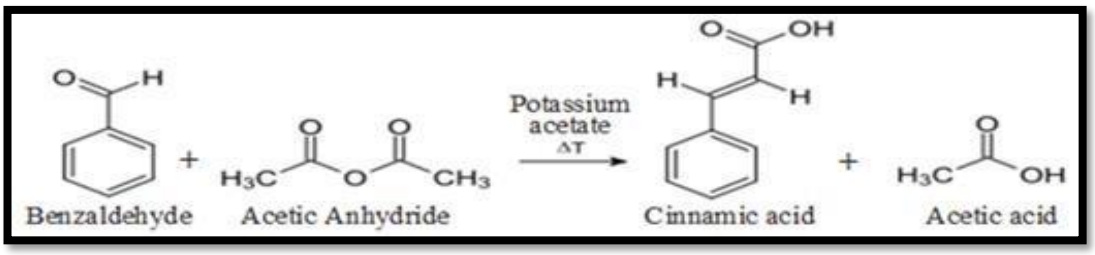
BenzoinCondensation

➢ ***AldolCondensation:***Condensationbetweentwomoleculesofaldehydetoformβ hydroxyaldehydeis known as the aldolcondensation.[10]
Reaction[11]



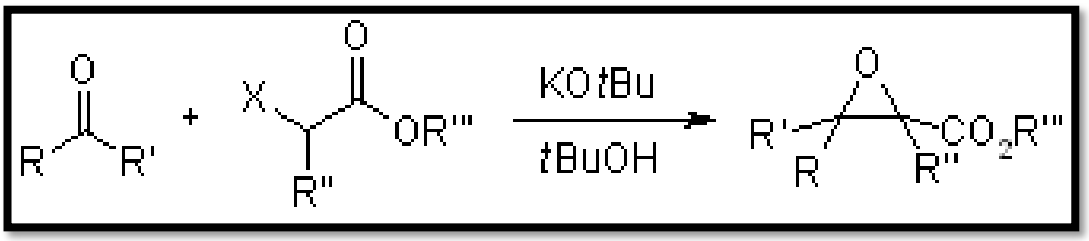
AldolCondensation

➢ ***Perkin Reaction:***The condensation between an aromatic aldehyde and aliphaticacidanhydrideinthepresenceoftheofthesodiumsaltofcorrespondinganhydrideto yield αβ unsaturatedacid isknown asPerkinreaction.[12]
➢ ***PerkinReaction(CinnamicAcidSynthesis):***Thecondensationofaromaticaldehydewith anhydrideis called thePerkin reaction.[12]
*Example:*Synthesisofcinnamicacidfrombenzaldehyde[13]



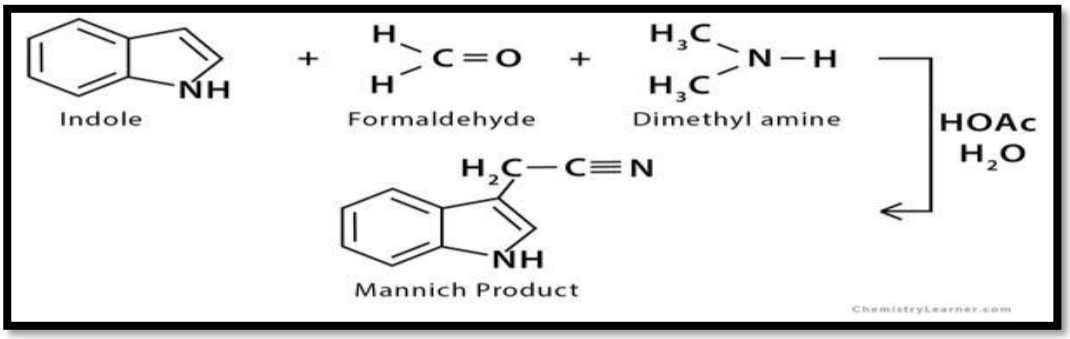
Cinnamic Acid Synthesis

➢ ***Darzen Condensation:*** The reaction involvesthe condensation of an aldehyde orketone with an α-halogen ester in the presence of sodium ethoxide or sodamide togivean α, β-epoxy ester(glycidic ester).[14]
Reaction[15]



DarzenCondensation

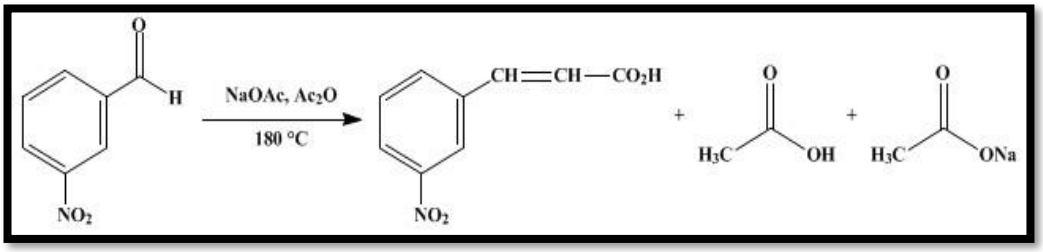
➢ ***Mannich Reaction:***This is the condensation between a compound containing at least one active hydrogenatom,formaldehyde and ammonia, a primary or secondary amine (preferably as the hydrochloride).
Example [16]



MannichReaction

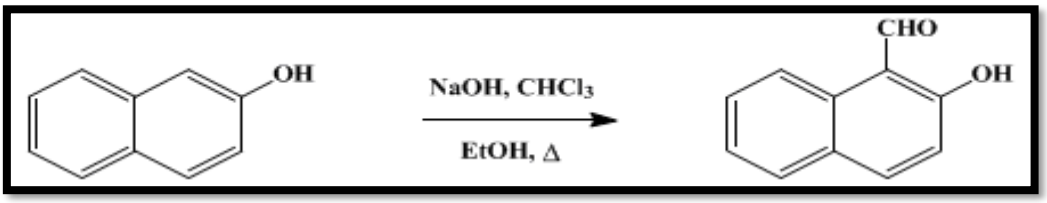
➢ ***Knoevenagel Reaction:*** The reaction with carbonyl compound with compoundcontainingactivemethylenegrouplikemalonicester,malonicacid,ethyl acetoacetate etc. in the presence of base resulting in the formation of unsaturatedcompoundis known as Knoevenagel reaction.[17]

*Example:*Synthesis ofm-nitrocinnamicacidfrom m-nitrobenzaldehyde[18]



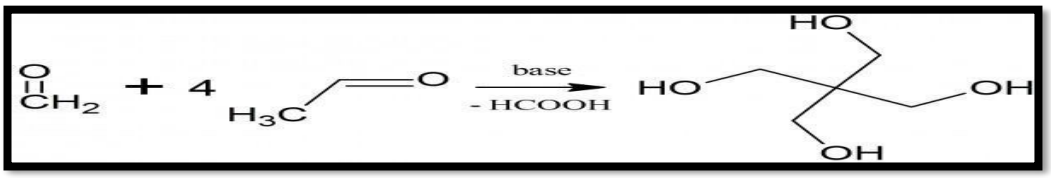
KnoovenagelReaction

3) Reimer-TiemannReaction: Phenols on the treatment withchloroforminpresenceofabaseintroduceanaldehydicgroupontothearomaticringgenerally ortho to the phenolic group. This method of generation of phenolicaldehydesis known as Reiman-Tieman reaction.[19]
*Example:*Synthesisof2-hydroxy-1-napthaldehyde[20]



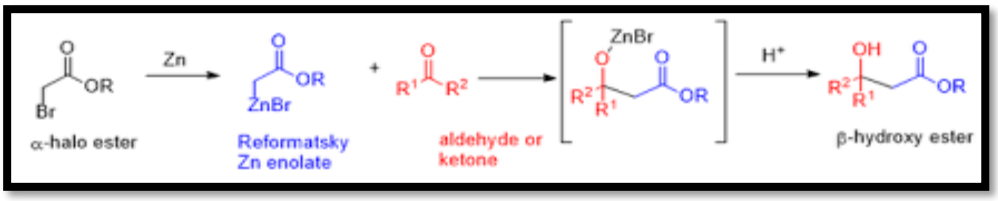
Reimer-TiemanReaction

4) Cannizaro Reaction: Aldehyde lacking α-hydrogen atom undergo self-oxidation or reduction in the presence of strong alkali giving a mixture of primaryalcoholand the salt ofacarboxylicacid.[21]
*Example:*Synthesisofpentaerythritol(tetrahydroxymethylmethane)fromacetaldehyde[22]



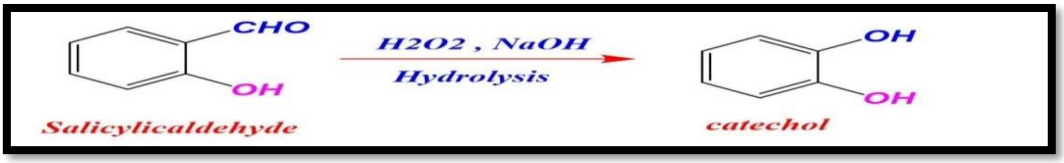
CannizaroReaction

5) Reformatsky Reaction: Reformatsky reaction involves the reaction of carbonyl compounds (aldehyde or ketone) with zinc metal and an α-bromo ester to give, after hydrolysis, β-hydroxy ester. [23]
Reaction[24]



ReformatskyReaction

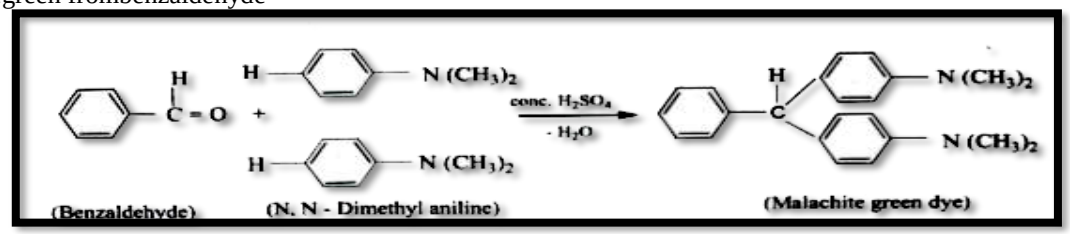
6) Dakin Reaction: This reaction involves replacement of the aldehyde (orketone) group of the o-hydroxy, p-hydroxy or o-aminobenzaldeyde (or ketone) byahydroxyl group by theaction ofalkaline hydrogen peroxide.[25]
Example[26]



DakinReaction

7) Dyes

Synthesisofmalachitegreen frombenzaldehyde[27]

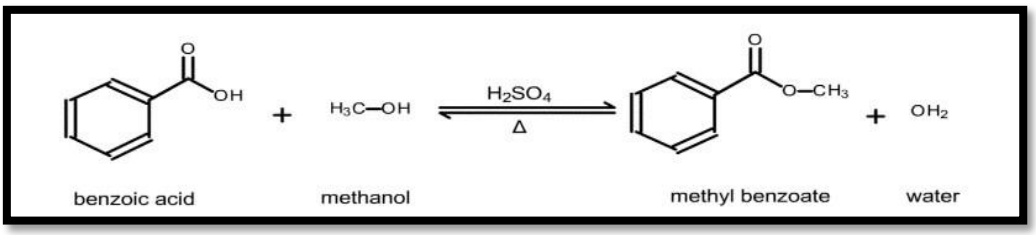


Dyes

2. KETONE

A ketone is an organic compound in which the carbonyl group is attached to acarbonatom within the carbonchain.[28]It shows the different types of reaction which are describe below:

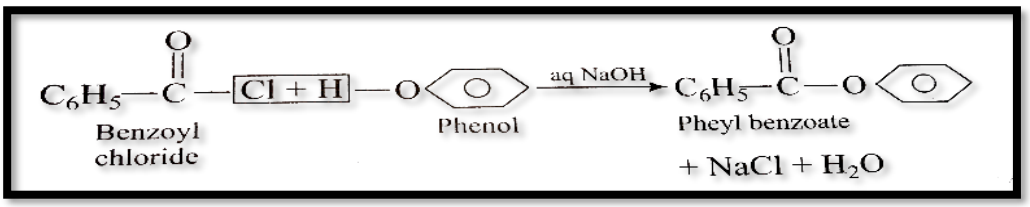
1) Esterification: Esterification is the process of combining an organic acid (RCOOH) with an alcohol(ROH) to form an ester (RCOOR) and water; or achemicalreaction resultingin the formationofatleast one ester product.[29]
*Example:*Synthesisofmethylbenzoate(oilofNiobe)frombenzoicacid[30]



Esterification

➢ ***Acetylation:***Theprocessconsistsinthereplacementofanalpha-hydrogenatomoftheketone by anacylgroup.[31]*Example:*Synthesisofbenzoinacetatefrombenzoin[32]

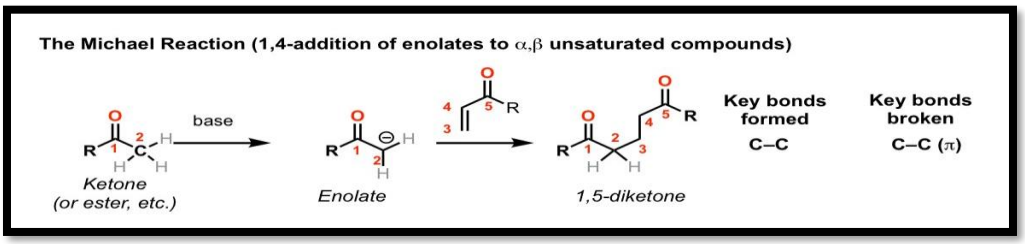
➢ ***Benzoylation(BenzeneCarbonylation):***Benzoylationisachemicalreactionthatintroduces abenzoylgroup into amolecule. [32]
*Example:*Synthesis of phenyl benzoatefrom phenol [33]



Benzoylation

2) Addition Reaction: In addition, reactions to aldehydes and ketones, thesequence of events is reversed; i.e., the initial step is addition of the negativelycharged component of the reagent to the carbon atom, followed by addition of thepositively charged component to theoxygen atom. [34]
*Example:*Addition ofbromine tobenzalacetone[34]

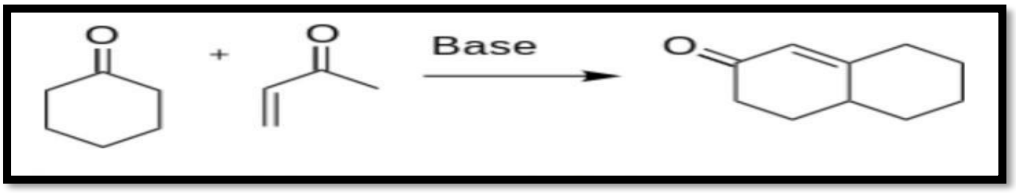
➢ ***Michael Reaction:*** This is the addition reaction between an α, β-unsaturated ketocompound(accepter)andacompoundwithanactivemethylenegroup(addendum)in thepresenceof base.[35]
Example[36]



MichealReaction

➢ ***Robinson Annelation Reaction:***Michel addition of cyclohexanones to methylvinylketonefollowedbyintramolecularaldolcondensationtogiveα-βunsaturatedfussed ring ketone. [37]

Example[38]

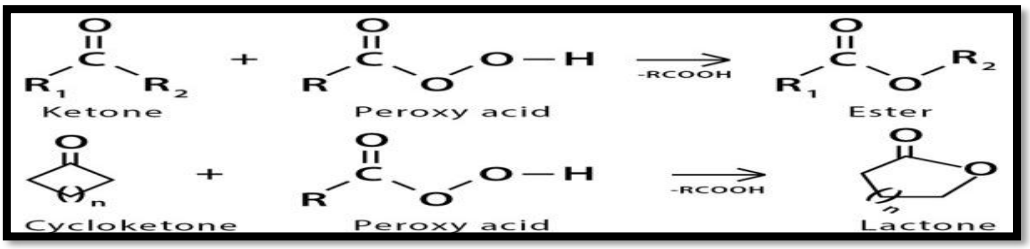


RobinsonAnnelationReaction

3) Elimination Reaction: Elimination reaction, any of a class of organicchemicalreactionsinwhichapairofatomsorgroupsofatomsareremovedfroma molecule, usually through the action of acids, bases, or metals and, in somecases,by heating to a high temperature.[39]
*Example:*Synthesis of Alfabromo benzalacetone[40]

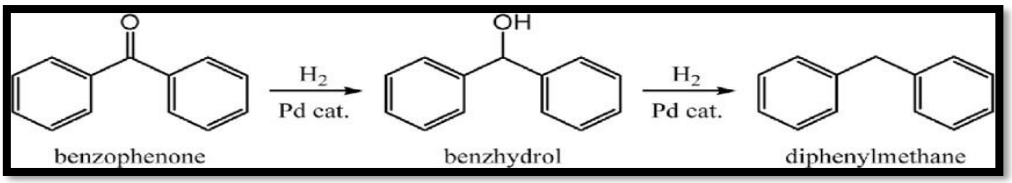
4) OxidationReaction: Onlyverystrongoxidizingagentssuchaspotassiummanganate(potassiumpermanganate)solutionoxidize ketones.However, this type of powerful oxidation occurs with cleavage, breaking carbon-carbonbonds andforming two carboxylicacids. [41]
*Example:*Oxidationofisoborneol tocamphor [42]

➢ ***Baeyer-Villiger Reaction:***The reaction consists in the oxidation of a ketone intoan esterby means of aperacid. [43]
Example [44]



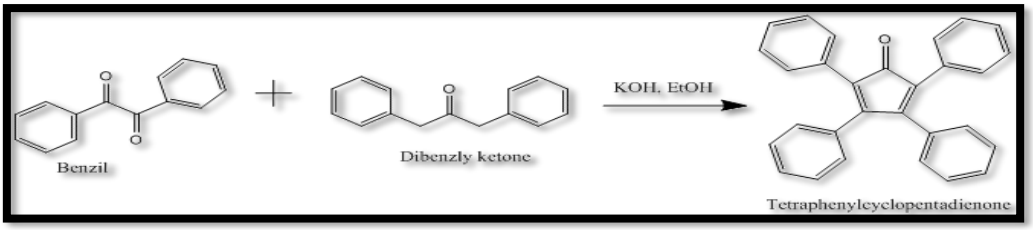
Baeyer-VilligerReaction

5) Reduction Reaction: Reduction reaction are usually affected chemicallyor by the addition of molecular hydrogen to one or more unsaturated groups underthe influenceof acatalyst. [45]
*Example:*Reductionofbenzophenonetobenzhydrol(diphenylmethanol)[46]



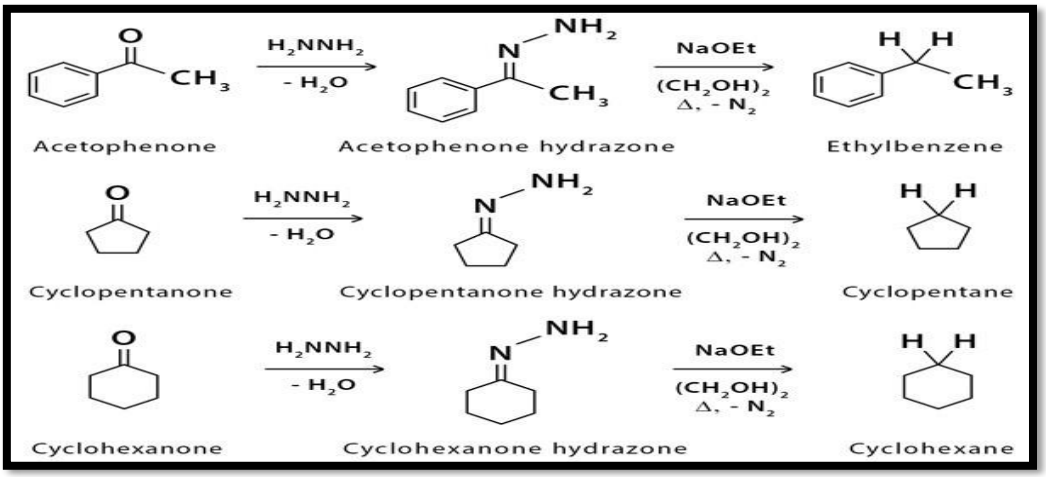
Reduction Reaction

➢ ***Clemmensen Reduction:***Reduction of the carbonyl group of the aldehyde andketonestomethylandmethyleneinthepresenceofamalgamatedzincandhydrochloricacid is known as clemmensenreduction.[47]
*Example:*Reductionofbenzil todibenzyl[48]



ClemmensenReduction

➢ ***Wolf-Kishner Reduction:***Reduction of hydrazones, semi carbazones or azines ofaldehydeorketonetohydrocarbonsinvigorouslybasicconditionwiththeevaluationof nitrogen isknown as wolf-kishnerreduction. [49]
Example [50]

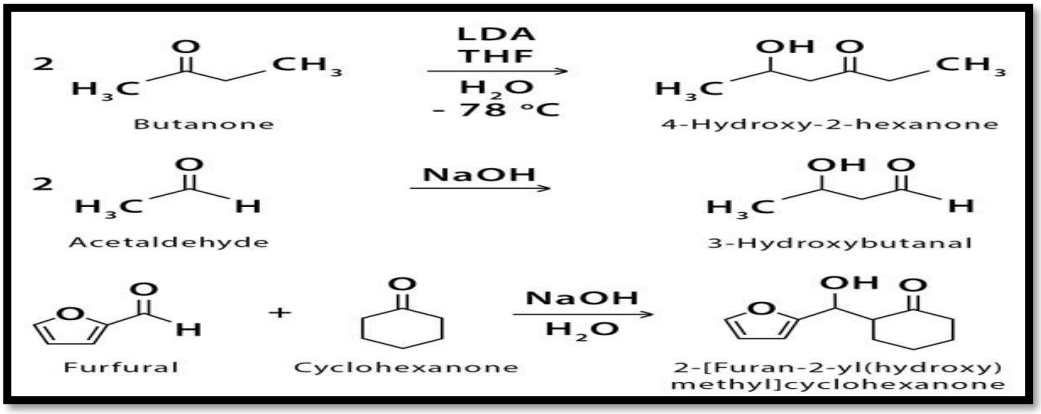


Wolf-KishnerReduction

6) Condensation: Reaction involvingbonding between two or more molecules,oftenwiththelossofasmallmoleculessuchaswater,hydrochloricorhydrobromicacid or an alcoholarereferredtoascondensation reactions.[51]

➢ ***Aldol Condensation:***Condensation between two molecules of ketone to form αβ-hydroxyketoneis knownas the aldol condensation.[52]

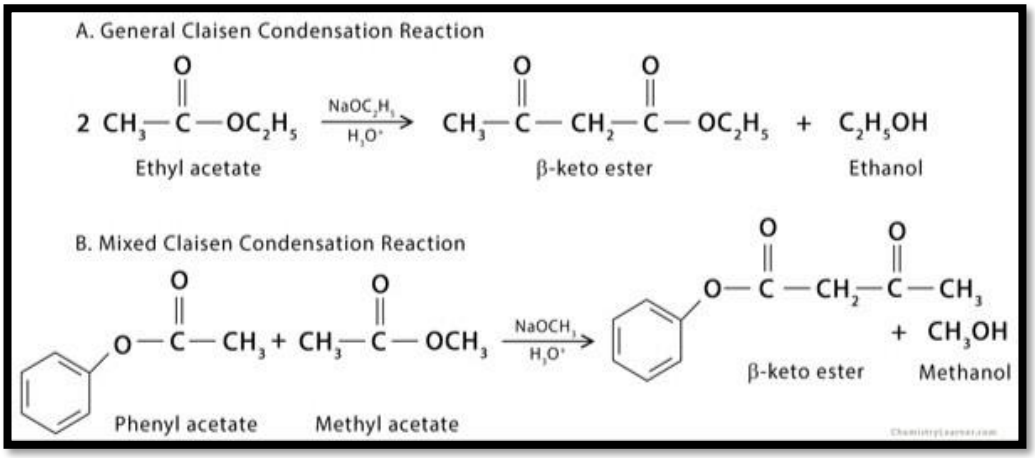
Example [52]



AldolCondensation

➢ ***ClaisenCondensation:***Basecatalysedself-condensationofanesterwhichcontains an α-hydrogen to give β-ketoester, is known as Claisen condensationreaction. [53]

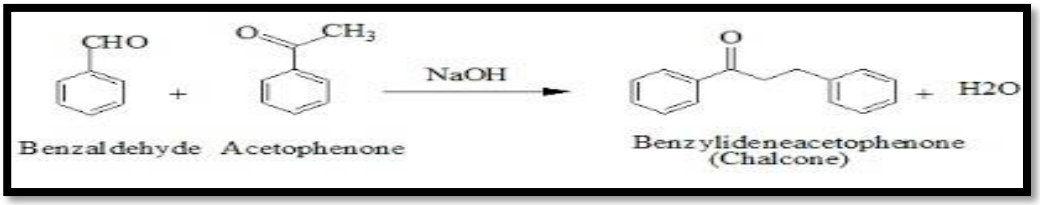
Example[54]



ClaisenCondensation

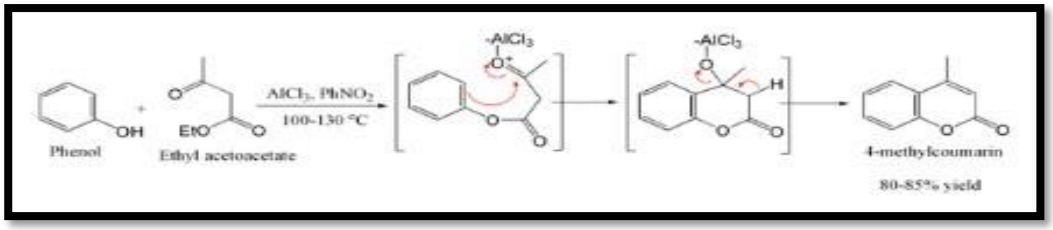
➢ ***Claisen Schmidt Condensation:*** Condensation of aromatic aldehydes lacking αhydrogen with aliphatic aldehyde or ketonesin the presence of dilutemineralleads to the formation of aldol, elimination of molecule of water results in

theformationof α-β unsaturated aldehydeor ketone.[55]
*Example:*Synthesisofbenzalacetophenone(chalcone)fromacetophenone[56]



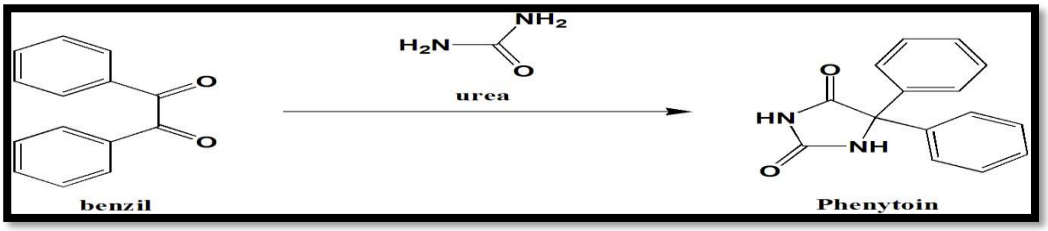
ClaisenSchmidt Condensation

➢ ***PechmannCondensationforCoumarinSynthesis:*** Acid(LewisorBronsted)mediated condensation of phenol with β-ketoester to produce coumarin. [57]
Example[58]



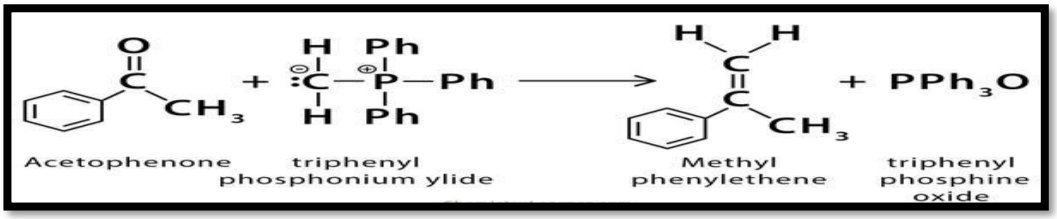
Pechmann CondensationforCoumarinSynthesis

7) HeterocyclicSynthesis: Heterocycliccompoundsareorganicmolecules containing a cyclic structure in which one or more atoms is an elementotherthan carbon. [59]
*Example:*Synthesisof5,5-dipheny hydantoinfrom benzil[60]



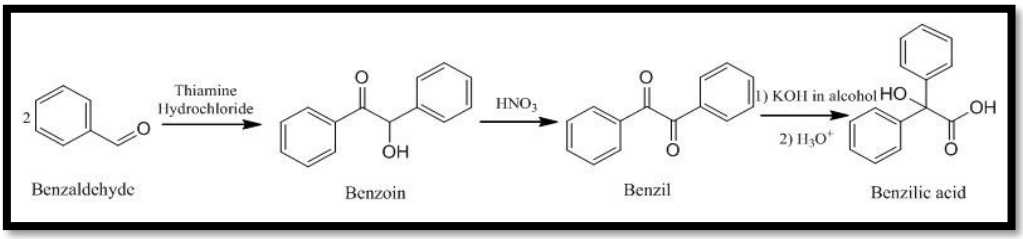
HeterocyclicSynthesis

8) WittingReaction: Wittingreactioninvolvesthe preparationof olefinesbythe interaction of aldehyde or ketone with triphenylphosphine alkylidenes. [61]
Example[62]



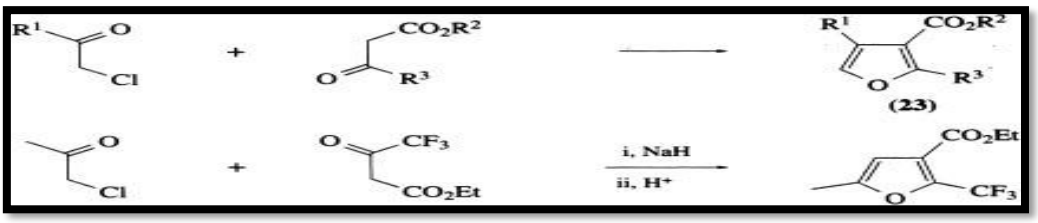
WittingReaction

9) MiscellaneousPreparation
*Example:*Synthesisof benzylicacidfrombenzoin [63]



MiscellaneousPreparation

10) Fiest-Benary Furan Synthesis:c-haloketones react with β-ketoestersin thepresenceof pyridineto synthesizefurans. [64]
Reaction[65]



Fiest-BenaryFuranSynthesis

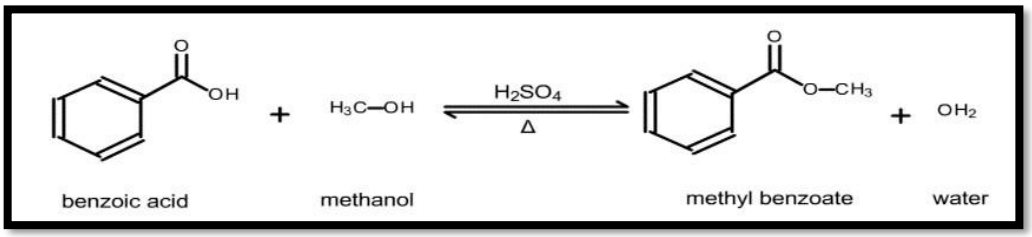
11) Fries Rearrangement Reaction: Phenolic ethers when heated withanhydrouszincchloride\aluminiumchlorideundergoesrearrangementcalledFries Rearrangement inwhich the acyl group migrates to ortho and para positiontoform phenolicketones.[66]
Example[67]

FriesRearrangementReaction

3. CARBOXYLICACID

Carboxylic acid, any of a class of organic compounds in which a carbon (C) atomisbonded to an oxygen (O)atom by adouble bond and to a hydroxyl group(—OH) by a single bond. A fourth bond links the carbon atom to a hydrogen (H)atom or to some other univalent combining group. The carboxyl (COOH) group isso-namedbecauseof the *carb*onyl group (C=O)and hydr*oxyl* group.[68]
It shows the different types of reaction which are describe below:

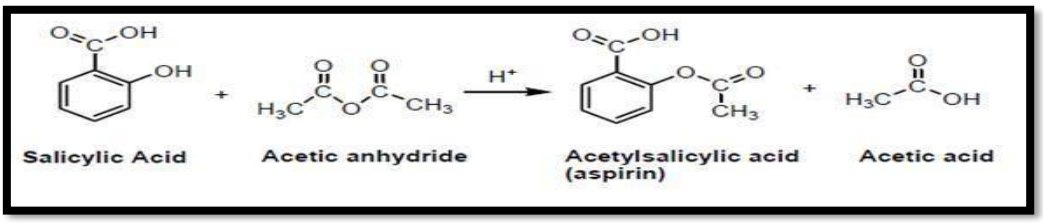
1) Esterification: Esterificationistheprocessofcombininganorganicacid(RCOOH)withanalcohol(ROH)toformanester(RCOOR)andwater;orachemicalreactionresultingintheformationofatleastoneesterproduct.Esterisobtained by an esterification reaction of an alcohol and a carboxylic acid.[69]
*Example:*Synthesis of methyl benzoate from benzoic acid [70]



Esterification

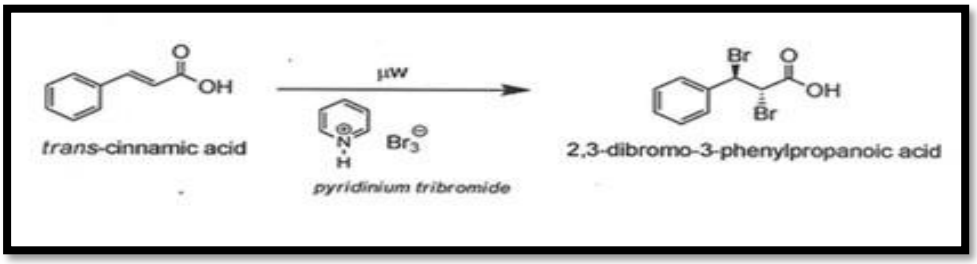
➢ ***Acetylation:***Acylation using carboxylic acids in the presence of trifluoroaceticanhydride as acylating agents does not require conversion of the acylating agentsintoacid chloride, anhydrideor amide

*Example:*Synthesisofacetylsalicylicacid(aspirin)fromsalicylicacid[71]



Acetylation

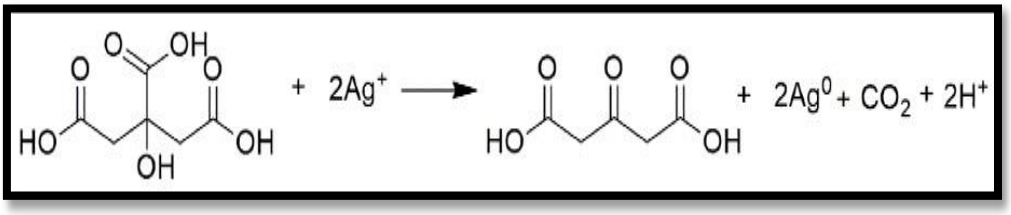
2) Addition Reaction:A carboxylic acid first adds to the DCC molecule toform a good leaving group, which can then be displaced by an amine duringnucleophilic substitution to form the corresponding amide. The reaction steps areshownbelow:Step1:Deprotonationoftheacid.Step2:Nucleophilicattackbythecarboxylate. [72]
*Example:*Synthesisof2,3-dibromo-3-phenylpropionicacidfromcinnamicacid [73]



AdditionReaction

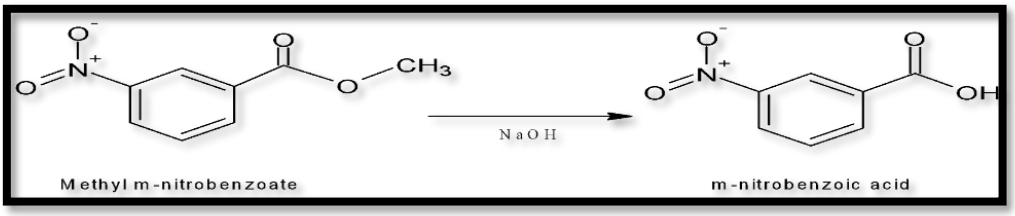
3) EliminationReaction: CarboxylicacidsreactwithThionyl Chloride(SOCl2) to form acid chlorides. During the reaction the hydroxyl group of thecarboxylic acid is converted to a chlorosulfite intermediate making it a betterleavinggroup.Thechlorideanionproducedduringthereactionactsanucleophile.[74]
*Example:*SynthesisofAlfabromocinnamicacidfromcinnamicaciddibromide [75]

4) Dehydration: In a dehydration reaction, either a hydroxyl group from onemoleculecombineswithahydrogenatomfromtheothermolecule,ortwohydrogen atoms from one molecule combine with an oxygen atom on the othermolecule.[75]
*Example:*Synthesis of acetone dicarboxylic acid from citric acid [76]



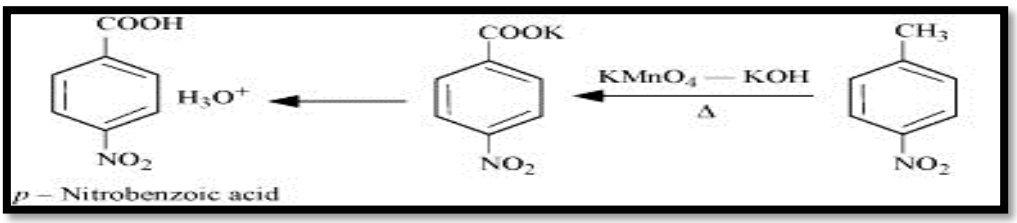
Dehydration

5) Hydrolysis: Theprocessofconversionoffunctionalderivativesofcarboxylic acids to alcohol, acids or their salts and amines in the presence of acidor alkali isknown as hydrolysis. [77]
*Example:*Synthesis Of M-Nitro Benzoic Acid From M-Nitro Benzoate[78]



Hydrolysis

6) OxidationReaction:α-oxidationofcarboxylicacid(fattyacid)withoxygenproducesanα-hydroperoxyacidintermediate,whichispreferentiallyconverted into aldehydethrough dehydrativedecarboxylation.[79]
*Example:*Synthesis of p-nitro benzoic acid from p-nitro toluene[80]



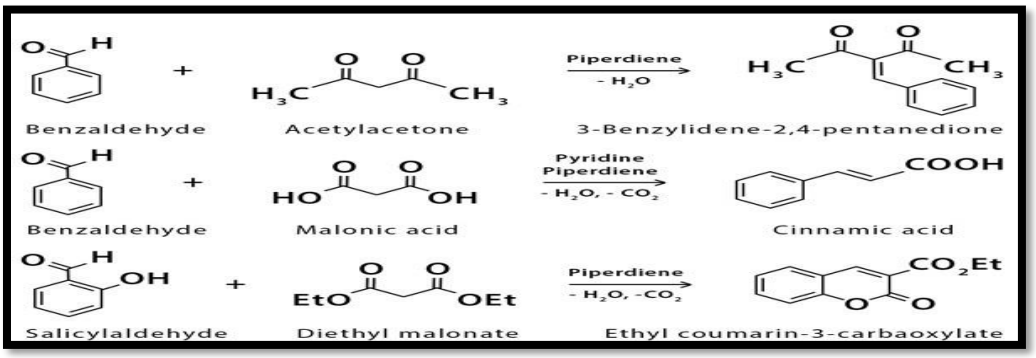
OxidationReaction

7) Reduction Reaction: Reduction reaction are usually affected chemicallyor by the addition of molecular hydrogen to one or more unsaturated groups underthe influenceof acatalyst. [81]
*Example:*Synthesisofthiosalicylicacidfromanthranilicacid[81]

8) Decarboxylation: Decarboxylation is the process in which a molecule ofcarbondioxideis eliminated from carboxylicacid. [81]
*Example:*Synthesisof phenylethylene(styrene)fromcinnamicacid[81]

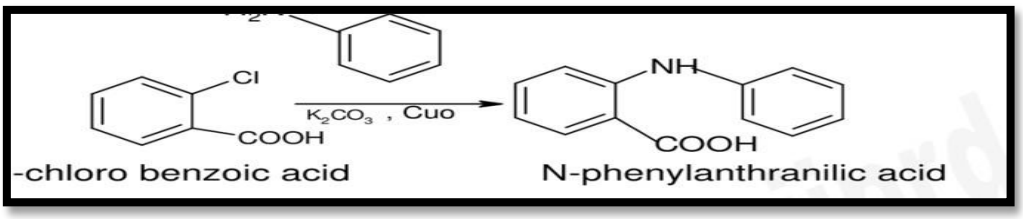
9) Condensation: Reactioninvolvingbondingbetweentwoormoremolecules, often with the loss of a small molecules such as water, hydrochloric orhydrobromicacid or an alcoholarereferredtoascondensation reactions.[81]

➢ ***Knoevenagel Reaction:***The reaction with carbonyl compound with compoundcontainingactivemethylenegrouplikemalonicester,malonicacid,ethylacetoacetate etc. in the presence of base resulting in the formation of unsaturatedcompoundis known as Knoevenagel reaction.[82]
Example[83]



KnoevenagelCondensation

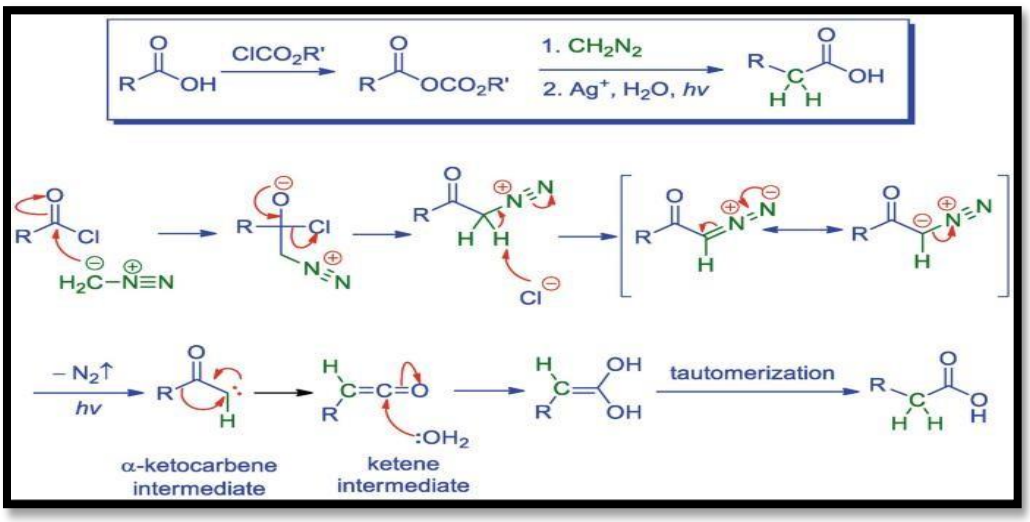
➢ ***UllmannCondensation:***Thisisoneofthebestavailablemethodsforthesynthesis of biaryl or polyaryl derivatives and involves the condensation of twomoleculesofaryl halidein thepresenceof copperpowder. [84]
*Example:*SynthesisofN-phenylanthranilicacidfromo-chlorobenzoicacid[85]



UllmannCondensation

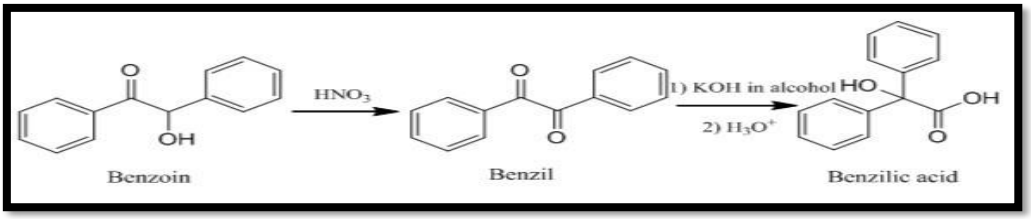
10) ArndtEistertSynthesis: ArndtEistertsynthesisconsistintheconversion of a carboxylic acid into its derivative, i.e. the chain is lengthened byoncarbonatom. [86]

Reaction[87]



Arndt EistertSynthesis

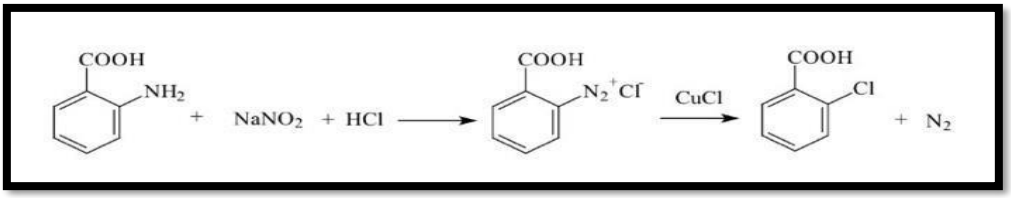
11) Rearrangement Reaction: During most organic reactions the carbonskeleton of the reactant normally remains unchanged and also there isno changeintheposition offunctional group. [88]
*Example:*Synthesis of benzilicacid frombenzil[89]



RearrangementReaction

➢ ***Hoffmann Rearrangements:***The conversion of an amide to primary amine withloss of one carbonyl carbon atom by the action of alkaline hypobromite is knownasHoffmann Rearrangement. [90]
➢ ***Schmidt Rearrangements:***The reaction of carbonyl compounds with hydrazoicacidinthepresenceofconcentratedsulphuricacidisknownasSchmidtRearrangement
*Example:*Synthesisofanthranilicacidfromphthalimide[90]
*Example:*Synthesisof3,5-dinitro anilinefrom3,5-dinitro benzoicacid[90]

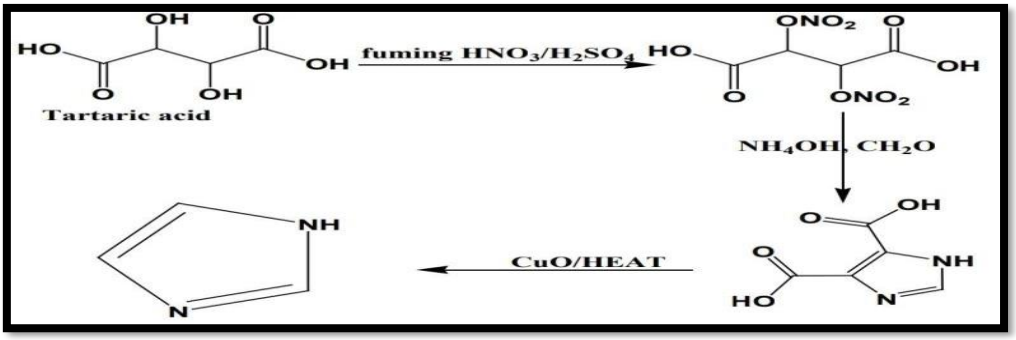
12) Sandmeyer'sReactionIncludingDiazotization: TheSandmeyer's reaction is a versatile synthetic tool by which an amino group on anaromatic ring is replaced with a wide range of substituents by converting an aminogroup attached to an aromatic ring into a diazonium salt that can be transformedintoseveral functional groups. [90]
*Example:*Synthesis of o-chlorobenzoic acid from anthranilic acid [91]



Sandmeyer'sReaction

13) HeterocyclicSynthesis: Heterocycliccompoundsareorganicmolecules containing a cyclic structure in which one or more atoms is an elementotherthan carbon.[92]

*Example:*Synthesisofimidazole-4,5-dicarboxylicacidfromtartaricacid[93]

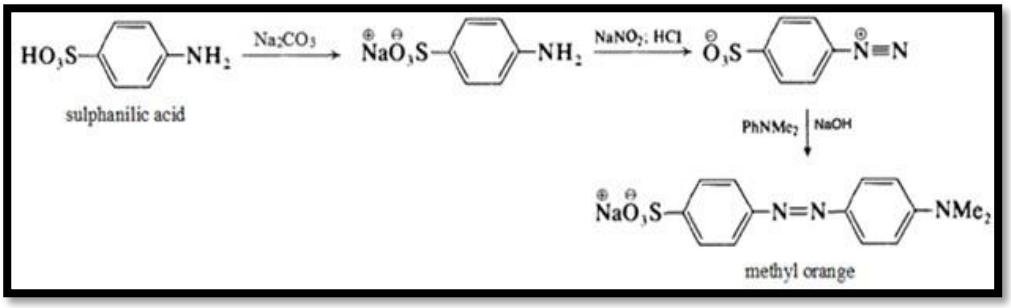


HeterocyclicSynthesis

14) **Dye:**Dyes are colored organic compounds (natural or synthetic) which impartcolor to substances like fibers, papers, food stuffs, leathers, plastics, medicinesetc.[94]

➢ ***AzoDye***

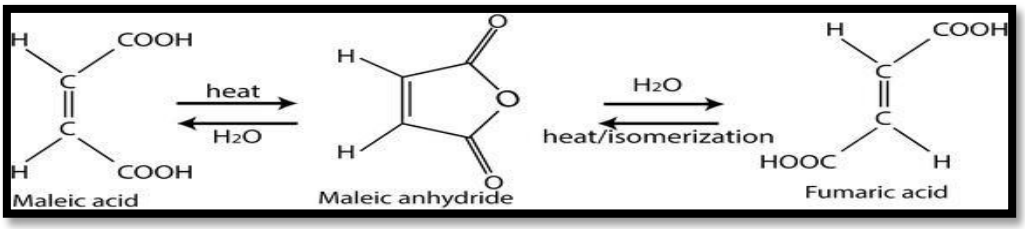
*Example:*Synthesisofmethylorangefromsulfanilicacid [95]



AzoDye

15) **MiscellaneousPreparation**

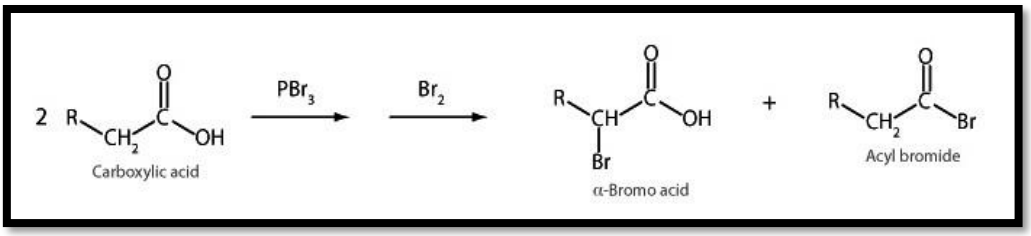
*Example:*Synthesisofmaleicacidfromfumaric acid[96]



Miscellaneous

16) **Hell-Volhardt-ZelinskyReaction:**α-Brominationofcarboxylicacidusing Br2/ PBr. [97]

Example:[98]



Hell-Volhardt-ZelinskyReaction

4. **ESTER**

Estersareagroupofchemicalcompoundswhichareformedbybondingofanalcoholgroup with agroup oforganicacids,by losing watermolecules.[99]

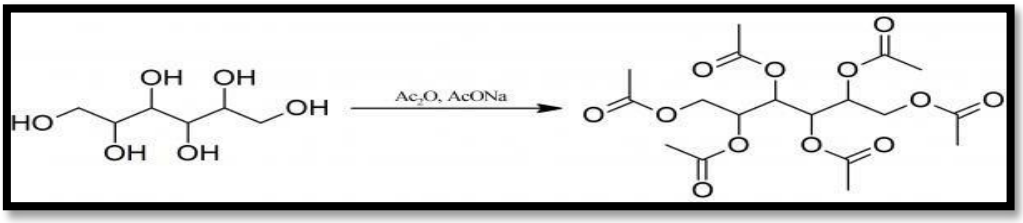
It shows different types of reaction which are describe below:

1) Esterification: Esterificationistheprocessofcombininganorganicacid(RCOOH)withanalcohol(ROH)toformanester(RCOOR)andwater;orachemicalreactionresultingintheformationofatleastoneesterproduct.Esterisobtained by an esterification reaction of an alcohol and a carboxylic acid.[100]

*Example:*Synthesis of ethylp-amino benzoatefrombenzoic acid[101]

➢ ***Acetylation:***Acylation'sarethe addition of an acylgroup (RCO)via electrophilicsubstitution.[102]

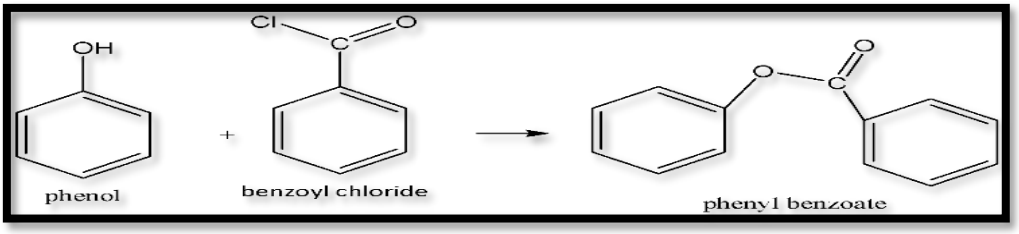
*Example:*Synthesis of mannitol hexa acetate from mannitol [103]



Acetylation

➢ ***ThieleAcetylation***

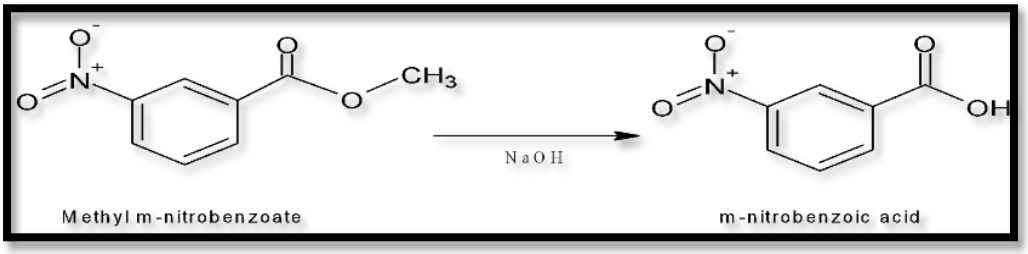
*Example:*Synthesis of phenyl benzoate from phenol[104]



Thiele Acetylation

2) Hydrolysis: Theprocessofconversionoffunctionalderivativesofcarboxylic acids to alcohol, acids or their salts and amines in the presence of acidor alkali isknown as hydrolysis. [105]

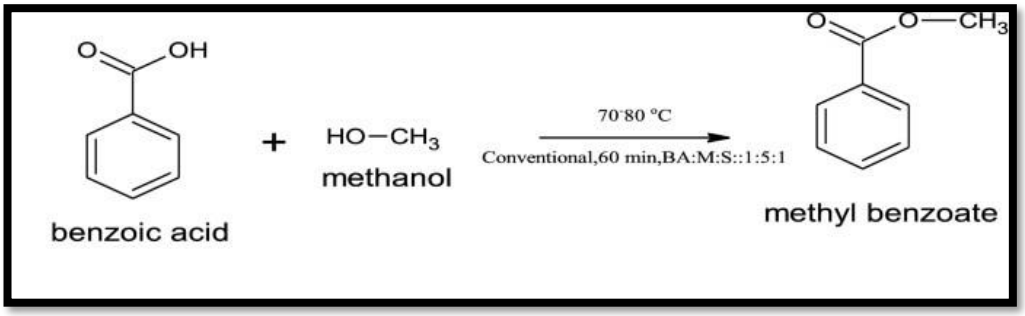
*Example:*Synthesis of m-nitro benzoic acid from m-nitro benzoate[105]



Hydrolysis

3) Reduction Reaction: Reduction reaction are usually affected chemicallyor by the addition of molecular hydrogen to one or more unsaturated groups underthe influenceof acatalyst. [106]

*Example:*Synthesisof3-aminobenzoicacidfrom3-nitromethylbenzoate[106]

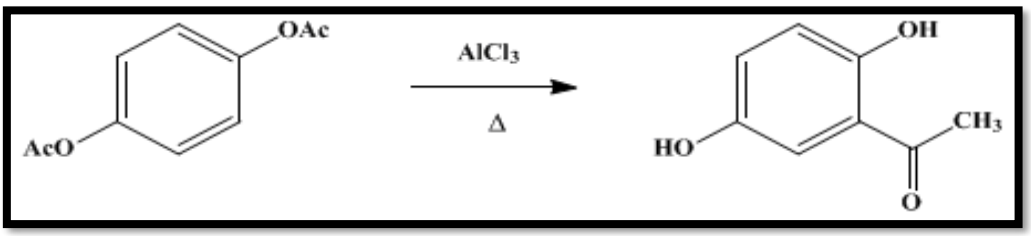


Reduction Reaction

4) Rearrangement Reaction: During most organic reactions the carbonskeleton of the reactantnormally remains unchanged and also there is no changeintheposition offunctional group.[107]

➢ ***FriesRearrangement:***Phenolicetherswhenheatedwithanhydrouszincchloride\aluminumchlorideundergoesrearrangementcalledFriesRearrangementinwhichtheacylgroupmigratestoorthoandparapositiontoformphenolic ketones. [107]

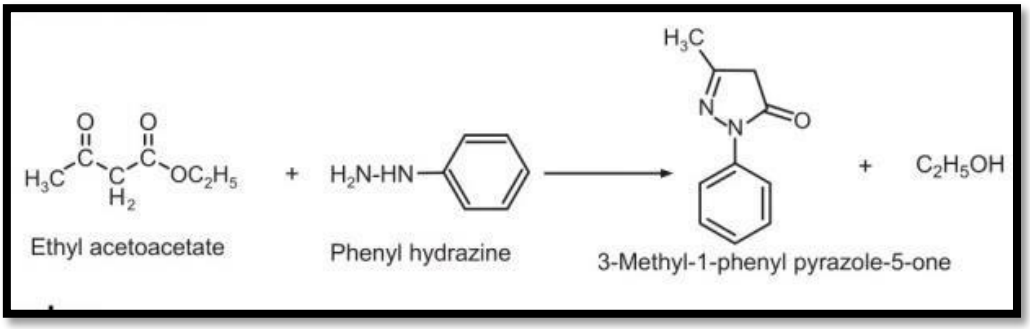
*Example:*Synthesisof2,5-dihydroxyacetophenonefromhydroquinonediacetate[107]



FriesRearrangement

5) Japp Klingermann Reaction: Diazonium salts undergo coupling withcompoundscontainingactivemethylenegroupslikeethylacetoacetateanddiethylmalonateto yieldphenylhydrazones. [108]
*Example:*Synthesisofmethylglyoxalphenylhydrazonefromethylacetoacetate[109]

6) HeterocyclicSynthesis: Heterocycliccompoundsareorganicmolecules containing a cyclic structure in which one or more atoms is an elementotherthan carbon.[110]
*Example:*Synthesisof3-methyl1-phenylpyrazolefromethylacetoacetate[111]



HeterocyclicSynthesis

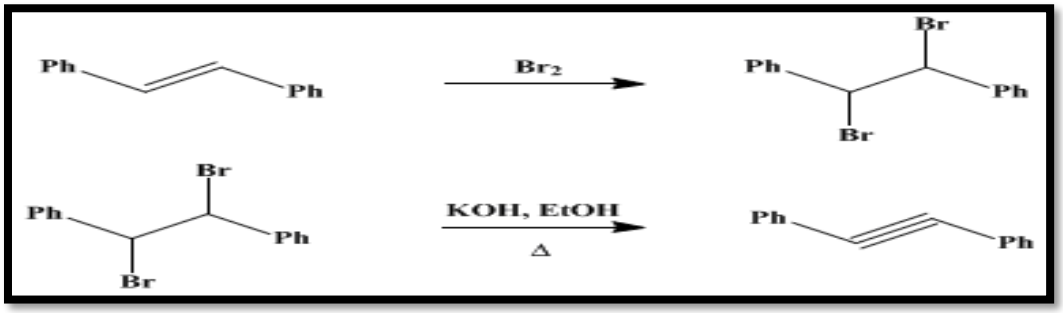
5. AMIDE

Anamideisusually anorganiccompoundthatcontainsafunctionalgroupconsistingofan acyl group (R–C=O)linked to anitrogen atom. [112]

It shows different types of reaction which are describe below:

1) AdditionReaction: Theadditionofamide/sulphonamidebondstoalkynesisnotonlyoneofthemostimportant strategiesforthedirectfunctionalization of carbon–carbon triple bonds, but also a powerful tool for thedownstreamtransformations of amides/sulphonamides. [113]
*Example:*Synthesis of stilbenedibromide from stilbene[113]

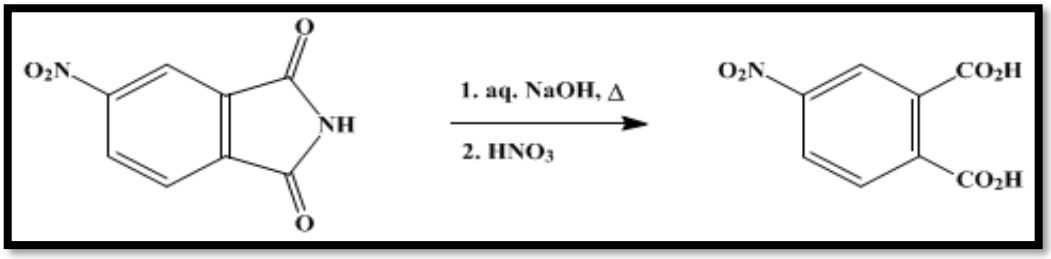
2) Elimination Reaction:A selective amide cleavage of proline-tetheredazetidin-2-one with sodium methoxide followed by cyclization of the resulting β-amino ester resulted into formation of the ring-expanded indolizidine derivative. [114]
*Example:*Synthesisofdiphenylacetylene(Tolan)fromstilbenedibromide[115]



EliminationReaction

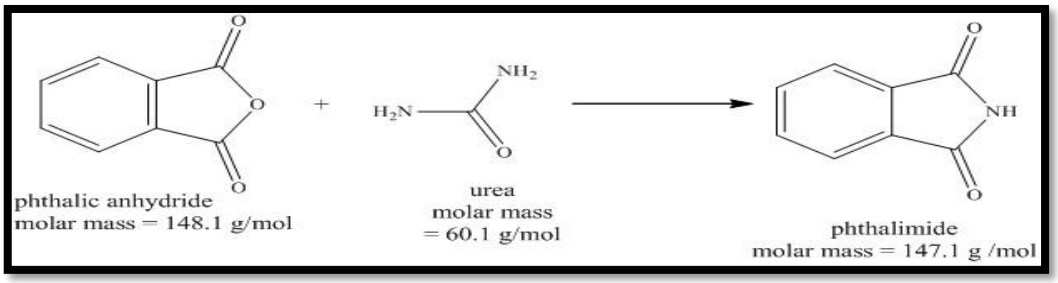
3) Hydrolysis: Theprocessofconversionoffunctionalderivativesofcarboxylic acids to alcohol, acids or their salts and amines in the presence of acidor alkali isknown as hydrolysis. [116]

*Example:*Synthesisof4-nirophthalicacidfrom4-nitrophthalimide[117]



Hydrolysis

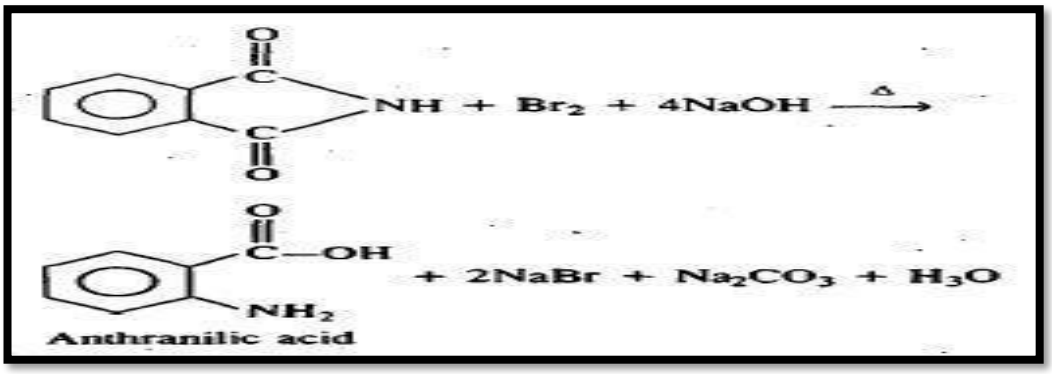
4) Reduction Reaction: Reduction reaction are usually affected chemicallyor by the addition of molecular hydrogen to one or more unsaturated groups underthe influenceof acatalyst. [118]
*Example:*Synthesis of phthalimide fromphthalic anhydride [119]



Reduction Reaction

5) Rearrengement Reaction: During most organic reactions the carbonskeletonofthereactantnormallyremainsunchangedandalsothereisnochangeintheposition offunctional group.[120]

➢ ***Hoffmann Rearrangement:***The conversion of an amide to primary amine withloss of one carbonyl carbon atom by the action of alkaline hypobromite is knownasHoffmann Rearrangement.[120]
*Example:*Synthesis of anthranilic acid from phthalimide [121]



Hoffmann Rearrangement

III.SUM REACTION OF SYNTHETIC IMPORTANCE

Table 2 Sum Reaction of Synthetic Importance

TYPES OF COMPOUNDS	NAME OF REACTION	SYNTHETIC APPLICATION	REFERENCE
Aldehyde	Meerwein-Ponndrof-Verley Reduction	Alcohol	5
	Leucart Reaction	Amine	6
	Darzen Condensation	α, β-epoxy ester(glycidic ester)	15
	Mannich Reaction	Mannich product	16
	Reformatsky Reaction	β-hydroxy ester	24
	Dakin Reaction	Catechol	26
	Micheal Reaction	1,5-dikwtone	36
	Robinson Annelation Reaction	α-β unsaturated fussed ring ketone	38

Ketone	Claisen Schmidt Condensation	Chalcone	56
	Pechmann Condensation	Coumarin	58
	Witting Reaction	Triphenyl phosphine oxide	62
	Fiest-Binary Furan Synthesis	Furan	65
Carboxylic acid	ArndrtEster Synthesis	α-ketocarbene	87
	Schmidt Rearrangements	Anthranilic acid	90
	Hell-Volhardt-Zelinsky Reaction	α-Bromo acid	97
Amide	Japp Klingermann Reaction	Methyl glyoxal hydrazone	109
Ester	Hoffmann Rearrangement	Anthranilic acid	121

CONCLUSION:

The review basedonreactionofsynthetic importanceforcompoundscontainingcarbonyl groups. It is a detailed overview of aldehyde, ketone, carboxylic acid, esterand amide and their synthetic reactions like oxidation reaction, reduction reaction, condensation reaction, esterification reaction, etc. In this review the different types of carbonylscompound and different synthetic reaction are included with their example, which can be use, drug synthesis, organic synthesis of compounds ofmedicinal importanceetc., in different industries. It is also helpful in different pharmaceutical industry to improve productqualityandquantity.Ithasvariousapplicationinpharmaindustry,researchlaboratory,drugsynthesisetc. The review work may be helpful for research student, synthesis of drug in different industries and academics.

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