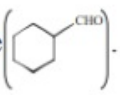
Aldehydes Ketones and Carboxylic Acids

Question1

From the compounds given below, number of compounds which give positive Fehling's test is___
Benzaldehyde, Acetaldehyde, Acetone,
Acetophenone,Methanal, 4-nitrobenzaldehyde, cyclohexane carbaldehyde.
[29-Jan-2024 Shift 1]

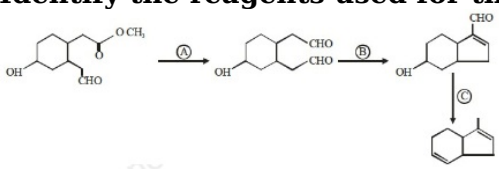
Answer: 3

Solution:

Acetaldehyde (CH_3CHO),Methanal$(HCHO)$, and cyclohexane carbaldehyde  .

Question2

Identify the reagents used for the following conversion



[29-Jan-2024 Shift 2]

Options:

A. A = $LiAlH_4$, B = $NaOH_{(aq)}$, C = $NH_2 - NH_2$ / KOH, ethylene glycol

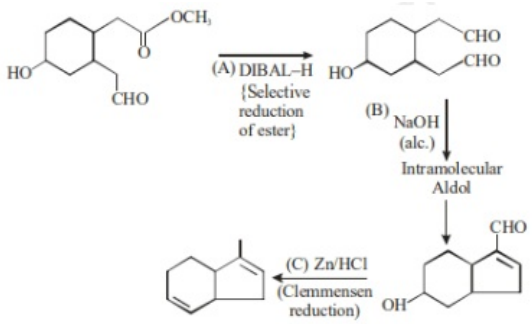
B. A = $LiAlH_4$, B = $NaOH_{(alc)}$, C = Zn / HCl

C. A = DIBAL − H, B = $NaOH_{(aq)}$,
C = $NH_2 - NH_2$ / KOH, ethylene glycol

D. A = DIBAL − H, B = $NaOH_{(alc)}$, C = Zn / HCl

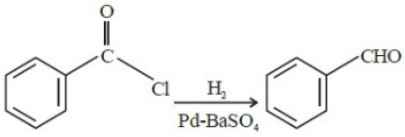
Answer: D

Solution:



Question3

This reduction reaction is known as:



[30-Jan-2024 Shift 1]

Options:

A. Rosenmund reduction

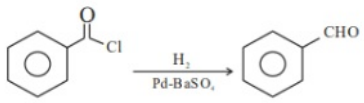
B. Wolff-Kishner reduction

C. Stephen reduction

D. Etard reduction

Answer: A

Solution:



It is known as rosenmund reduction that is the partial reduction of acid chloride to aldehyde

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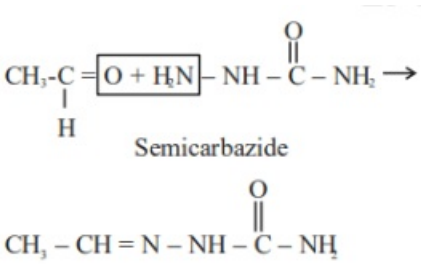
Question4

The compound formed by the reaction of ethanal with semicarbazide contains _____number of nitrogen atoms.
[30-Jan-2024 Shift 1]

Answer: 3

Solution:

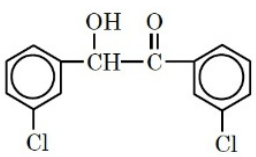


Question5

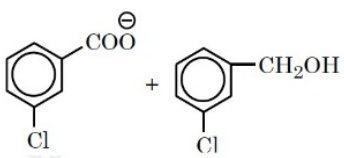
m-chlorobenzaldehyde on treatment with 50% KOH solution yields
[30-Jan-2024 Shift 2]

Options:

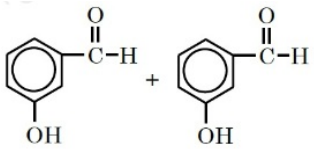
A.



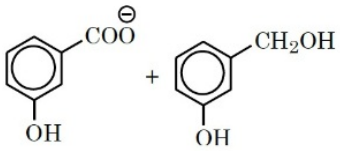
B.



C.



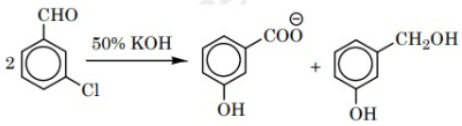
D.



Answer: B

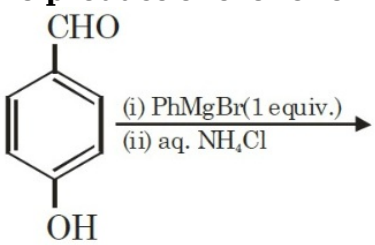
Solution:

Meta-chlorobenzaldehyde will undergo Cannizzaro reaction with 50%KOH to give m− chlorobenzoate ion and m-chlorobenzyl alcohol.



Question6

The product of the following reaction is P.

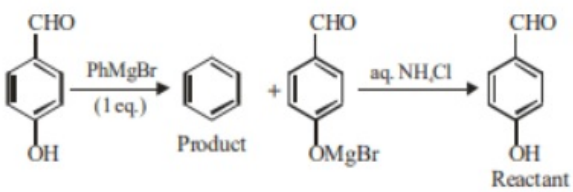


The number of hydroxyl groups present in the product P is____
[31-Jan-2024 Shift 1]

Answer: 0

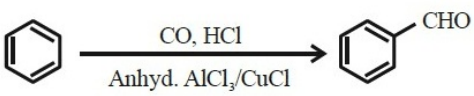
Solution:

Product benzene has zero hydroxyl group



Question7

Identify the name reaction.



[31-Jan-2024 Shift 2]

Options:

A. Stephen reaction

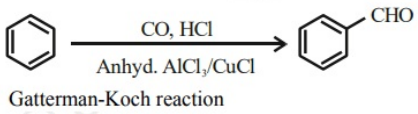
B. Etard reaction

C. Gatterman-koch reaction

D. Rosenmund reduction

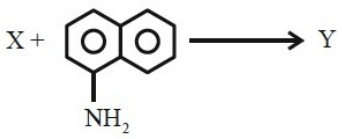
Answer: C

Solution:



Question8

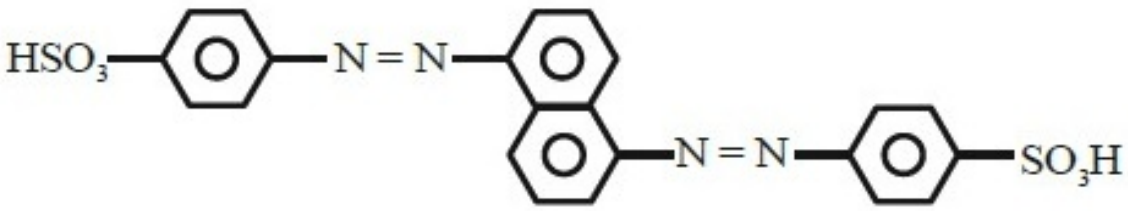
The azo-dye (Y) formed in the following reactions is Sulphanilic acid $+NaNO_2 + CH_3COOH \longrightarrow X$



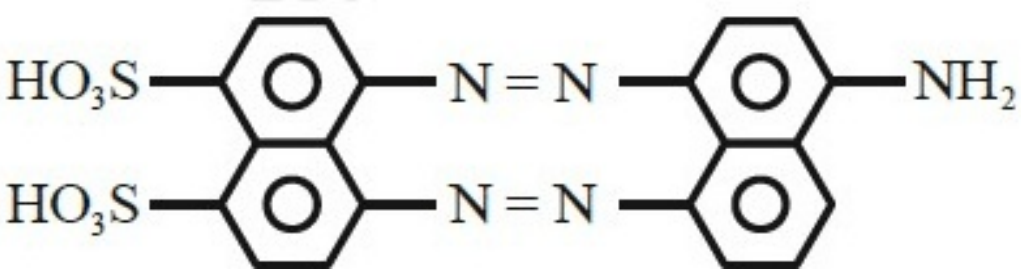
[31-Jan-2024 Shift 2]

Options:

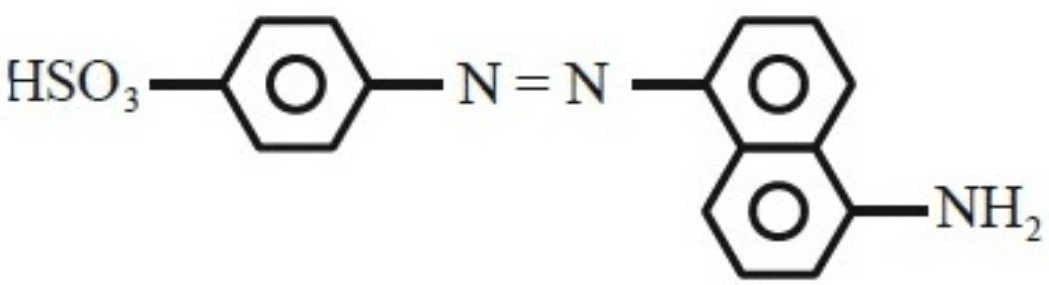
A.



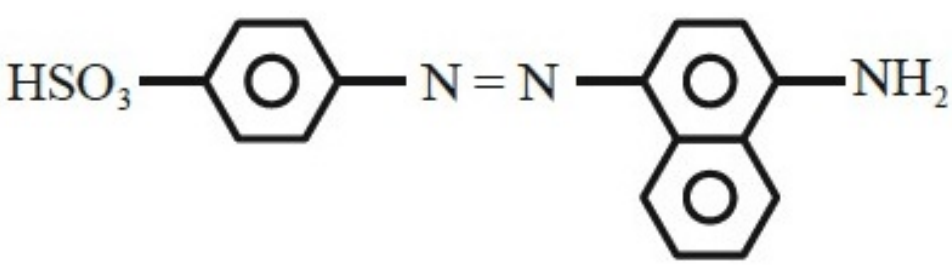
B.



C.

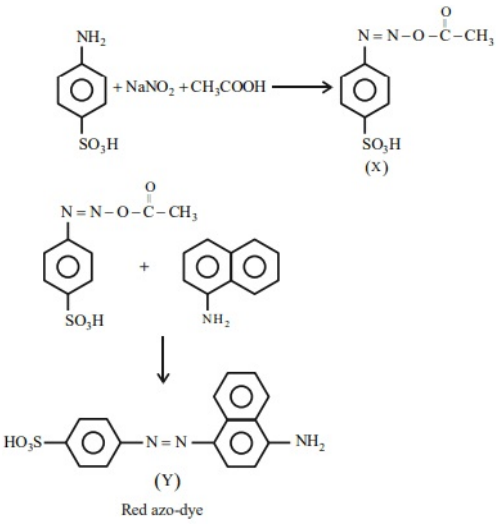


D.



Answer: D

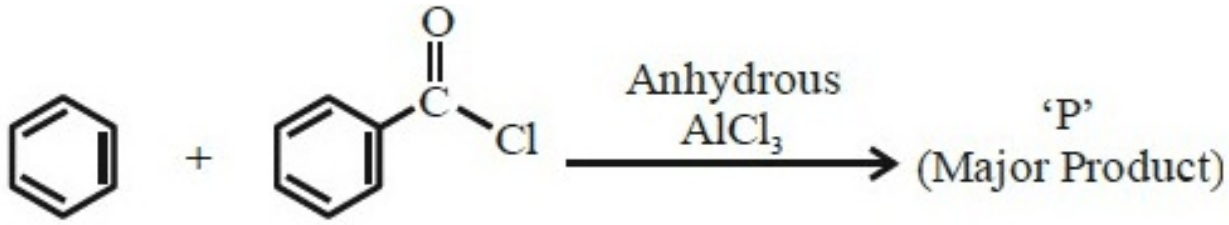
Solution:



This is known as Griess-Ilosvay test.

Question9

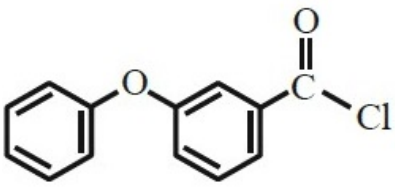
Identify major product ' P ' formed in the following reaction.



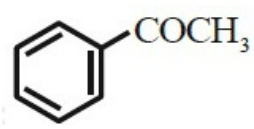
[31-Jan-2024 Shift 2]

Options:

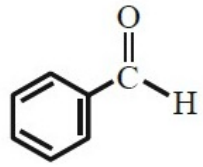
A.



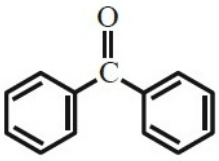
B.



C.

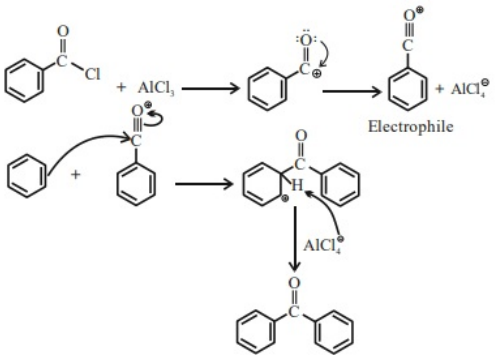


D.



Answer: D

Solution:



Question10

Choose the correct answer from options given below:

List - I (Reactions)		List - II (Reagents)	
(A)	$CH_3(CH_2)_5-C_2-\underset{\underset{O}{\|}}{C}-OC_2H_5 \rightarrow CH_3(CH_2)_5CHO$	(I)	CH_3MgBr, H_2O
(B)	$C_6H_5COC_6H_5 \rightarrow C_6H_5CH_2C_6H_5$	(II)	Zn(Hg) and conc. HCl
(C)	$C_6H_5CHO \rightarrow C_6H_5CH(OH)CH_3$	(III)	$NaBH_4, H^+$
(D)	$CH_3COCH_2COOC_2H_5 \rightarrow CH_3\underset{\underset{H}{\|}}{C}(OH)CH_2COOC_2H_5$	(IV)	DIBAL-H, H_2O

[1-Feb-2024 Shift 1]

Options:

A. A-(III), (B)-(IV), (C)-(I), (D)-(II)

B. A-(IV), (B)-(II), (C)-(I), (D)-(III)

C. A-(IV), (B)-(II), (C)-(III), (D)-(I)

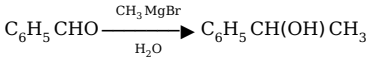
D. A-(III), (B)-(IV), (C)-(II), (D)-(I)

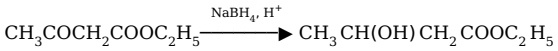
Answer: B

Solution:

$$CH_3(CH_2)_5COOC_2H_5 \xrightarrow{\text{DIBAL- } H_2H_2O} CH_3(CH_2)_5CHO$$

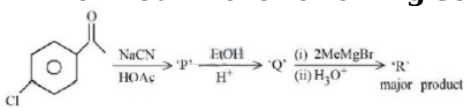
$$C_6H_5COC_6H_5 \xrightarrow{\text{Zn(Hg) \& conc. HCl}} C_6H_5CH_2C_6H_5$$





Question11

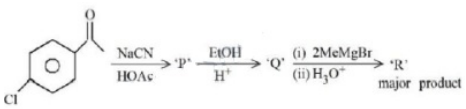
' R ' formed in the following sequence of reaction is:



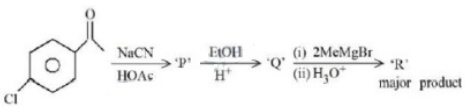
[24-Jan-2023 Shift 1]

Options:

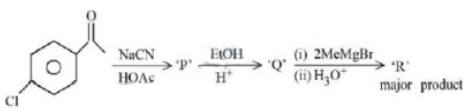
A.



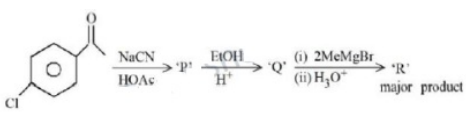
B.



C.

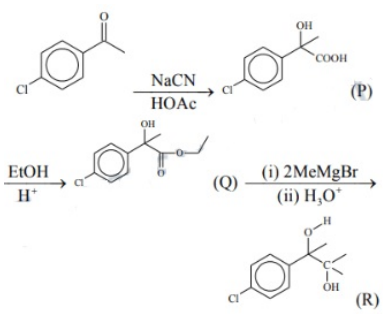


D.



Answer: B

Solution:



Question12

Given below are two statements : one is labelled as Assertion A and the other is labelled as Reason R :
Assertion A : Acetal/Ketal is stable in basic medium.
Reason R : The high leaving tendency of alkoxide ion gives the stability to acetal/ketal in basic medium.
In the light of the above statements, choose the correct answer from the options given below:
[25-Jan-2023 Shift 1]

Options:

A. A is true but R is false

B. A is false but R is true

C. Both A and R are true and R is the correct explanation of A

D. Both A and R are true but R is NOT the correct explanation of A

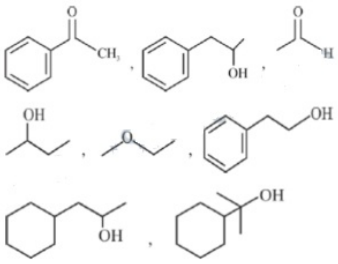
Answer: A

Solution:

Solution:
For Assertion :Acetal and ketals are basically ethers hence they must be stable in basic medium but should break down in acidic medium.
Hence assertion is correct.
For reason: Alkoxide ion (RO^-)is not considered a good leaving group hence reason must be false.

Question13

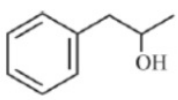
Number of compounds giving (i) red colouration with ceric ammonium nitrate and also (ii) positive iodoform test from the following is

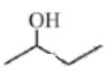


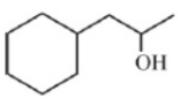
[25-Jan-2023 Shift 2]

Answer: 3

Solution:







Question14

Match List I with List II.

List-I Reaction	List-II Reagents
A Hoffmann Degradation	I Conc. KOH, Δ
B Clemenson reduction	II $CHCl_3$, $NaOH/H_3O^+$
C Cannizaro reaction	III Br_2, NaOH
D Reimer-Tiemann reaction	IV $Zn-Hg/HCl$

[29-Jan-2023 Shift 1]

Options:

A. (A) - III, (B) - IV, (C) - II, (D) - I

B. (A) - II, (B) - IV, (C) - I, (D) - III

C. (A) - III, (B) - IV, (C) - I, (D) - II

D. (A) - II, (B) - I, (C) - III, (D) - IV

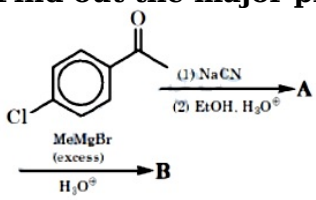
Answer: C

Solution:

Reaction	Reagents used
A HoffmannDegradation	Br_2, NaOH
B Clemensonreduction	Zn − Hg/HCl
C Cannizaro reaction	Conc. KOH, Δ
D Reimer-Tiemannreaction	$CHCl_3$, NaOH/H_3O^-

Question15

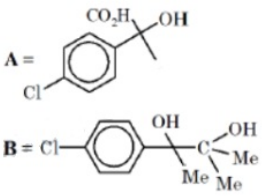
Find out the major products from the following reaction sequence.



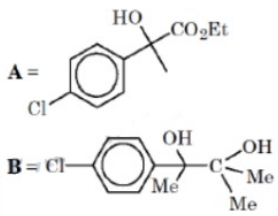
[29-Jan-2023 Shift 2]

Options:

A.



B.



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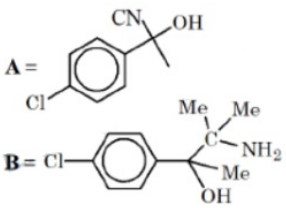
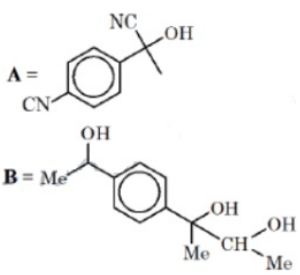
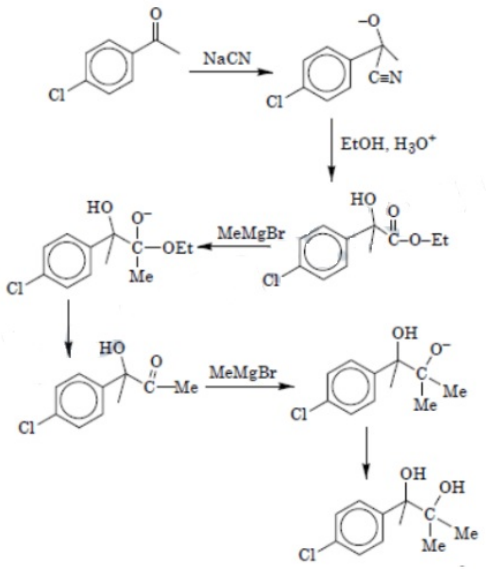


D.



Answer: B

Solution:

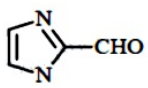


Question16

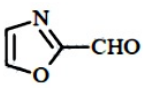
Which of the following compounds would give the following set of qualitative analysis ?
(i) Fehling's Test : Positive
(ii) Na fusion extract upon treatment with sodium nitroprusside gives a blood red colour but not
[30-Jan-2023 Shift 1]

Options:

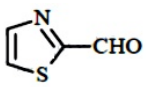
A.



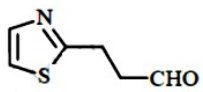
B.



C.



D.



Answer: D

Solution:

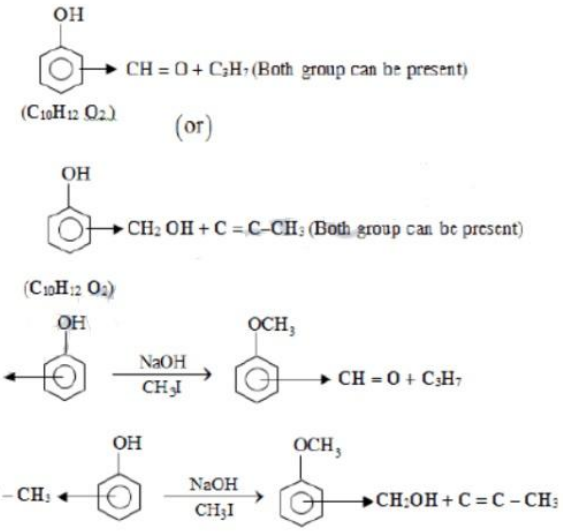
Solution:
Aromatic aldehydes do not give Fehling's test.. Both nitrogen and sulfur must be present to obtain blood red colour
Sodium nitroprusside gives blood red colour with S&N.

Question17

A trisubstituted compound ' A ', $C_{10}H_{12}O_2$ gives neutral $FeCl_3$ test positive. Treatment of compound ' A ' with NaOH and CH_3Br gives $C_{11}H_{14}O_2$, with hydroiodic acid gives methyl iodide and with hot conc. NaOH gives a compound B, $C_{10}H_{12}O_2$. Compound 'A' also decolorises alkaline $KMnO_4$. The number of π bond/s present in the compound ' A ' is _____.
[30-Jan-2023 Shift 1]

Answer: 4

Solution:



Question18

Given below are two statements: One is labelled as Assertion A and the other is labelled as Reason R.
Assertion A : can be easily reduced using Zn − Hg / HCl to
Reason R : Zn − Hg / HCl is used to reduce carbonyl group to $-CH_2-$ group.
In the light of the above statements, choose the correct answer from the options given below:
[30-Jan-2023 Shift 2]

Options:

A. A is false but R is true

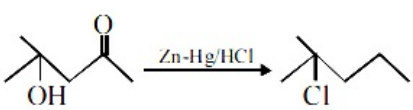
B. A is true but R is false

C. Both A and R are true but R is not the correct explanation of A

D. Both A and R are true and R is the correct explanation of A

Answer: A

Solution:



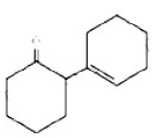
The acid sensitive alcohol group reacts with HCl, hence Clemmenson reduction is not suitable for above conversion.

Question19

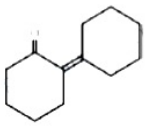
Cyclohexylamine when treated with nitrous acid yields (P). On treating (P) with PCC results in (Q). When (Q) is heated with dil. NaOH we get (R) The final product (R) is:
[31-Jan-2023 Shift 2]

Options:

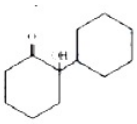
A.



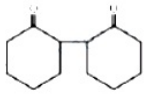
B.



C.

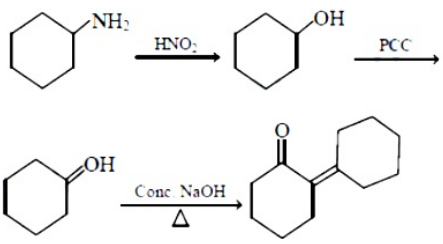


D.



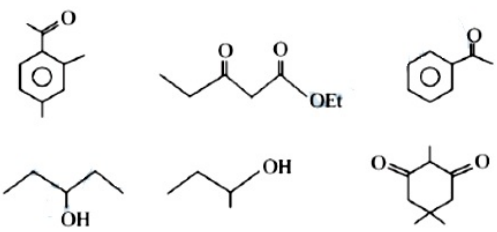
Answer: B

Solution:



Question20

The number of molecules which gives haloform test among the following molecules is



[31-Jan-2023 Shift 2]

Answer: 3

Solution:

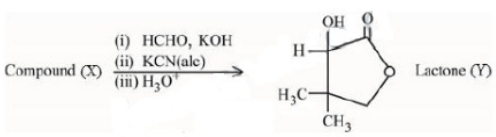
Molecules having

$\overset{O}{\overset{||}{C}} - CH_3$ and $-\overset{OH}{\overset{|}{C}}H - CH_3$

gives positive haloform test.

Question21

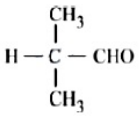
Compound (X) undergoes following sequence of reactions to give the Lactone (Y).



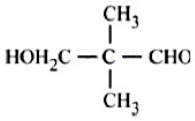
[24-Jan-2023 Shift 1]

Options:

A.



B.

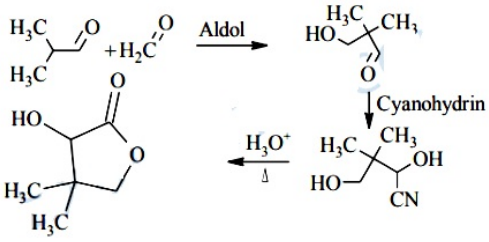


C. H_2  $-CH_2-CH_2-CH_2-CHO$

D. H_2 

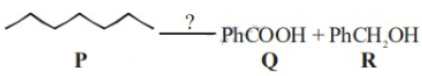
Answer: A

Solution:



Question22

The correct sequence of reagents for the preparation of Q and R is :



[25-Jan-2023 Shift 1]

Options:

A. (i) Cr_2O_3, 770K, 20 atm;
(ii) CrO_2Cl_2, H_3O^+;
(iii) NaOH;
(iv) H_3O^+

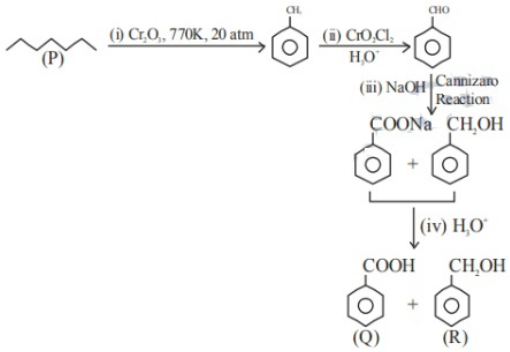
B. (i) CrO_2Cl_2, H_3O^+; (ii) Cr_2O_3, 770K, 20 atm;
(iii) NaOH; (iv) H_3O^+

C. (i) $KMnO_4$, OH^-; (ii) Mo_2O_3, A; (iii) NaOH;
(iv) H_3O^+

D. (i) Mo_2O_3, Δ; (ii) CrO_2Cl_2, H_3O^+; (iii) NaOH;
(iv) H_3O^+

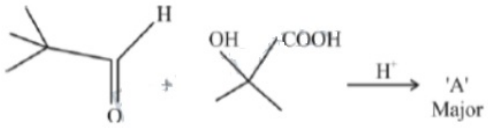
Answer: A

Solution:



Question23

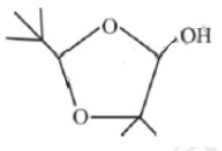
' A ' in the given reaction is



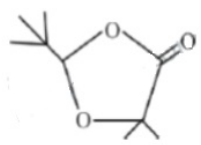
[25-Jan-2023 Shift 2]

Options:

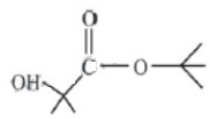
A.



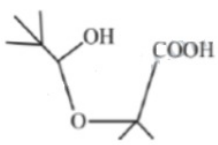
B.



C.

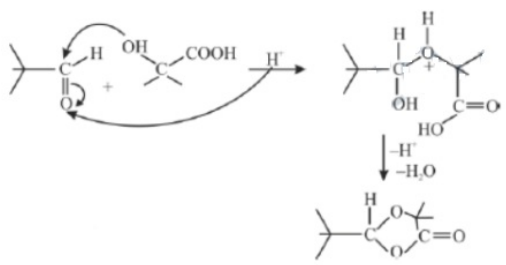


D.



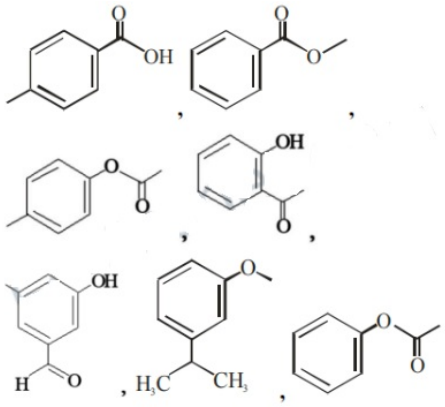
Answer: B

Solution:



Question24

Number of compounds from the following which will not dissolve in cold $NaHCO_3$ and NaOH solutions but will dissolve in hot NaOH solution is _____.



[30-Jan-2023 Shift 2]

Answer: 3

Solution:

Solution:
Compound 2, 3, 7

Question25

Number of isomeric compounds with molecular formula $C_9H_{10}O$ which
(i) do not dissolve in NaOH
(ii) do not dissolve in HCl.
(iii) do not give orange precipitate with 2, 4 - DNP
(iv) on hydrogenation give identical compound with molecular formula $C_9H_{12}O$ is _____.
[1-Feb-2023 Shift 1]

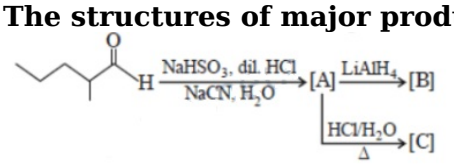
Answer: 2

Solution:

Solution:
As per the language of given question, the best possible isomeric structure is $Ph - CH = CH - O - CH_3$ (cis and trans). So, the answer is 2.

Question26

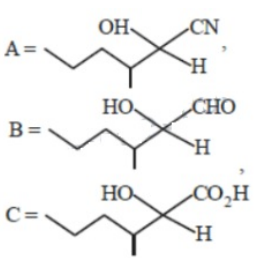
The structures of major products A, B and C in the following reaction are sequence.



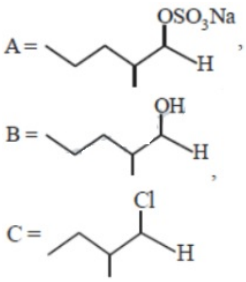
[1-Feb-2023 Shift 2]

Options:

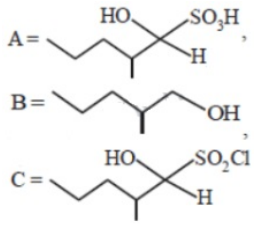
A.



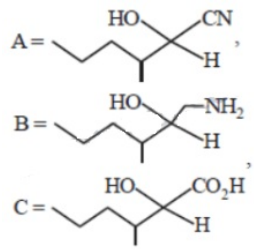
B.



C.

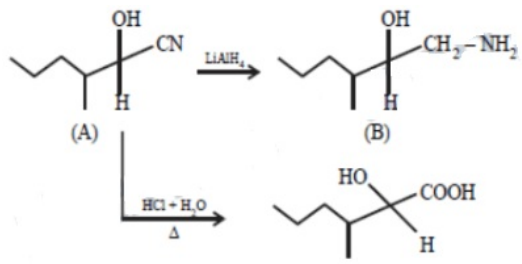


D.



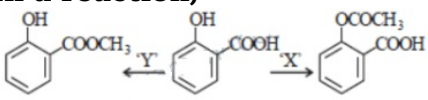
Answer: D

Solution:



Question27

In a reaction,



reagents ' X ' and ' Y ' respectively are :
[1-Feb-2023 Shift 2]

Options:

A. $(CH_3CO)_2O$ / $H^+$and CH_3OH / H^+, Δ

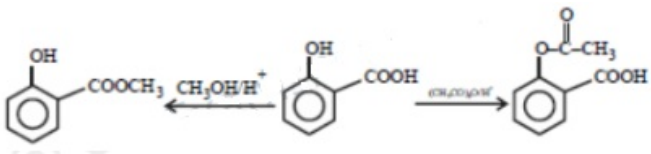
B. $(CH_3CO)_2O$ / $H^+$and $(CH_3CO)_2O$ / H^+

C. CH_3OH / H^+, Δ and CH_3OH / H^+, Δ

D. CH_3OH / H^+Δ and $(CH_3CO)_2O$ / H^+

Answer: A

Solution:

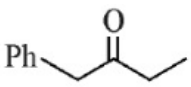


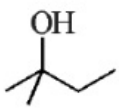
Question28

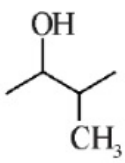
Among the following, the number of compounds which will give positive iodoform reaction is__
(a) 1-Phenylbutan-2-one
(b) 2-Methylbutan-2-ol
(c) 3-Methylbutan-2-ol
(d) 1-Phenylethanol
(e) 3,3-dimethylbutan-2-one
(f) 1-Phenylpropan-2-ol
[6-Apr-2023 shift 2]

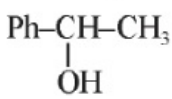
Answer: 4

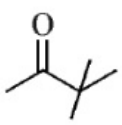
Solution:

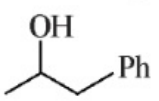
(a) 

(b) 

(c)  (Positive for iodoform)

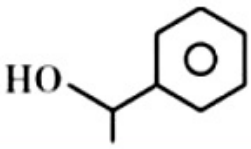
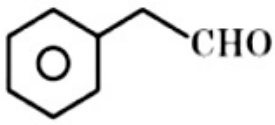
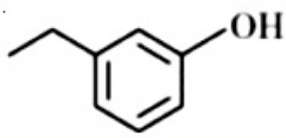
(d)  (Positive for iodoform)

(e)  (Positive for iodoform)

(f)  (Positive for iodoform)

Question29

Match List I with List II:

List I (Reagents used)	List II (Compound with Functional group detected)
A. Alkaline solution of copper sulphate and sodium cirate	I. 
B. Neutral $FeCl_3$ solution	II. 
C. Alkaline chloroform solution	III. 
D. Potassium iodide and sodium hypochlorite	IV. 

Choose the correct answer from the options given below:
[8-Apr-2023 shift 1]

Options:

A. A-III, B-IV, C-II, D-I

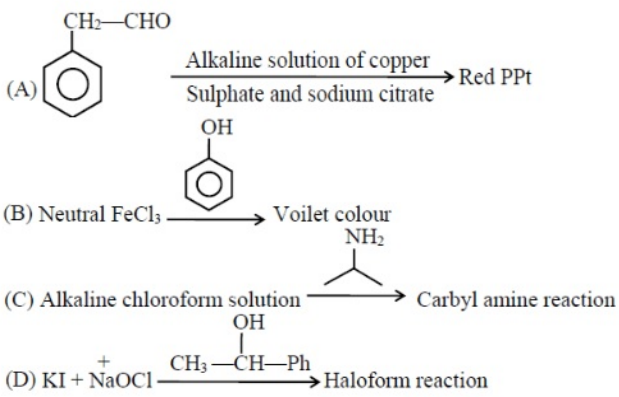
B. A-II, B-IV, C-III, D-I

C. A-IV, B-I, C-II, D-III

D. A-III, B-IV, C-I, D-II

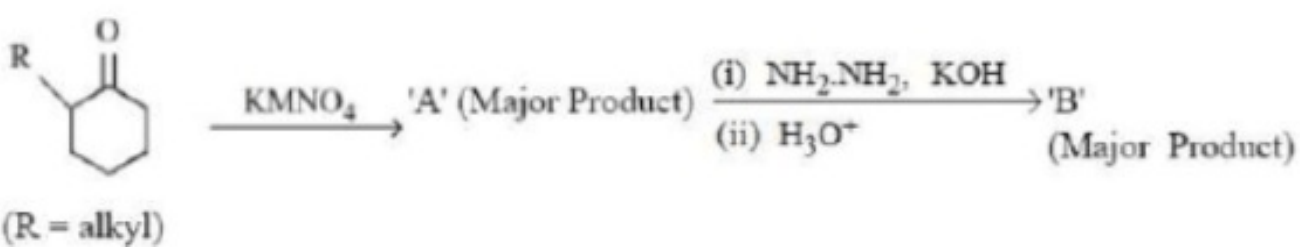
Answer: A

Solution:



Question30

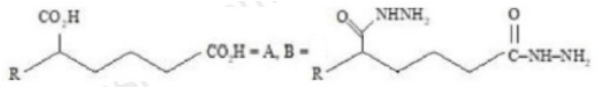
' A ' and ' B ' in the above reactions are :



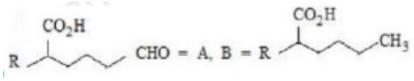
[11-Apr-2023 shift 1]

Options:

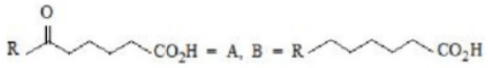
A.



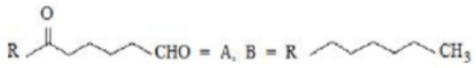
B.



C.

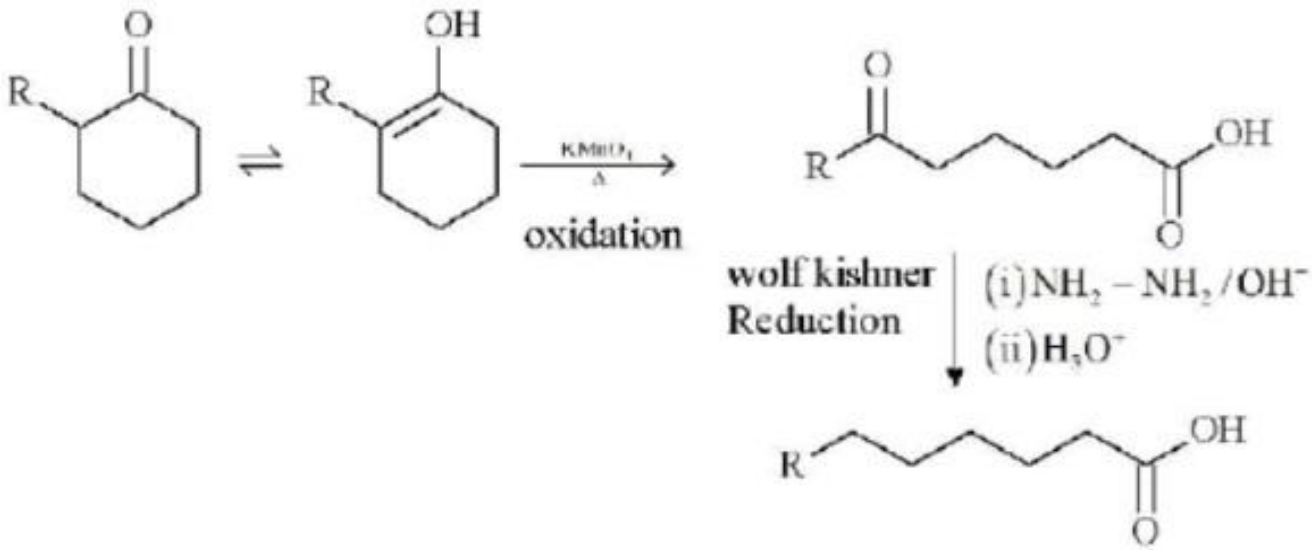


D.

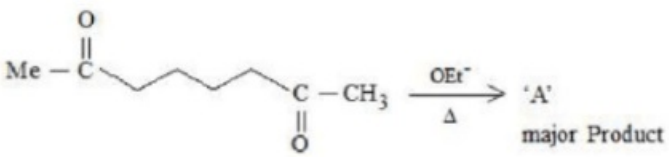


Answer: C

Solution:



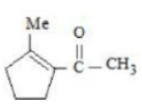
Question31



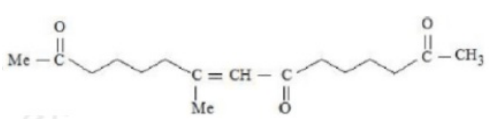
A in the above reaction is:
[12-Apr-2023 shift 1]

Options:

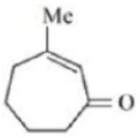
A.



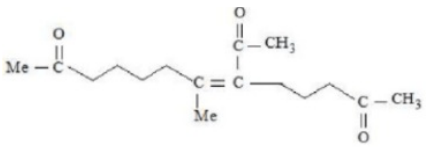
B.



C.

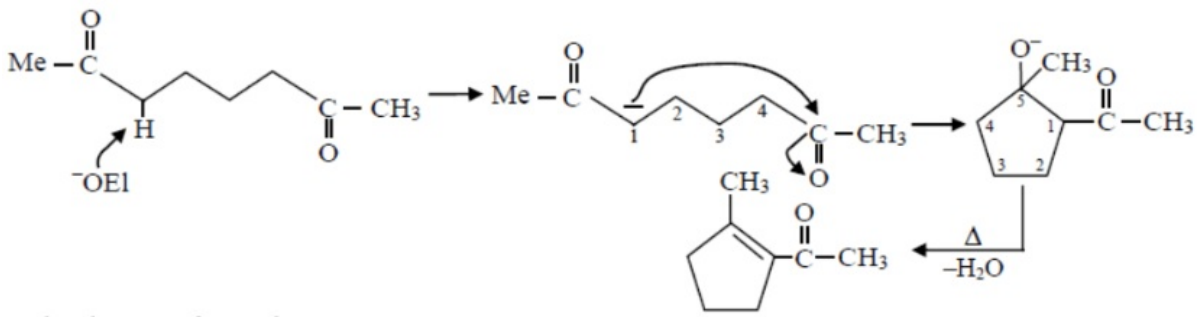


D.

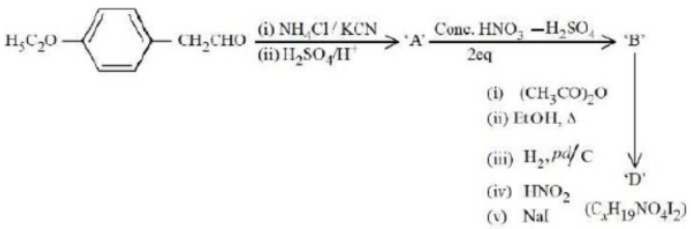


Answer: A

Solution:



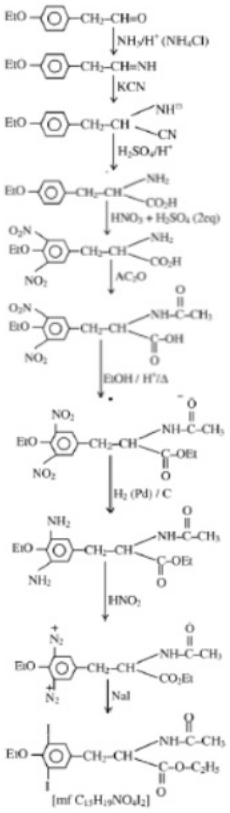
Question32



The value of x in compound ' D ' is _____.
[12-Apr-2023 shift 1]

Answer: 15

Solution:

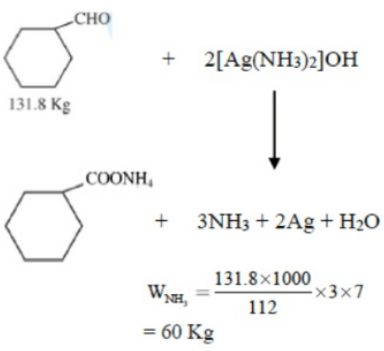


Question33

The mass of NH_3 produced when 131.8 kg of cyclohexanecarbaldehyde undergoes Tollen's test is kg. (Nearest Integer)
Molar Mass of C = 12g / mol
N = 14g / mol
O = 16g / mol
[12-Apr-2023 shift 1]

Answer: 60

Solution:



$$W_{NH_3} = \frac{131.8 \times 1000}{112} \times 3 \times 7$$
$$= 60 \text{ Kg}$$

Question34

D-(+) Glyceraldehyde $\xrightarrow[\text{iii) } H_2O / H_3^+]{\text{i) HCN}}$

The products formed in the above reaction are
[13-Apr-2023 shift 1]

Options:

A. Two optically active products

B. One optically inactive and one meso product.

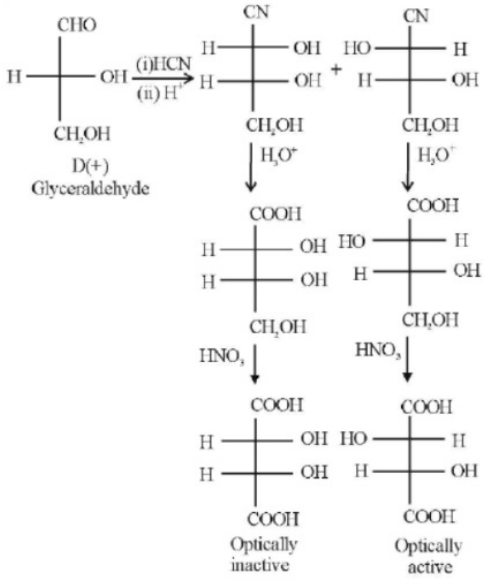
C. One optically active and one meso product

D. Two optically inactive products

Answer: C

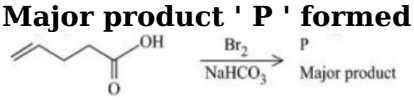
Solution:

Solution:



Question35

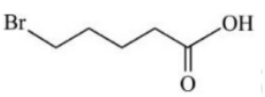
Major product ' P ' formed in the following reaction is :



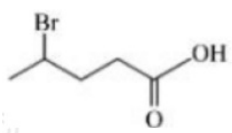
[8-Apr-2023 shift 2]

Options:

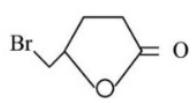
A.



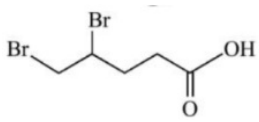
B.



C.



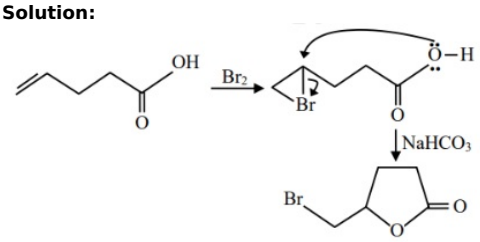
D.



Answer: C

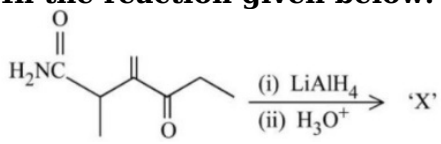
Solution:

Solution:



Question36

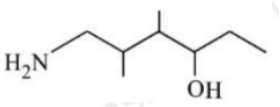
In the reaction given below:



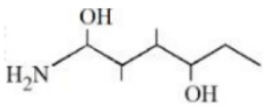
The product ' X ' is:
[10-Apr-2023 shift 2]

Options:

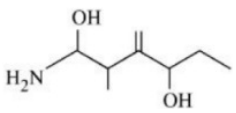
A.



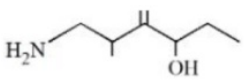
B.



C.



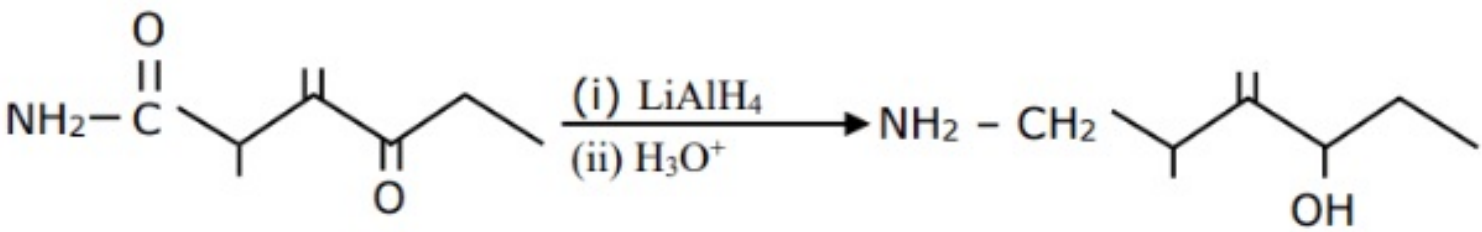
D.



Answer: D

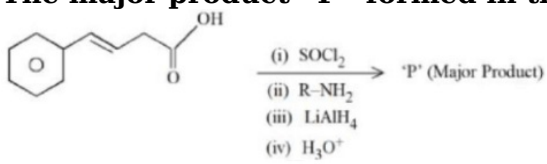
Solution:

Solution:



Question37

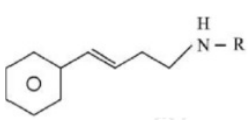
The major product ' P ' formed in the following sequence of reactions is



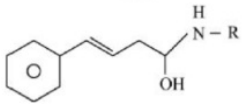
[12-Apr-2023 shift 1]

Options:

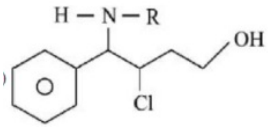
A.



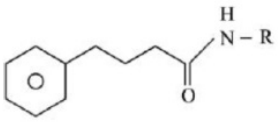
B.



C.



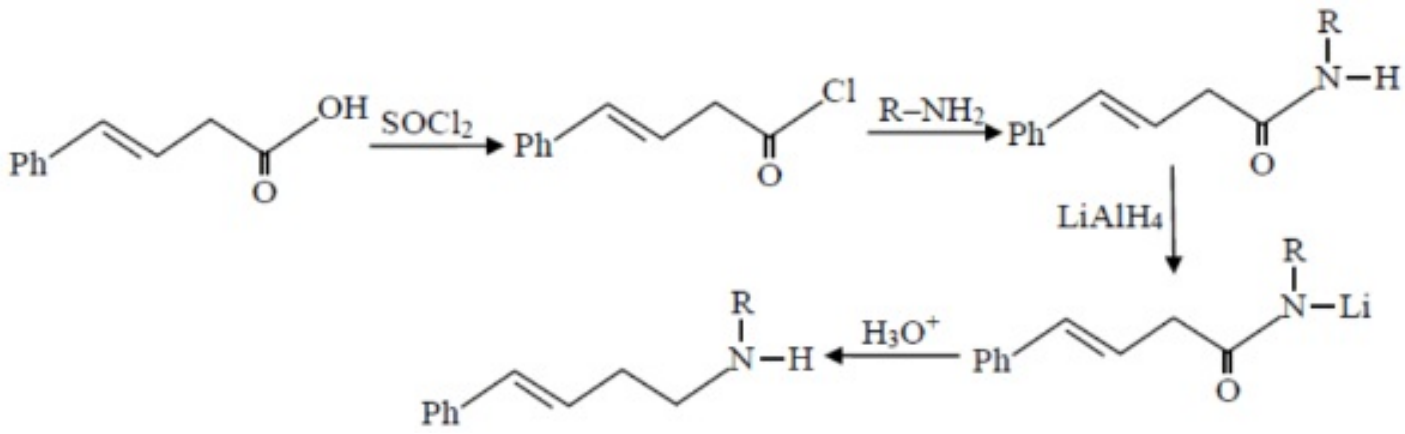
D.



Answer: A

Solution:

Solution:

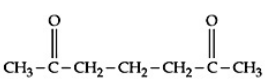


Question38

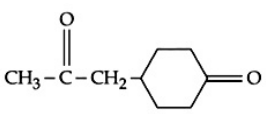
Which of the following is an example of conjugated diketone?
[24-Jun-2022-Shift-1]

Options:

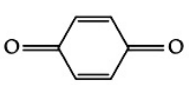
A.



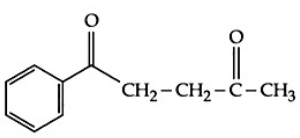
B.



C.

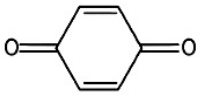


D.



Answer: C

Solution:



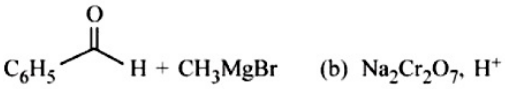
is a conjugated diketone. In the rest of the diketones given in the question, the two (C = O) groups are not in conjugation with each other.

Question39

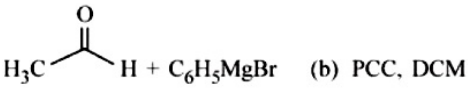
Which of the following conditions or reaction sequence will NOT give acetophenone as the major product?
[25-Jun-2022-Shift-2]

Options:

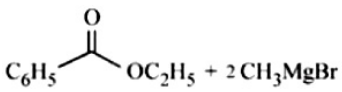
A.



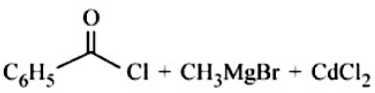
B.



C.

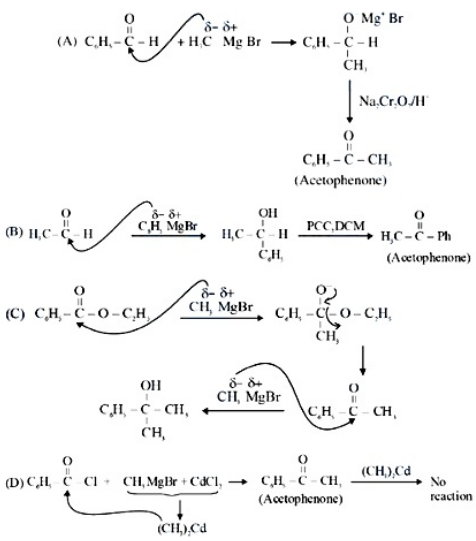


D.

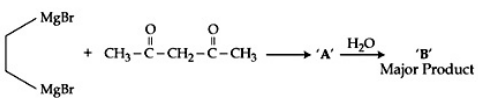


Answer: C

Solution:



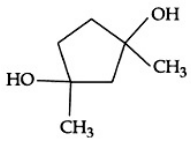
Question40



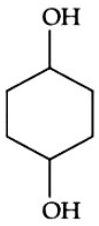
Consider the above reaction sequence and identify the product B.
[26-Jun-2022-Shift-1]

Options:

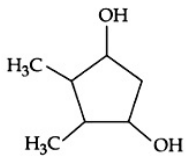
A.



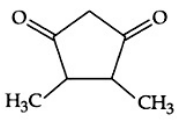
B.



C.



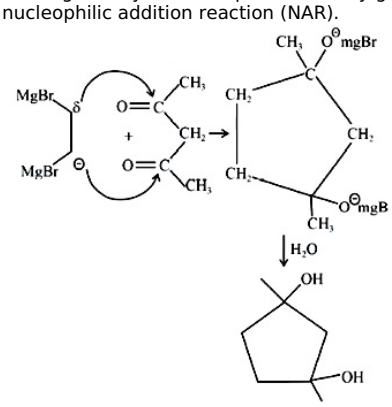
D.



Answer: A

Solution:

Solution:
Although Acetyl Acetone predominantly gives Acid base reaction with G.R due to Active methylene group but according to given option ans should be based on nucleophilic addition reaction (NAR).

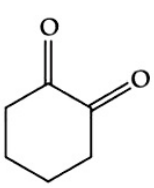


Question41

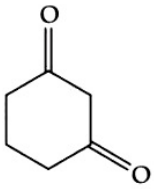
Which will have the highest enol content? [26-Jun-2022-Shift-1]

Options:

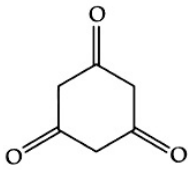
A.



B.



C.

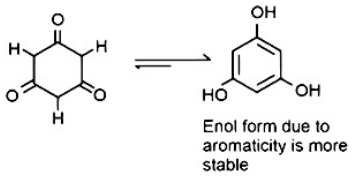


D.

Answer: C

Solution:

Solution:



Question42

The final product ' A ' in the following reaction sequence

$$CH_3CH_2-\overset{\overset{O}{\|}}{C}-CH_3 \xrightarrow{HCN} ? \xrightarrow[\text{Heat}]{95\%\ H_2SO_4} A$$

[26-Jun-2022-Shift-2]

Options:

A.

$$CH_3-CH=\overset{\overset{CH_3}{|}}{C}-COOH$$

B.

$$CH_3-CH=\overset{\overset{C}{|}}{\underset{CH_3}{|}}-CN$$

C.

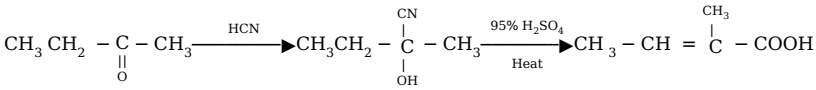
$$CH_3-CH_2=\overset{\overset{OH}{|}}{\underset{CH_3}{C}}-COOH$$

D.

$$CH_3CH=\overset{\overset{C}{|}}{\underset{CH_3}{|}}-CONH_2$$

Answer: A

Solution:

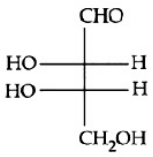


Question43

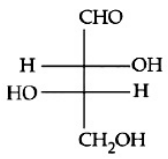
L-isomer of a compound 'A' ($C_4H_8O_4$) gives a positive test with $[Ag(NH_3)_2]^+$. Treatment of 'A' with acetic anhydride yields triacetate derivative. Compound ' A ' produces an optically active compound (B) and an optically inactive compound (C) on treatment with bromine water and HNO_3 respectively. Compound (A) is :
[27-Jun-2022-Shift-1]

Options:

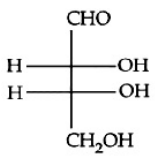
A.



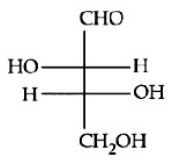
B.



C.

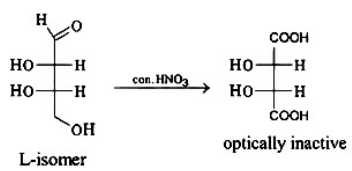


D.



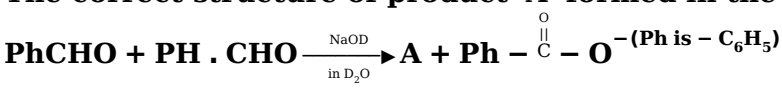
Answer: A

Solution:



Question44

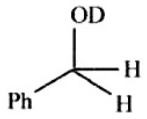
The correct structure of product 'A' formed in the following reaction.



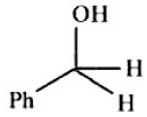
is
[28-Jun-2022-Shift-1]

Options:

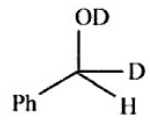
A.



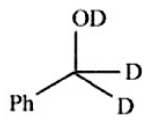
B.



C.



D.



Answer: A

Solution:

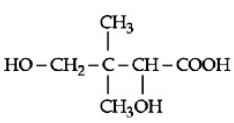
Solution:

Question45

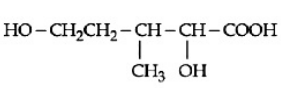
Isobutyraldehyde on reaction with formaldehyde and K_2CO_3 gives compound ' A '. Compound ' A ' reacts with KCN and yields compound ' B ', which on hydrolysis gives a stable compound ' C '. The compound ' C ' is
[28-Jun-2022-Shift-2]

Options:

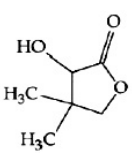
A.



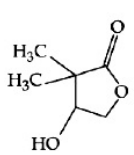
B.



C.

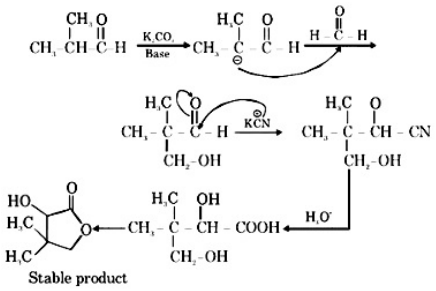


D.



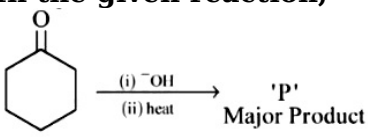
Answer: C

Solution:



Question46

In the given reaction,



The number of π electrons present in the product ' P ' is
[29-Jun-2022-Shift-2]

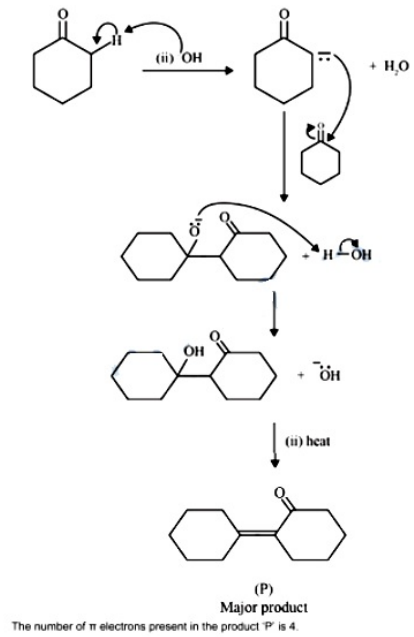
Options:

A.

Answer: 4

Solution:

Solution:



Question47

Two statements are given below:
Statement I : The melting point of monocarboxylic acid with even number of carbon atoms is higher than that of with odd number of carbon atoms acid immediately below and above it in the series.
Statement II : The solubility of monocarboxylic acids in water decreases with increase in molar mass.
Choose the most appropriate option :
[24-Jun-2022-Shift-1]

Options:

A. Both Statement I and Statement II are correct.

B. Both Statement I and Statement II are incorrect.

C. Statement I is correct but Statement II is incorrect.

D. Statement I is incorrect but Statement | is correct.

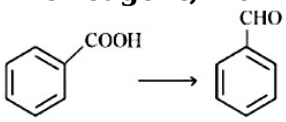
Answer: A

Solution:

Solution:
Statement (I) is correct as monocarboxylic acids with even number of carbon atoms show better packing efficiency in the solid state, statement (II) is also correct as the solubility of carboxylic acids decreases with an increase in molar mass due to increase in the hydrophobic portion with an increase in the number of carbon atoms.

Question48

The reagent, from the following, which converts benzoic acid to benzaldehyde in one step is



[26-Jun-2022-Shift-2]

Options:

A. $LiAlH_4$

B. $KMnO_4$

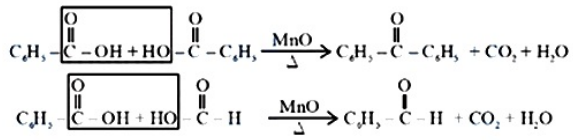
C. MnO

D. $NaBH_4$

Answer: C

Solution:

Solution:



Question49

Decarboxylation of all six possible forms of diaminobenzoic acids $C_6H_3(NH_2)_2COOH$ yields three products A, B and C. Three acids give a product ' A ', two acids gives a product ' B ' and one acid give a product ' C '. The melting point of product ' C ' is
[27-Jun-2022-Shift-2]

Options:

A. 63˚C

B. 90˚C

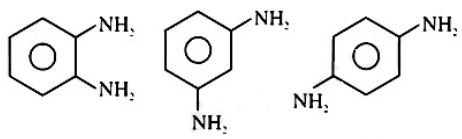
C. 104˚C

D. 142˚C

Answer: D

Solution:

Solution:



M.P. 142°C

Question50

Given below are two statements :
Statement I : The esterification of carboxylic acid with an alcohol is a nucleophilic acyl substitution.
Statement II : Electron withdrawing groups in the carboxylic acid will increase the rate of esterification reaction.
Choose the most appropriate option :
[29-Jun-2022-Shift-1]

Options:

A. Both Statement I and Statement II are correct.

B. Both Statement I and Statement II are incorrect.

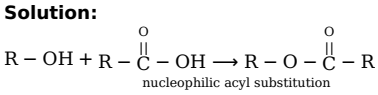
C. Statement I is correct but Statement II is incorrect.

D. Statement I is incorrect but Statement II is correct.

Answer: A

Solution:

Solution:



electron with drawing group on carboxylic acidwill increase the rate of esterification

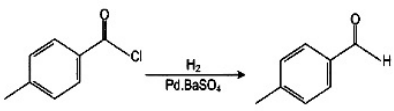
---

Question51

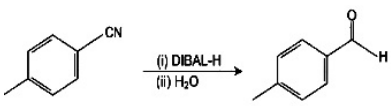
Which one of the following reactions does not represent correct combination of substrate and product under the given conditions?
[25-Jul-2022-Shift-1]

Options:

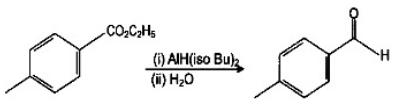
A.



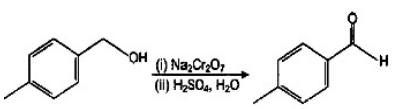
B.



C.

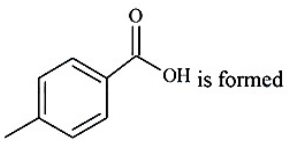


D.



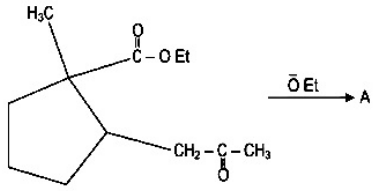
Answer: D

Solution:



Question52

In the given reaction



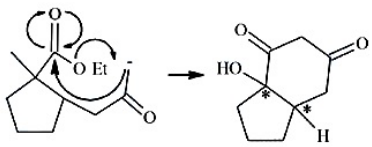
(Where Et is – C_2H_5)

The number of chiral carbon/s in product A is__
[25-Jul-2022-Shift-1]

Answer: 2

Solution:

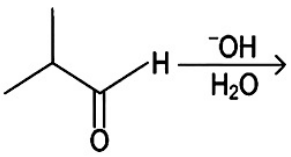
Solution:



2 chiral carbons

Question53

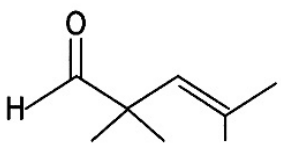
What is the major product of the following reaction?



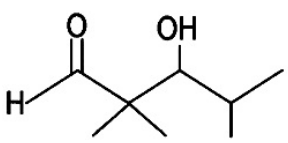
[25-Jul-2022-Shift-2]

Options:

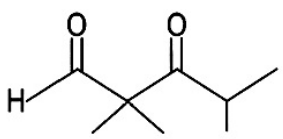
A.



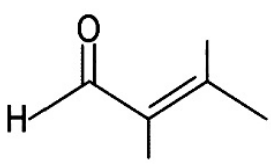
B.



C.

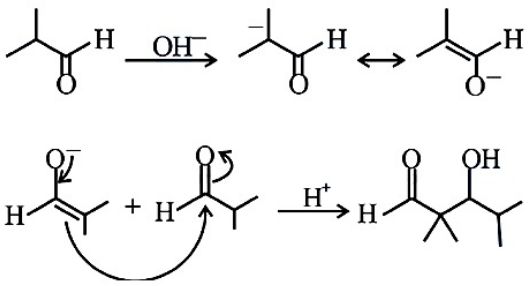


D.



Answer: B

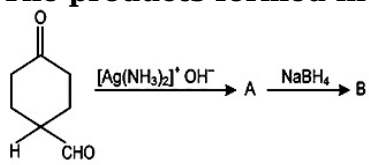
Solution:



Aldol formation takes place.

Question54

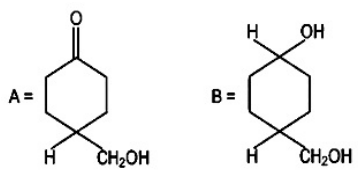
The products formed in the following reaction, A and B are



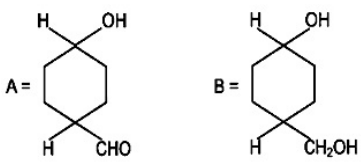
[26-Jul-2022-Shift-1]

Options:

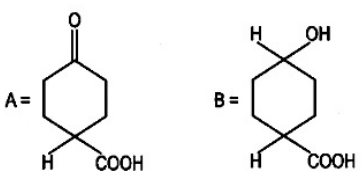
A.



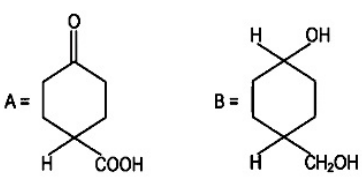
B.



C.



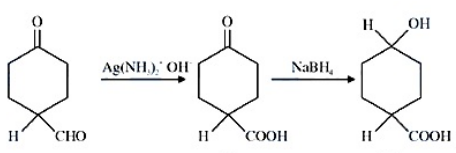
D.



Answer: C

Solution:

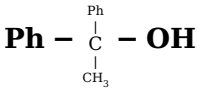
Solution:



$NaBH_4$ does not reduce carboxylic acid.

Question55

Which reactant will give the following alcohol on reaction with one mole of phenyl magnesium bromide (PhMgBr) followed by acidic hydrolysis?



[26-Jul-2022-Shift-1]

Options:

A. $CH_3 - C \equiv N$

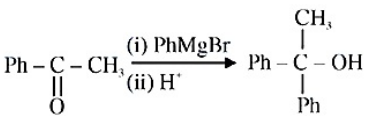
B. $Ph - C \equiv N$

C. $CH_3 - \overset{O}{\overset{\|}{C}} - O - Ph$

D. $Ph - \overset{O}{\overset{\|}{C}} - CH_3$

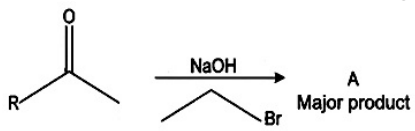
Answer: D

Solution:



Question56

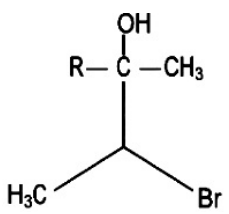
The structure of A in the given reaction is :



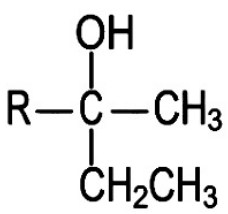
[27-Jul-2022-Shift-2]

Options:

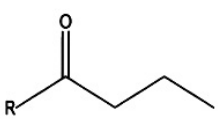
A.



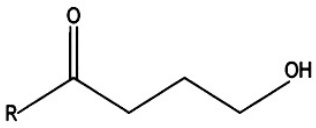
B.



C.

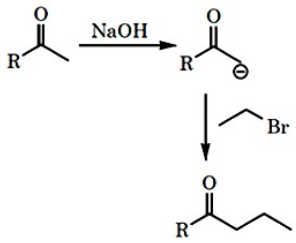


D.



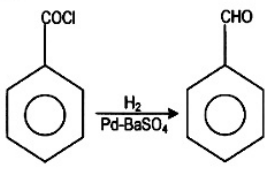
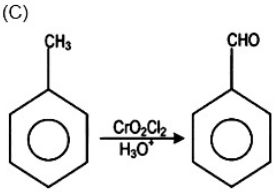
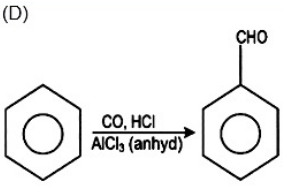
Answer: C

Solution:



Question57

Match List - I with List - II.

List I	List II
(A) 	(I)Gatterman Koch reaction
(B) $CH_3-CN \xrightarrow[H_3O^+]{SnCl_2/HCl} CH_3-CHO$	(II)Etard reaction
(C) 	(III)Stephen reaction
(D) 	(IV)Rosenmund reaction

Choose the correct answer from the options given below :
[27-Jul-2022-Shift-2]

Options:

A. (A) – (IV), (B) – (II), (C) – (I), (D) – (I)

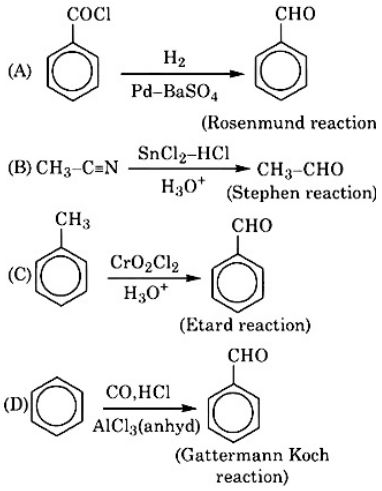
B. (A) – (I), (B) – (II), (C) – (II), (D) – (IV)

C. (A) – (II), (B) – (II), (C) – (IV), (D) – (I)

D. (A) – (II), (B) – (I), (C) – (I), (D) – (IV)

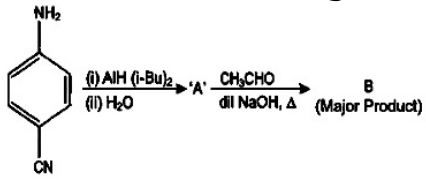
Answer: A

Solution:



Question58

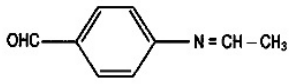
Consider the following reaction sequence:



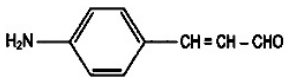
The product ' B ' is :
[29-Jul-2022-Shift-1]

Options:

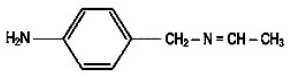
A.



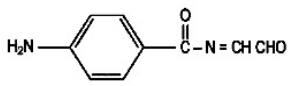
B.



C.

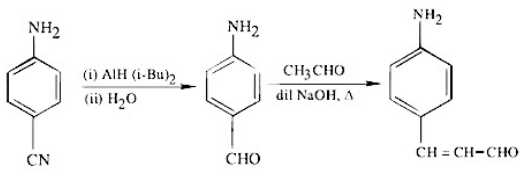


D.



Answer: B

Solution:



Cross aldol condensation

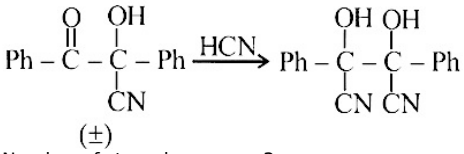
Question59

The number of stereoisomers formed in a reaction of (±) Ph(C = O) C(OH)(CN) Ph with HCN is _____.
[where Ph is $-C_6H_5$]
[29-Jul-2022-Shift-2]

Answer: 3

Solution:

Solution:



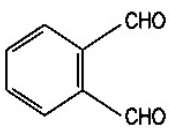
Number of stereoisomers = 3

Question60

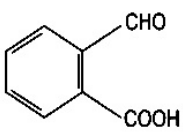
An organic compound 'A' on reaction with NH_3 followed by heating gives compound B. Which on further strong heating gives compound C($C_8H_5NO_2$). Compound C on sequential reaction with ethanolic KOH, alkyl chloride and hydrolysis with alkali gives a primary amine. The compound A is :
[25-Jul-2022-Shift-1]

Options:

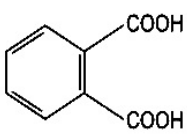
A.



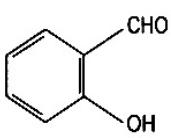
B.



C.



D.

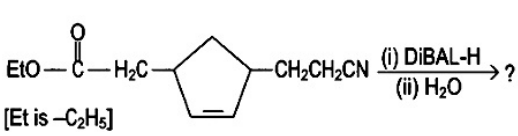


Answer: C

Solution:

Solution:
Diamagnetic species are: N_2, O_2^{2-}

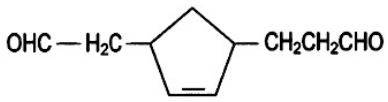
Question61



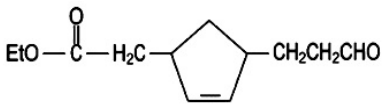
Consider the above reaction and predict the major product.
[26-Jul-2022-Shift-2]

Options:

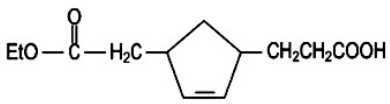
A.



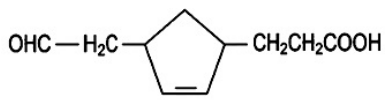
B.



C.

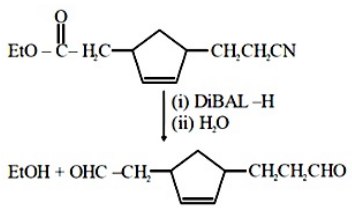


D.

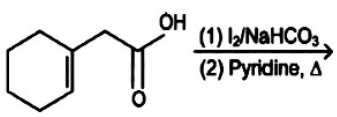


Answer: A

Solution:



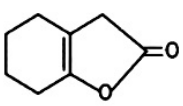
Question62



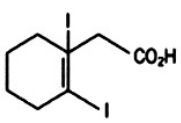
Find out the major product for the above reaction.
[28-Jul-2022-Shift-2]

Options:

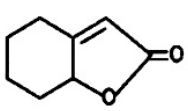
A.



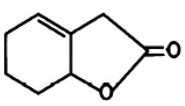
B.



C.

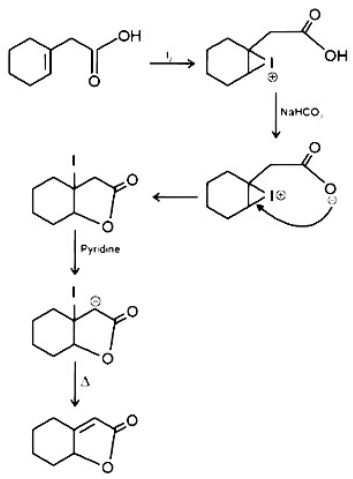


D.



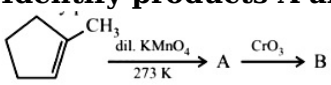
Answer: C

Solution:



Question63

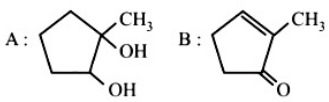
Identify products A and B



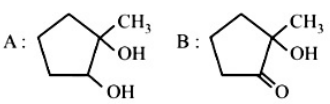
[24 Feb 2021 Shift 1]

Options:

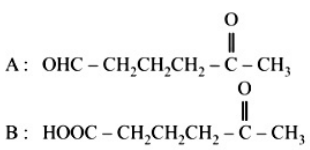
A.



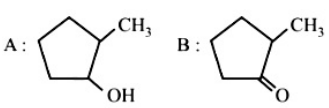
B.



C.

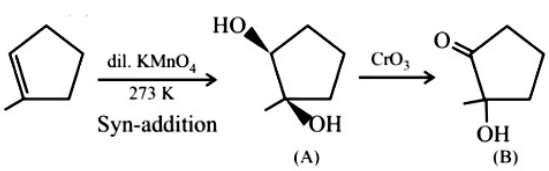


D.



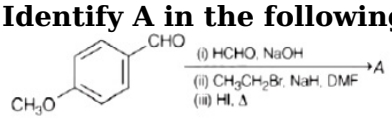
Answer: B

Solution:



Question64

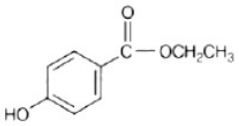
Identify A in the following chemical reaction.



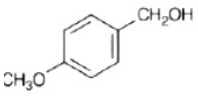
[26 Feb 2021 Shift 2]

Options:

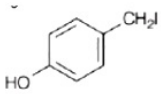
A.



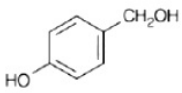
B.



C.



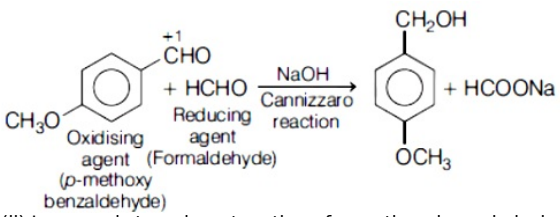
D.



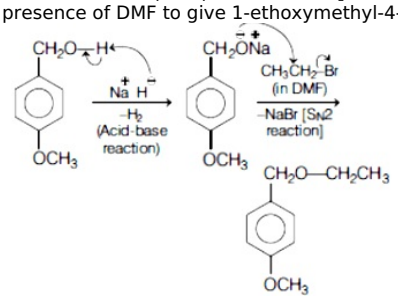
Answer: C

Solution:

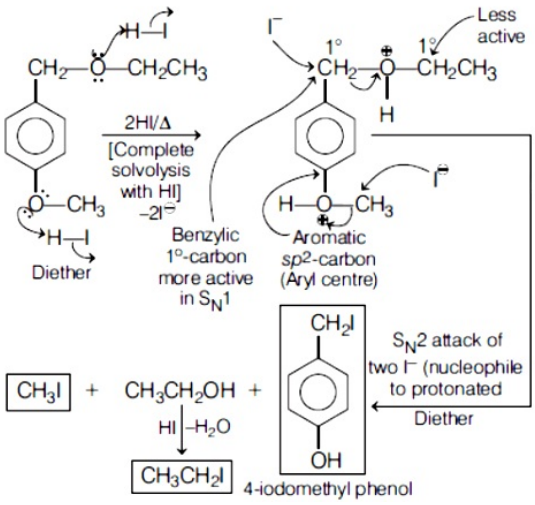
Here, 4-methoxybenzaldehyde in series of reaction finally forms 4-(iodomethyl) phenol (A). Let us compute the reaction step by step with mechanism as follows
(i) In first step, oxidising agent (p-methoxybenzaldehyde) reacts with formaldehyde in presence of strong base $NaOH$ to give p-methoxybenzyl alcohol along with sodium salt of methanoic acid. It is known as Cannizzaro's reaction.



(ii) In second step, deprotonation of p-methoxybenzyl alcohol in presence of sodium hydride (NaH) to form alkoxide which further react with bromoethane in presence of DMF to give 1-ethoxymethyl-4-methoxybenzene.

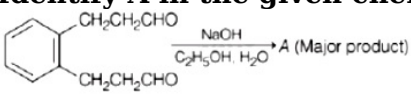


(iii) In last step, 1-ethoxymethyl-4-methoxybenzene undergoes solvolysis reaction followed by S_N2 attack of two iodide ion (I^-) to give 4-iodomethyl phenol, iodoform and iodoethane.



Question65

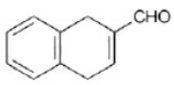
Identify A in the given chemical reaction,



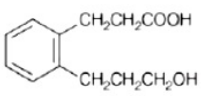
[26 Feb 2021 Shift 2]

Options:

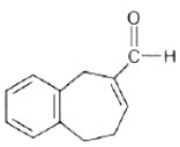
A.



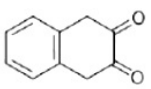
B.



C.

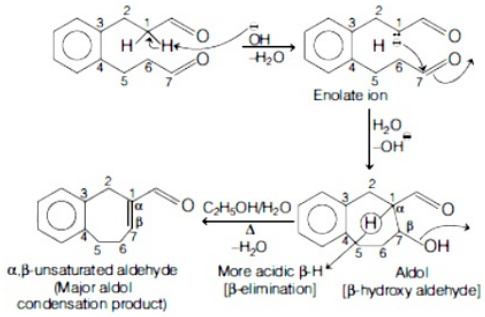


D.



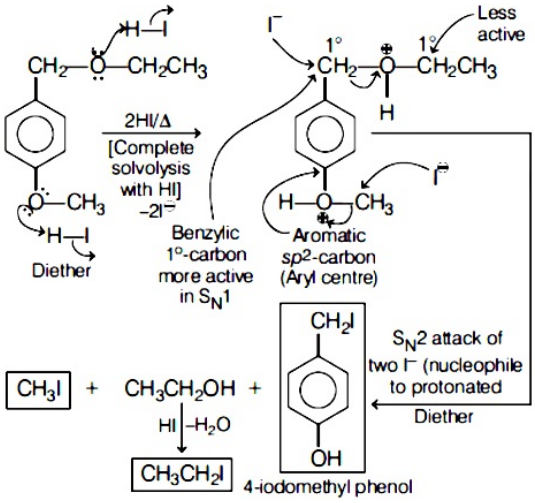
Answer: C

Solution:



It is an example of intramolecular aldol condensation. α - hydrogen atom of one - CHO group gets abstracted by $NaOH$ form enolate ion which then attacks $=C=O$ another $-CHO$ group to form aldol or β - hydroxy aldehyde. The aldol on heating C_2H_5OH / H_2O forms the final product (α, β-unsaturated aldehyde) as the major product.

Mechanism



Question66

2,4 -DNP test can be used to identify
[26 Feb 2021 Shift 2]

Options:

A. amine

B. aldehyde

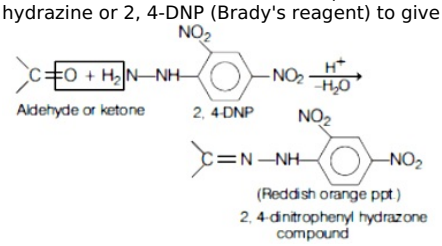
C. ether

D. halogens

Answer: B

Solution:

2,4 - DNP test is used to detect the presence of carbonyl group (aldehyde or ketone) in organic compound. The test is carried out with 2, 4- dinitro phenyl hydrazine or 2, 4-DNP (Brady's reagent) to give a reddish orange precipitate.



Question67

$$\underset{(C_4H_3Cl_2)}{A} \xrightarrow[373K]{\text{Hydrolysis}} \underset{(C_4H_8O)}{B}$$

B reacts with hydroxyl amine but does not give Tollen's test. Identify A and B.
[26 Feb 2021 Shift 1]

Options:

A. 1,1 -dichlorobutane and 2 -butanone

B. 2,2 -dichlorobutane and butanal

C. 1,1 -dichlorobutane and butanal

D. 2,2-dichlorobutane and 2-butan-one

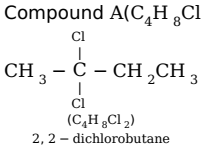
Answer: D

Solution:

Compound $B(C_4H_8O)$ reacts with hydroxylamine (NH_2OH). So, compound B is an aldehyde or a ketone. Again, B does not give Tollen's test which indicates that B is a ketone but not an aldehyde. So, B is

$$\underset{2-\text{butan}-\text{one}}{CH_3-\overset{O}{\overset{\|}{C}}-CH_2CH_3}(C_4H_8O)$$

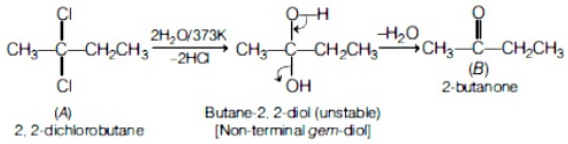
Compound A($C_4H_8Cl_2$) is a dihalide which undergoes hot hydrolysis (H_2O / 373K) to give B, a ketone. So, A is a non-terminal geminal or gem dichloride and A is



$(C_4H_8Cl_2)$

2, 2 – dichlorobutane

The reaction can be computed as,



Question68

The major product of the following reaction is

$CH_3CH_2CH = CH_2 \xrightarrow[Rh\ catalyst]{H_2 / CO}$

[25 Feb 2021 Shift 2]

Options:

A. $CH_3CH_2CH_2CH_2CHO$

B. $CH_3CH_2CH_2CHO$

C. $CH_3CH_2CH = CH - CHO$

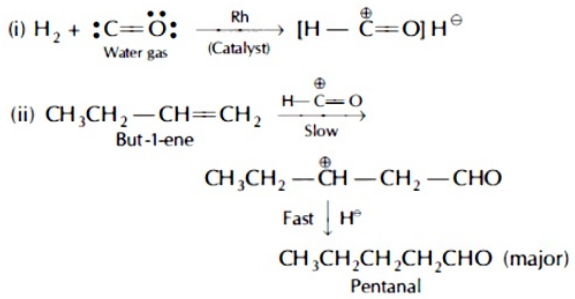
D. $CH_3CH_2\underset{\underset{CHO}{|}}{C} = CH_2$

Answer: A

Solution:

The major product of the reaction is $CH_3CH_2CH_2CH_2CHO$.

Here, electrophilic addition of $H-\overset{+}{C}=O$ (formylation) take place to the alkene through Markownikoff addition.



Question69

Which one of the following reactions will not form acetaldehyde?

[25 Feb 2021 Shift 1]

Options:

A. $CH_2 = CH_2 + O_2 \xrightarrow[H_2O]{Pd\ (II)/\ Cu\ (II)}$

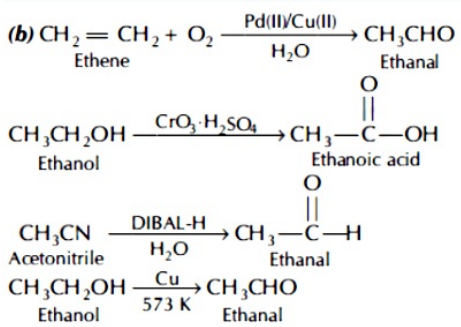
B. $CH_3CH_2OH \xrightarrow{CrO_3 - H_2SO_4}$

C. $CH_3CN \xrightarrow[(ii)H_2O]{(i)\ DI\ BAL \cdot H}$

D. $CH_3CH_2OH \xrightarrow[573K]{Cu}$

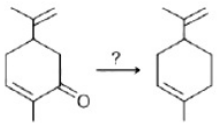
Answer: B

Solution:



Since, $CrO_3 \cdot H_2SO_4$ behave as strong oxidising agent and it converts alcohol directly to carboxylic acid. Thus, reaction (b) will not form acetaldehyde.

Question70



Which of the following reagent is suitable for the preparation of the product in the above reaction?
[24 Feb 2021 Shift 2]

Options:

A. $NaBH_4$

B. $NH_2 - NH_2 / C_2H_5\overset{\ominus}{O}\overset{\oplus}{N}a$

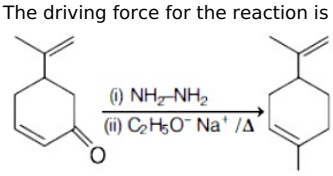
C. Ni / H_2

D. Red $P + Cl_2$

Answer: B

Solution:

Solution:
To reduce the carbonyl groups into alkane, wolff-Kishner reduction is used, without affecting the double bond.
Wolff-Kishner reagent It utilises hydrazine ($NH_2 - NH_2$) as the reducing agent in the presence of strong base KOH or $C_2H_5\overline{O}Na^+$in a high boiling protic solvent.
The driving force for the reaction is the conversion of hydrazine to nitrogen gas.



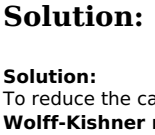
Question71

Which one of the following carbonyl compounds cannot be prepared by addition of water on an alkyne in the presence of $HgSO_4$ and H_2SO_4 ?
[24 Feb 2021 Shift 2]

Options:

A. $CH_3 - \overset{O}{\overset{\|}{C}} - H$

B.



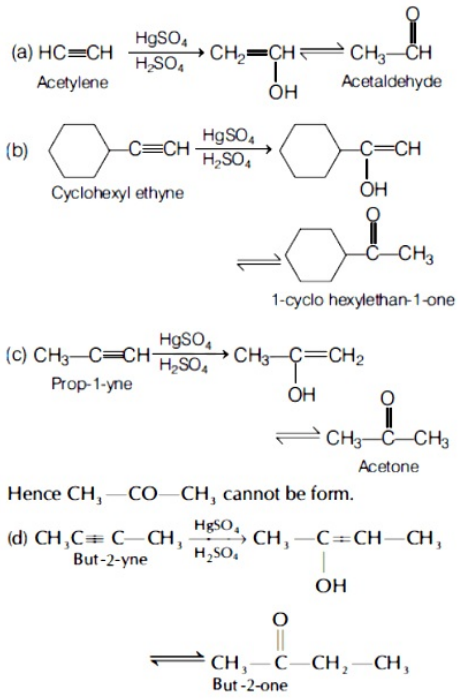
C. $CH_3 - CH_2 - \overset{O}{\overset{\|}{C}} - H$

D. $CH_3 - \overset{O}{\overset{\|}{C}} - CH_2CH_3$

Answer: C

Solution:

Reaction of $HgSO_4$ / dil . H_2SO_4 with alkyne result in addition of water as per Markownikoff's rule.



Hence $CH_3—CO—CH_3$ cannot be form.

Question72

Match List-I with List-II.

List-I	List-II
A. $R-\overset{O}{\overset{\|}{C}}-Cl \longrightarrow R-CHO$	1. $Br_2/NaOH$
B. $R-CH_2-COOH \longrightarrow R-\underset{Cl}{CH}-COOH$	2. $H_2/Pd-BaSO_4$
C. $R-\overset{O}{\overset{\|}{C}}-NH_2 \longrightarrow R-NH_2$	3. $Zn(Hg)/$ Conc. HCl
D. $R-C-CH_3 \longrightarrow R-CH_2-CH_3$	4. $Cl_2/$ Red P, H_2O

Choose the correct answer from the options given below. [24 Feb 2021 Shift 2]

Options:

A. (A-2), (B-1), (C-4), (D-3)

B. (A-3), (B-4), (C-1), (D-2)

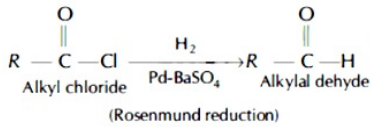
C. (A-2), (B-4), (C-1), (D-3)

D. (A-3), (B-1), (C-4), (D-2)

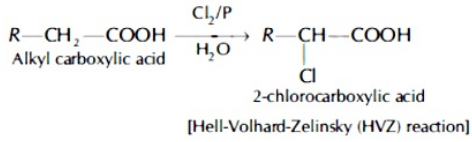
Answer: C

Solution:

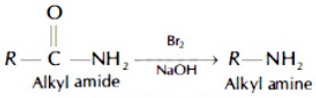
(A) Alkyl chloride reacts with H_2 / Pd $-BaSO_4$ and reduced to alkyl aldehyde. This is known as Rosenmund reduction.



(B) Carboxylic acid reacts with Cl_2 / P in aqueous medium to form 2-chlorocarboxylic acid. This reaction is known as HVZ reaction.

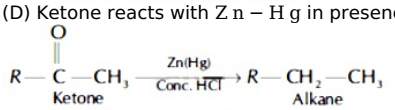


[Hell-Volhard-Zelinsky (HVZ) reaction] (C) Alkyl amide reacts with Br_2 in presence of NaOH to give alkyl amine. This reaction is known as Hofmann bromide reaction,



(Hofmann bromide reaction)

(D) Ketone reacts with $Zn-Hg$ in presence of conc. HCl to give alkane. This reaction is known as clemmensen reduction.



(Clemmenson reduction)

Hence, correct match is (A)-2, (B)-4, (C)-1, (D)-3.

Question73

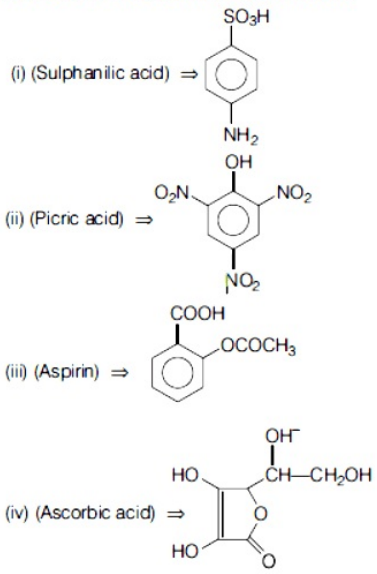
The number of compound(s) given below which contain(s) - COOH group is .....
(i) Sulphanilic acid
(ii) Picric acid
(iii) Aspirin
(iv) Ascorbic acid
[25 Feb 2021 Shift 2]

Answer: 1

Solution:

Solution:

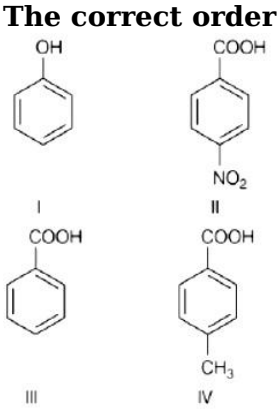
Structure of given compounds are as follows



Only one compound (iii) contains - *COOH* group.

Question74

The correct order of acid character of the following compounds is



Options
[25 Feb 2021 Shift 2]

Options:

A. I > II > III > IV

B. III > II > I > IV

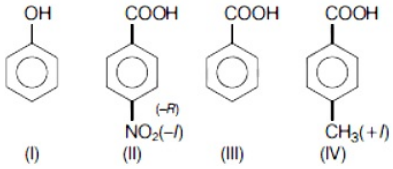
C. II > III > IV > I

D. IV > III > II > I

Answer: C

Solution:

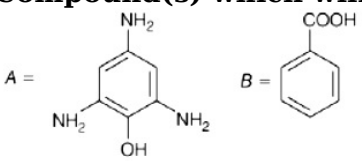
Solution:

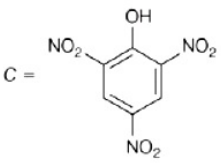


Acidity of phenol (I) is weaker than any carboxylic acid.
Electron withdrawing nature ($-\mathrm{R}$, $-\mathrm{I}$), of $-\mathrm{NO_2}$ group at para position increases acidic strength of (II), whereas + I effect of $-\mathrm{CH_3}$ group at para position decreases acidic strength of (IV).
So, the order of acid character is II > III > IV > I.

Question75

Compound(s) which will liberate carbon dioxide with sodium bicarbonate solution is/are





[25 Feb 2021 Shift 1]

Options:

A. A and B only

B. C only

C. B and C only

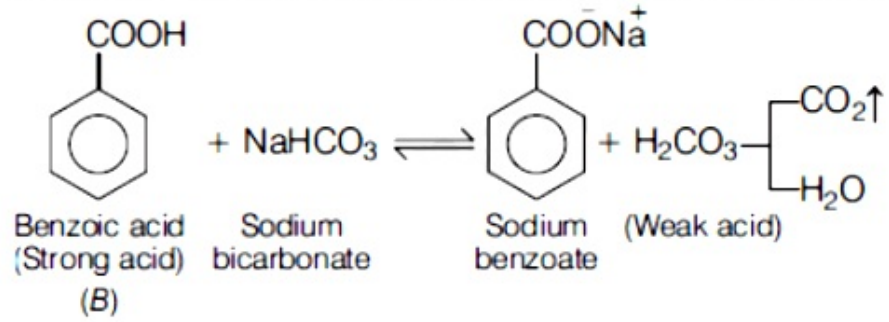
D. B only

Answer: C

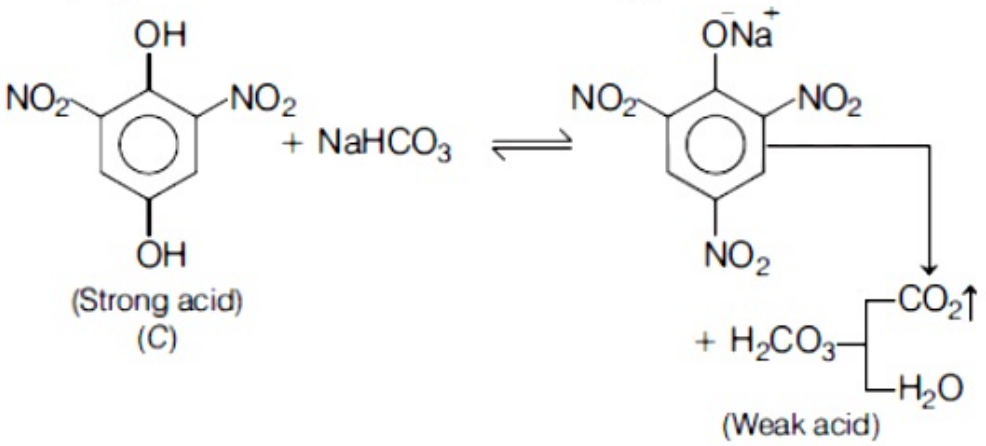
Solution:

Solution:

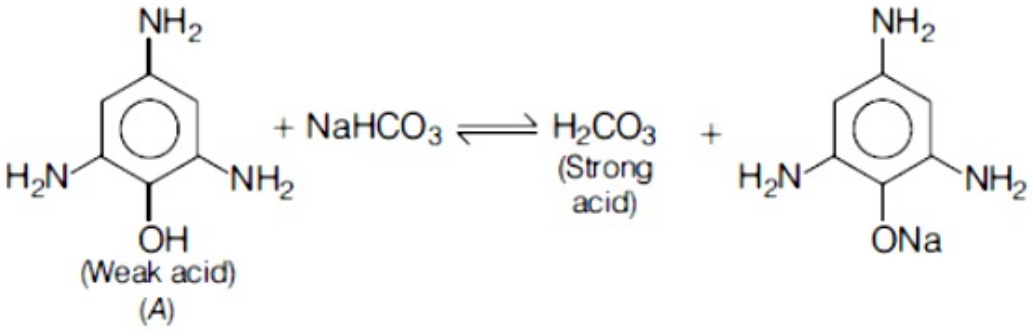
The reactions of given compound with sodium bicarbonate solution are as follows



As H_2CO_3 is weak acid it dissociate to liberate CO_2 gas and H_2O.

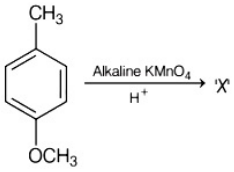


Equilibrium favours forward direction and CO_2 is liberated. In the above two reactions, H_2CO_3 is comparatively weak acid.



Equilibrium favours backward direction and CO_2 is not liberated. Thus, only B and C will liberate carbon dioxide with sodium bicarbonate solution.

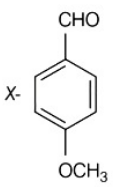
Question76



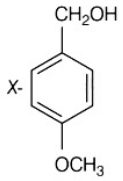
Considering the above chemical reaction, identify the product ' X '.
[18 Mar 2021 Shift 1]

Options:

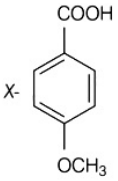
A.



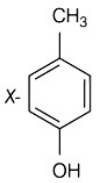
B.



C.



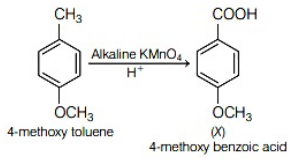
D.



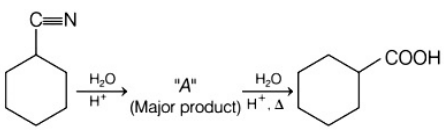
Answer: C

Solution:

Solution:
4-methoxy toluene in the presence of alkaline $KMnO_4$ to give
4-methoxy benzoic acid.
Chemical reaction is as follows:



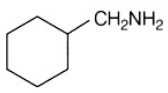
Question77



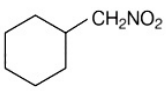
Consider the above chemical reaction and identify product " A ".
[18 Mar 2021 Shift 1]

Options:

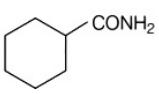
A.



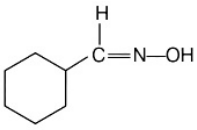
B.



C.



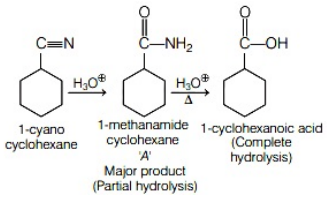
D.



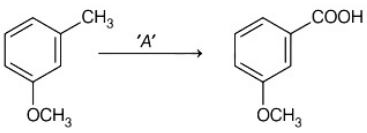
Answer: C

Solution:

1-cyano cyclo hexane on complete hydrolysis gives 1 -cyclo hexanoic acid. Intermediate 1 - methanamide cyclohexane (A) is formed by partial hydrolysis. Complete reaction is as follows



Question78



In the above reaction, the reagent ' A′ is
[16 Mar 2021 Shift 2]

Options:

A. $NaBH_4$, H_3O^+

B. $LiAlH_4$

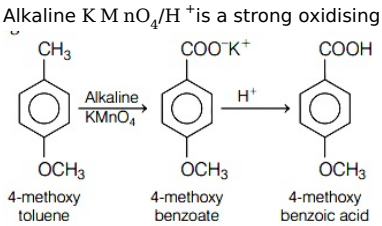
C. Alkaline $KMNO_4$, H^+

D. HCl, Zn − Hg

Answer: C

Solution:

In the given reaction, A is alkaline $KMnO_4$, H^+.
Alkaline $KMnO_4/H^+$ is a strong oxidising agent and oxidises alkyl benzene to benzoic acid. While $NaBH_4$, $LiAlH_4$ and Zn − Hg/HCl are reducing agent.



Question79

Assertion (A) Enol form of acetone [CH_3COCH_3] exists in <0.1% quantity. However, the enol form of acetyl acetone [$CH_3COCH_2OCCH_3$] exists in approximately 15% quantity.
Reason (R) Enol form of acetyl acetone is stabilised by intramolecular hydrogen bonding, which is not possible in enol form of acetone.
Choose the correct statement.
[16 Mar 2021 Shift 1]

Options:

A. A is false but R is true

B. Both A and R are true and R is the correct explanation of A.

C. Both A and R are true but R is not the correct explanation of A.

D. A is true but R is false.

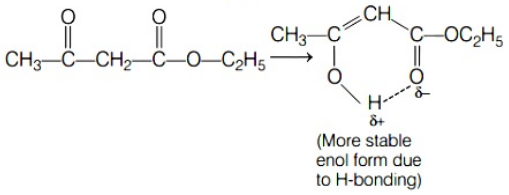
Answer: B

Solution:

Enol form of acetone $[CH_3COCH_3]$ exists in <0.1% quantity as monocarbonyl are more stable in keto form due to high bond energy.

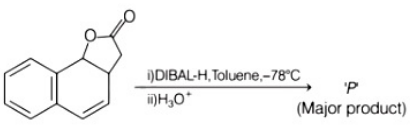
$$CH_3-\underset{\text{Keto}}{\overset{O}{\overset{\|}{C}}}-CH_3 \xrightarrow{\text{Tautomerisation}} CH_3-\underset{\text{Enol}}{\overset{OH}{\overset{|}{C}}}=CH_2$$

The enol form of acetyl acetone $[CH_3COCH_2OCCH_3]$ exists in approximately 15% quantity as it is stabilised by intramolecular hydrogen bonding, which is not possible in enol form of acetone.



So, both A and R are true and R is the correct explanation of A.

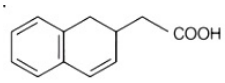
Question80



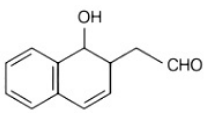
The product P in the above reaction is [16 Mar 2021 Shift 1]

Options:

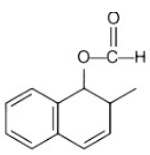
A.



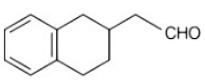
B.



C.



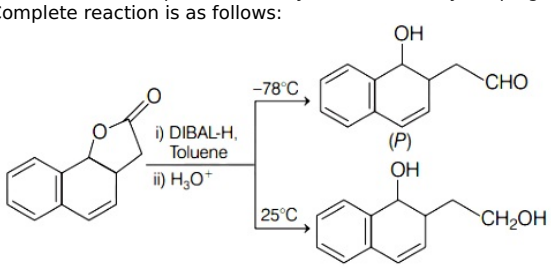
D.



Answer: B

Solution:

Solution:
DIBAIL is added to produce aldehyde from ester by keeping the temperature low while at higher temperature it can perform different conversions.
Complete reaction is as follows:



Diisobutyl aluminium hydride (DIBAL-H) is parallel to LAH (Lithium aluminium hydride) as a reducing agent but it is more selective. It forms different product at different temperature. Role of DIBAL-H is shown below

Reagen	DIBAL-H (– ° 78 C)	DIBAL-H (25° C)	DIBAL-H (–78°C)
Reactant	Ester	Ester	Cyanide
Product	Aldehyde	Alcohol	Aldehyde

Reagen	DIBAL-H (− ° 78 C)	DIBAL-H (25° C)	DIBAL-H (–78°C)
Reactant	Ester	Ester	Cyanide
Product	Aldehyde	Alcohol	Aldehyde

Note : DIBAL-H does not reduce double bond.

Question81

$R - CN \xrightarrow[(ii)\,H_2O]{(i)\ DI\ BAL-H} R - Y$

Consider the above reaction and identify "Y"
[27 Jul 2021 Shift 2]

Options:

A. $-CH_2NH_2$

B. $-CONH_2$

C. $-CHO$

D. $-COOH$

Answer: C

Solution:

$R - C \equiv N \xrightarrow[(ii)\,H_2O]{(i)\ DI\ BAL-H} R - \underset{\underset{O}{\|}}{C} - H$

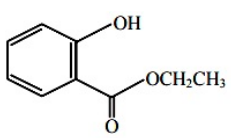
Here Y is $-\underset{\underset{O}{\|}}{C} - H$ Aldehyde

Question82

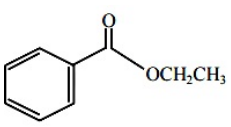
Which one of the following compounds will give orange precipitate when treated with 2,4-dinitrophenyl hydrazine ?
[27 Jul 2021 Shift 1]

Options:

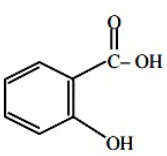
A.



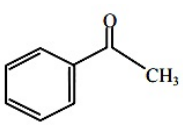
B.



C.

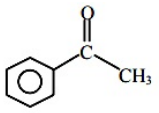


D.



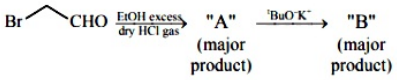
Answer: D

Solution:



Explanation ⇒ 2-4-D.N.P test is used for carbonyl compound (aldehyde & ketone)

Question83

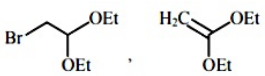


[where Et ⇒ $-C_2H_5$ $^tBu \Rightarrow (CH_3)_3C-$]

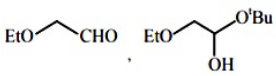
Consider the above reaction sequence, Product "A" and Product "B" formed respectively are : [25 Jul 2021 Shift 2]

Options:

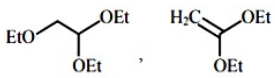
A.



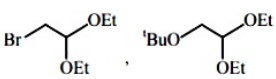
B.



C.



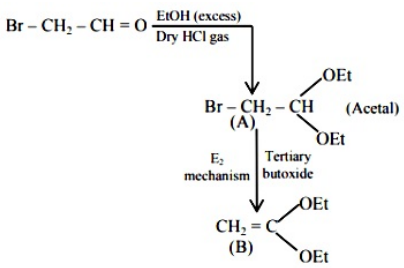
D.



Answer: A

Solution:

Solution:



Question84

A reaction of benzonitrile with one equivalent CH_3MgBr followed by hydrolysis produces a yellow liquid "P". The compound "P" will give positive____. [25 Jul 2021 Shift 2]

Options:

A. Iodoform test

B. Schiff's test

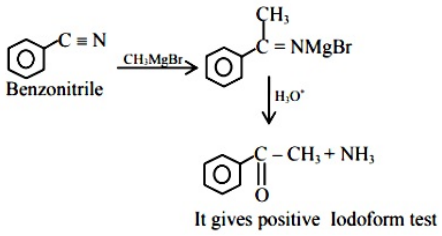
C. Ninhydrin's test

D. Tollen's test

Answer: A

Solution:

Solution:



Question85

An organic compound 'A' C_4H_8 on treatment with $KMnO_4 / H^+$ yields compound ' B′C_3H_6O. Compound 'A' also yields compound 'B' an ozonolysis. Compound 'A' is :
[25 Jul 2021 Shift 1]

Options:

A. 2–Methylpropene

B. 1–Methylcyclopropane

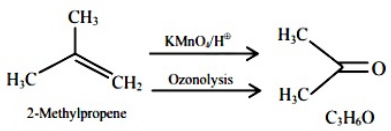
C. But–2–ene

D. Cyclobutane

Answer: A

Solution:

Solution:

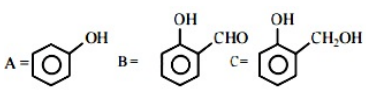


Question86

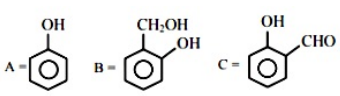
An organic compound A(C_6H_6O) gives dark green colouration with ferric chloride. On treatment with $CHCl_3$ and KOH, followed by acidification gives compound B. Compound B can also be obtained from compound C on reaction with pyridinium chlorochromate (PCC). Identify A, B and C .
[22 Jul 2021 Shift 2]

Options:

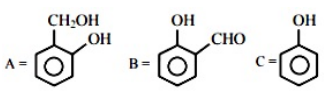
A.



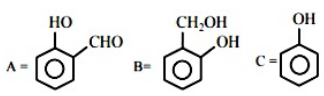
B.



C.

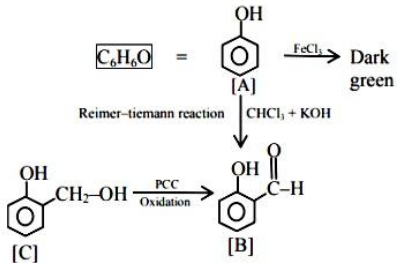


D.



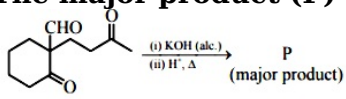
Answer: A

Solution:



Question87

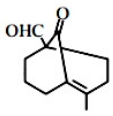
The major product (P) in the following reaction is :



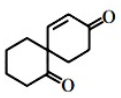
[20 Jul 2021 Shift 2]

Options:

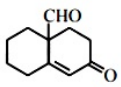
A.



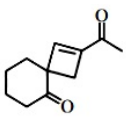
B.



C.

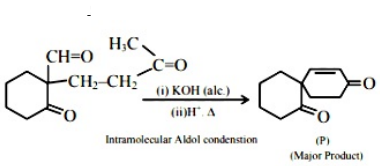


D.

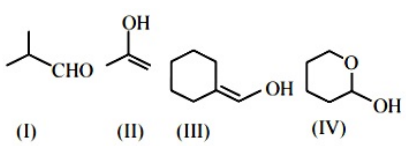


Answer: B

Solution:



Question88



Which among the above compound/s does/do not form Silver mirror when treated with Tollen's reagent?
[20 Jul 2021 Shift 1]

Options:

A. (I), (III) and (IV) only

B. Only (IV)

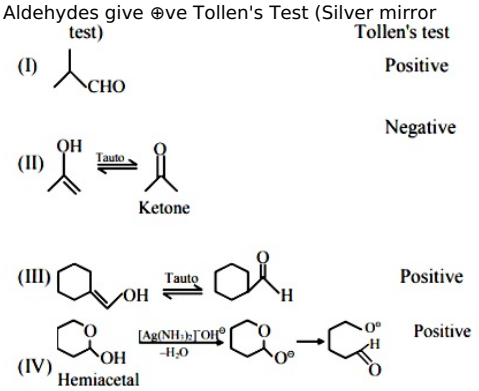
C. Only (II)

D. (III) and (IV) only

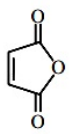
Answer: C

Solution:

Solution:
Aldehydes give ⊕ve Tollen's Test (Silver mirror test)



Question89



Maleic anhydride
Maleic anhydride can be prepared by :
[25 Jul 2021 Shift 2]

Options:

A. Heating trans-but-2-enedioic acid

B. Heating cis-but-2-enedioic acid

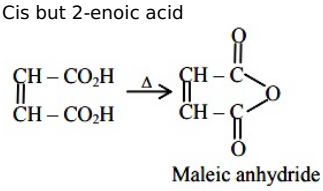
C. Treating cis-but-2-enedioic acid with alcoholand acid

D. Treating trans-but-2-enedioic acid with alcoholand acid

Answer: B

Solution:

Solution:
Cis but 2-enoic acid



Question90

Which one of the following compounds will liberate CO_2, when treated with $NaHCO_3$?
[25 Jul 2021 Shift 1]

Options:

A. $(CH_3)_3\overset{\oplus}{N}H\,C\overset{\ominus}{l}$

B. $(CH_3)_4\overset{\oplus}{N}\overset{\ominus}{O}H$

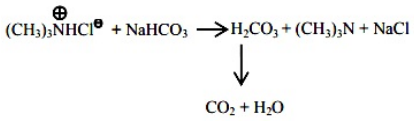
C. $CH_3-\overset{O}{\overset{\|}{C}}-NH_2$

D. CH_3NH_2

Answer: A

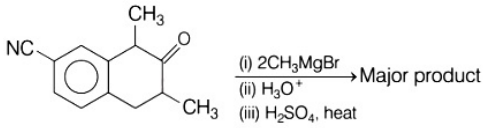
Solution:

Solution:



Question91

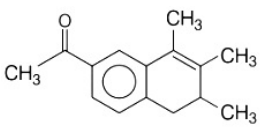
Which one of the following is the major product of the given reaction?



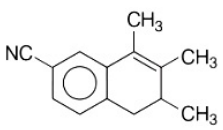
[27 Aug 2021 Shift 2]

Options:

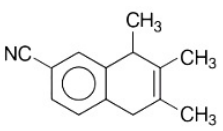
A.



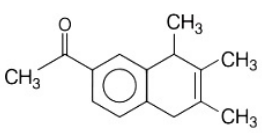
B.



C.



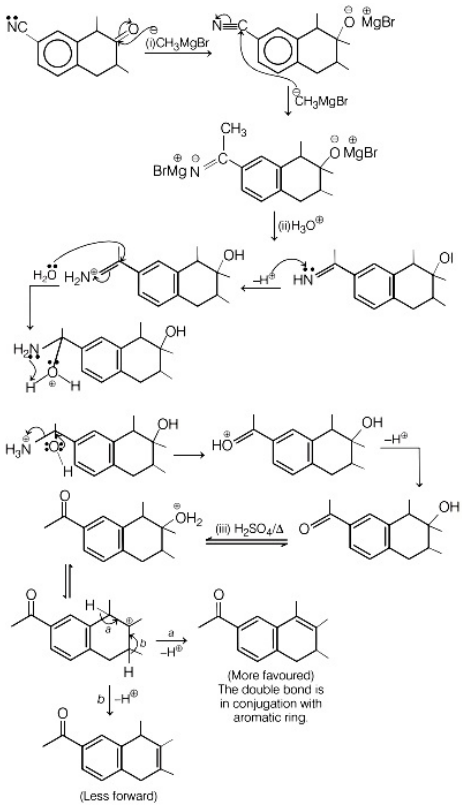
D.



Answer: A

Solution:

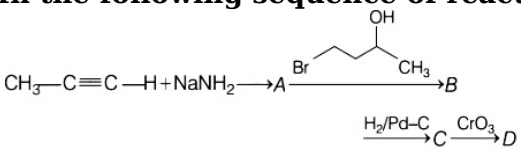
Solution:
The reaction of keto and cyanide group with Grignard reagent and further hydrolysis gives alcohol and keto group respectively. On further heating with H_2SO_4 at $-OH$ group is eliminated resulting in formation of alkene.



Therefore, option(a) is correct.

Question92

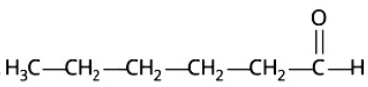
In the following sequence of reactions, the final product D is



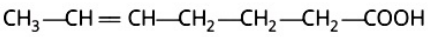
[27 Aug 2021 Shift 1]

Options:

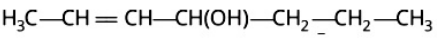
A.



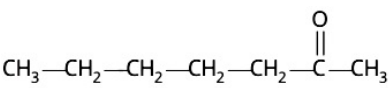
B.



C.



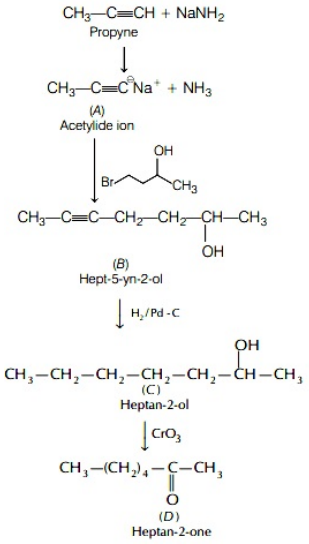
D.



Answer: D

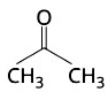
Solution:

Solution:
$NaNH_2$ is a strong base that causes deprotonation of propyne and forms acetylide ion (A) which further combines with the carbon chain and forms hept - 5 - yn - 2 - ol (B) that undergoes reduction in presence of H_2 / Pd − C and forms heptan-2-ol(C). Being a secondary alcohol (C), oxidises in presence of CrO_3 to give corresponding ketone i.e. heptan-2-one (D).
The complete reaction take place as follows.



Question93

Match List-I with List-II.

List-I(Chemical reaction)	**List-II**(Reagent used)
A. $CH_3COOC_2H_5 \rightarrow C_2H_5OH$	1. CH_3MgBr/H_3O^+(1.equivalent)
B. $CH_3COOCH_3 \rightarrow CH_3CHO$	2. H_2SO_4/H_2O
C. $CH_3C \equiv N \rightarrow CH_3CHO$	3. $DIBAL-H/H_2O$
D. $CH_3C \equiv N \longrightarrow$ 	4. $SnCl_2$, HCl/H_2O

Choose the most appropriate option given below. [26 Aug 2021 Shift 2]

Options:

A. A-2 B-4 C-3 D-1

B. A-4 B-2 C-3 D-1

C. A-2 B-3 C-4 D-1

D. A-3 B-2 C-1 D-4

Answer: C

Solution:

Solution:
(A) This reaction is reverse of esterification. As it takes place in presence of acid and the ester molecule gets hydrolysed, the reaction is called as acidic hydrolysis of ester (hydrolysis is breaking of molecule in presence of water). Acidic hydrolysis is reversible reacton, hence does not go to completion.

$$\underset{\text{Ester}}{CH_3COOC_2H_5} \xrightarrow[H_2O]{H_2SO_4} \underset{\text{Alchohol}}{C_2H_5OH}$$

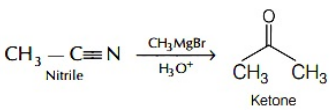
(B) Diisobutylaluminium hydride (DIBAL-H) is a reducing agent, which reduces ester to aldehyde.

$$\underset{\text{Ester}}{CH_3COOH_3} \xrightarrow[H_2O]{DIBAL-H} \underset{\text{Aldehyde}}{CH_3CHO}$$

(C) This reaction is called Stephen aldehyde synthesis which involves preparation of aldehyde from nitrile using $SnCl_2$, HCl and quenching of resulting iminium salt ($[R-CH=NH_2]^+Cl^-$)with H_2O.

$$\underset{\text{Nitrile}}{CH_3C \equiv N} \xrightarrow[HCl/H_2O]{SnCl_2} \underset{\text{Aldehyde}}{CH_3CHO}$$

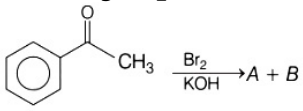
(D) Grignard reagent (CH_3MgBr) attack electrophilic carbon in the nitrile to form imine salt, this salt then gets hydrolysed to form a ketone.



Thus, the correct match is (c) A → 2, B → 3, C → 4, D → 1.

Question94

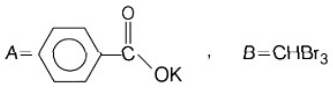
The major products formed in the following reaction sequence A and B are



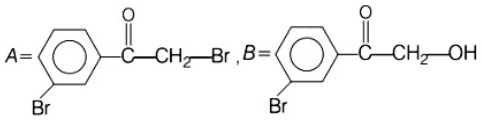
[26 Aug 2021 Shift 1]

Options:

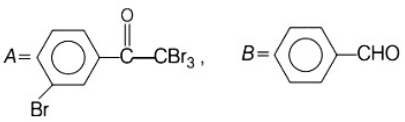
A.



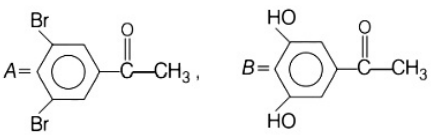
B.



C.



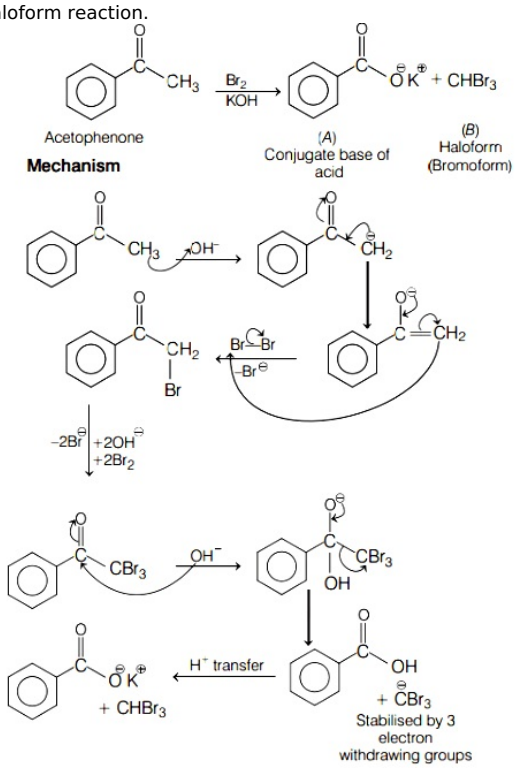
D.



Answer: A

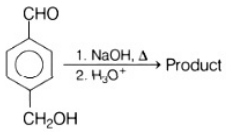
Solution:

Solution:
Acetophenone is a methyl ketone which on reaction with Br_2 and KOH will give conjugate base of an acid and methyl group will turn into haloform. This reaction is haloform reaction.



Question95

For the reaction given below.



The compound which is not formed as a product in the reaction is a
[31 Aug 2021 Shift 2]

Options:

A. compound with both alcohol and acid functional groups

B. monocarboxylic acid

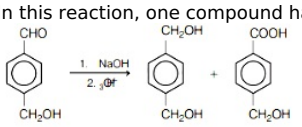
C. dicarboxylic acid

D. diol

Answer: C

Solution:

In this reaction, one compound having alcohol and acid functional group and another one having two alcohol groups are formed.



∴ Dicarboxylic acid not formed as a product.

Question96

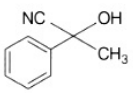
The structure of product C, formed by the following sequence of reactions is

$$CH_3COOH + SOCl_2 \longrightarrow A \xrightarrow[AlCl_3]{\text{Benzene}} B \xrightarrow[-OH]{KCN} C$$

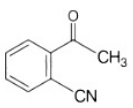
[31 Aug 2021 Shift 1]

Options:

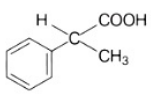
A.



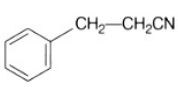
B.



C.



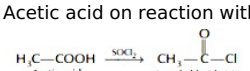
D.



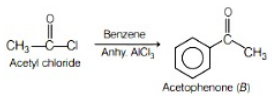
Answer: A

Solution:

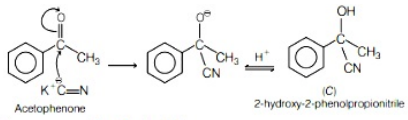
Acetic acid on reaction with $SOCl_2$ gives acetyl chloride (A).



Acetyl chloride undergoes Friedel-Craft acylation in presence of anhyd. $AlCl_3$ and benzene to form acetophenone (B).



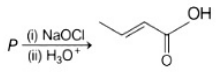
Acetophenone reacts with KCN to give (C) the final product, i.e. 2-hydroxy-2-phenolpropionitrile.



Hence, correct option is (a).

Question97

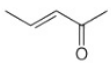
The structure of the starting compound P used in the reaction given below is



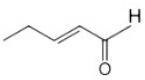
[27 Aug 2021 Shift 1]

Options:

A.



B.



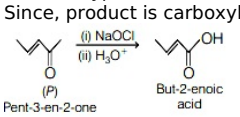
C.

D.

Answer: A

Solution:

Sodium hypochlorite (NaOCl) is a strong oxidising agent that will convert ketone to carboxylic acid.
Since, product is carboxylic acid, therefore reactant (P) would be ketone.



Question98

The correct sequential addition of reagents in the preparation of 3 - nitrobenzoic acid from benzene is
[26 Aug 2021 Shift 1]

Options:

A.

Br_2 / $AlBr_3$, HNO_3 / H_2SO_4, Mg / ether, CO_2, H_3O^+

B.

Br_2 / $AlBr_3$, NaCN, H_3O^+, HNO_3 / H_2SO_4

C.

Br_2 / $AlBr_3$, HNO_3 / H_2SO_4, NaCN, H_3O^+

D.

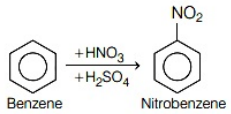
HNO_3 / H_2SO_4, Br_2 / $AlBr_3$, Mg / ether, CO_2, H_3O^+

Answer: D

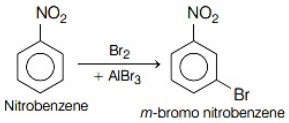
Solution:

The preparation of 3-nitrobenzoic acid from benzene is as follows

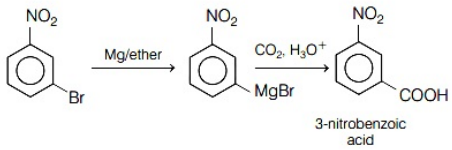
- Nitration of benzene



- Electrophilic substitution of nitrobenzene

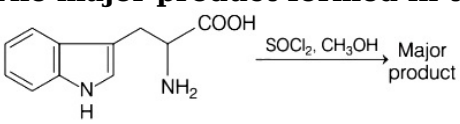


- m - bromo nitrobenzene is converted to 3-nitrobenzoic acid.



Question99

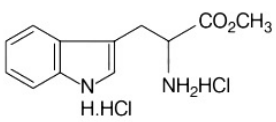
The major product formed in the following reaction is



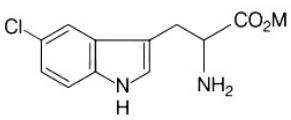
[26 Aug 2021 Shift 1]

Options:

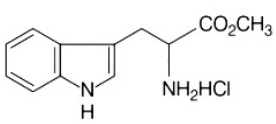
A.



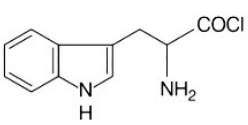
B.



C.



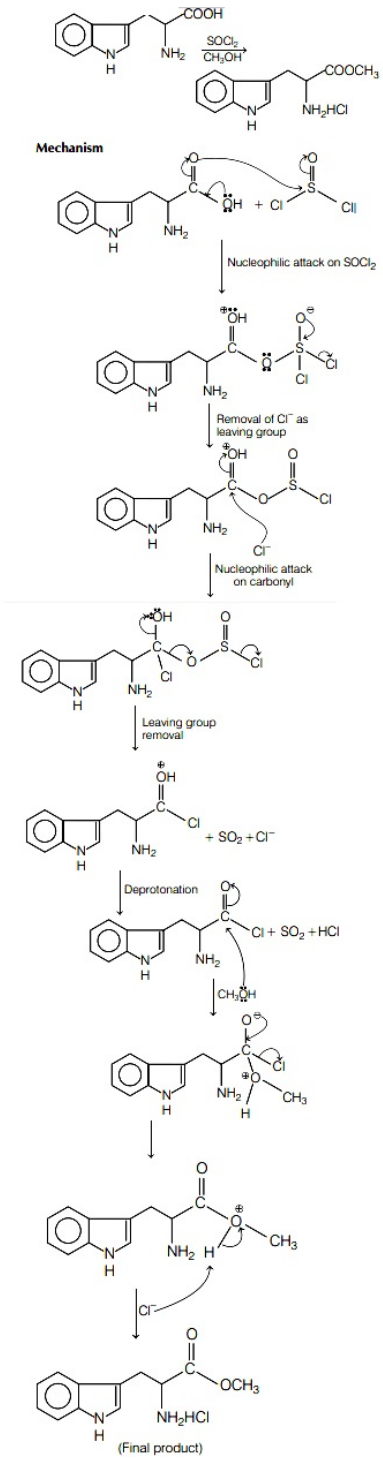
D.



Answer: C

Solution:

Esterification of carboxylic group ($-COOH$) take place in presence of $SOCl_2$ and CH_3OH as follows



Question100

Given below are two statements.
Statement I The nucleophilic addition of sodium hydrogen sulphite to an aldehyde or a ketone involves proton transfer to form a stable ion.
Statement II The nucleophilic addition of hydrogen cyanide to an aldehyde or a ketone yields amine as final product.
In the light of the above statements, choose the most appropriate answer from the options given below.
[1 Sep 2021 Shift 2]

Options:

A. Both statement I and statement II are true

B. Statement I is false but statement II is true.

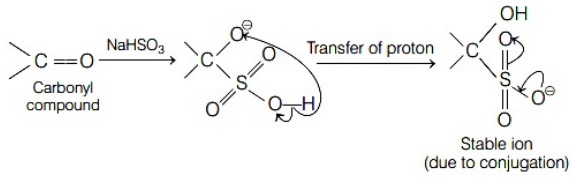
C. Statement I is true but statement II is false.

D. Both statement I and statement II are false.

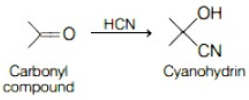
Answer: C

Solution:

Nucleophilic addition of sodium hydrogen sulphite ($NaHSO_3$) tocarbonyl compound (aldehyde or ketone) involves proton transfer to form a stable ion.



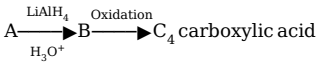
Hence, statement I is true.
Nucleophilic addition of HCN (hydrogen cyanide) to an aldehyde/ketone yield cyanohydrin as final product.



Hence, statement II is false.

Question101

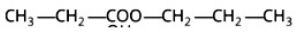
In the following sequence of reactions a compound A, (molecular formula $C_6H_{12}O_2$) with a straight chain structure gives a C_4 carboxylic acid. A is



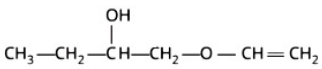
[1 Sep 2021 Shift 2]

Options:

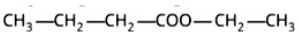
A.



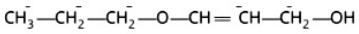
B.



C.



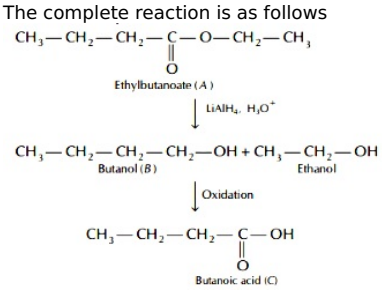
D.



Answer: C

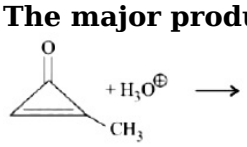
Solution:

Ethylbutanoate on reduction with $LiAlH_4$ and hydrolysis gives butanol and ethanol. Butanol on further oxidation gives butanoic acid which has four carbon atoms.
The complete reaction is as follows



Question102

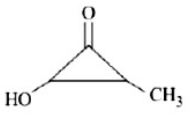
The major product in the following reaction is:



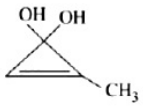
[Jan. 08, 2020 (II)]

Options:

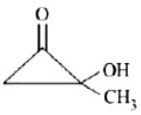
A.



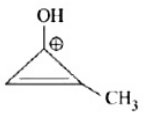
B.



C.

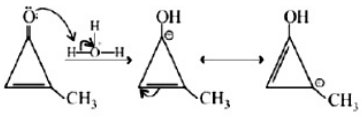


D.



Answer: D

Solution:



Question103

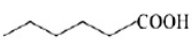
What is the product of following reaction?

Hex-3-ynal $\xrightarrow[(ii)PBr_3,\ (iii)Mg\ /\ ether,\ (iv)CO_2\ /\ H_3O^+]{(i)NaBH_4}$ **?**

[Jan. 07, 2020 (I)]

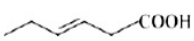
Options:

A.



B.

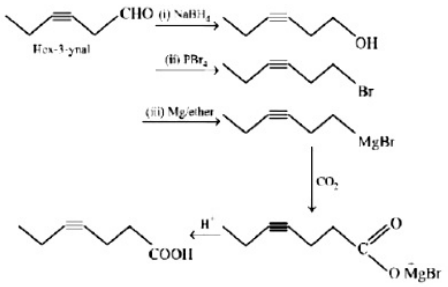
C.



D.

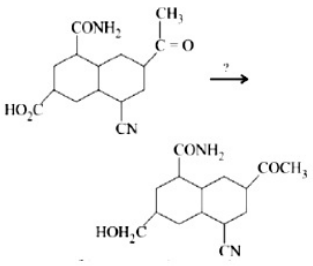
Answer: D

Solution:



Question104

The most suitable reagent for the given conversion is:



[Jan. 08, 2020 (I)]

Options:

A. B_2H_6

B. $NaBH_4$

C. $\underset{4}{Lt}$

D. H_2 / Pd

Answer: A

Solution:

B_2H_6 is a very selective reducing agent and usually used to reduce acid to alcohol.

Question105

An unsaturated hydrocarbon X absorbs two hydrogen molecules on catalytic hydrogenation, and also gives following reaction:

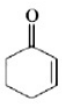
$$X \xrightarrow[Zn H_2O]{O_3} A \xrightarrow{[Ag(NH_3)_2]^+}$$

B (3-oxo-hexanedicarboxylic acid) X will be:
[Jan. 08, 2020 (II)]

Options:

A.

B.

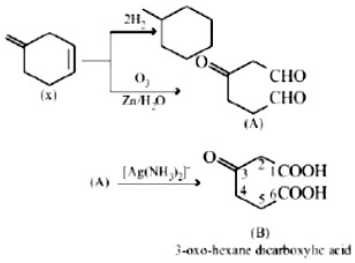


C.

D.

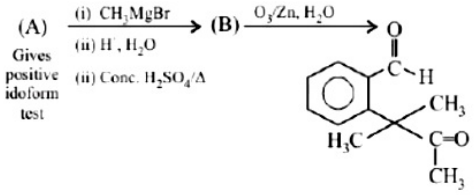
Answer: C

Solution:



Question106

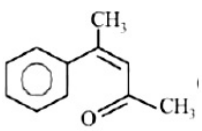
Identify (A) in the following reaction sequence:



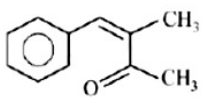
[Jan. 09, 2020 (I)]

Options:

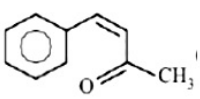
A.



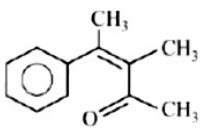
B.



C.

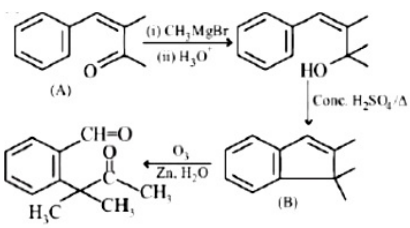


D.



Answer: B

Solution:



Question107

Consider the following reactions

$A \xrightarrow[(ii)H_3O^+]{(i)CH_2M\,gBr} B \xrightarrow[573\ K]{Cu}$ 2 -methyl-2-butene

The mass percentage of carbon in A is _____.
[NV, Jan. 09, 2020 (II)]

Answer: 66.67

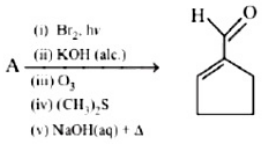
Solution:

$$CH_3-\underset{A}{\overset{O}{\overset{\|}{C}}}-CH_2CH_3 \xrightarrow{CH_3M\,gBr} CH_3-\underset{CH_3}{\overset{O}{\overset{|}{C}}}-CH_2CH_3 \xrightarrow{H_3O^+} CH_3-\underset{CH_3}{\overset{OH}{\overset{|}{C}}}-CH_2-CH_3 \xrightarrow[573K]{CU} CH_3-\underset{\underset{2-methyl-2-butene}{CH_3}}{\overset{|}{C}}=CH-CH_3$$

Compound A is $CH_3-\overset{O}{\overset{\|}{C}}-CH_2-CH_3 (C_4H_8O)$
Mass percentage of carbon
$= \left(\frac{12\times 4}{48+16+8}\times 100\right) = 66.67$

Question108

In the following reaction A is:



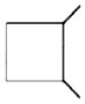
[Jan .09,2020(II)]

Options:

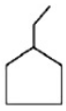
A.

B.

C.

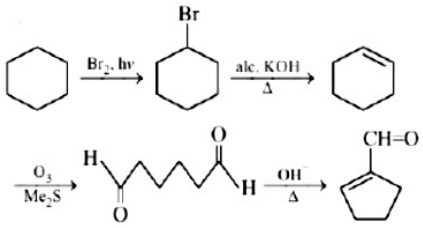


D.



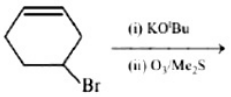
Answer: A

Solution:



Question109

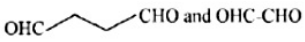
The major product(s) obtained in the following reaction



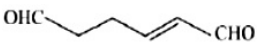
[April .12,2020(I)]

Options:

A.

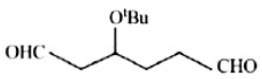


B.



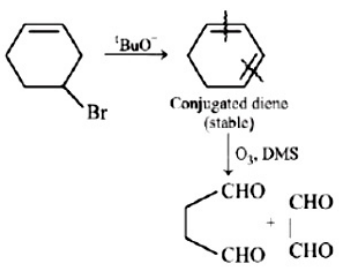
C.

D.



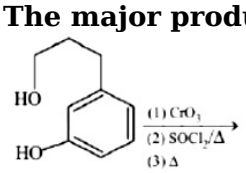
Answer: A

Solution:



Question110

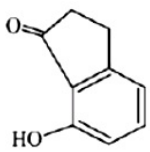
The major product of the following reaction is:



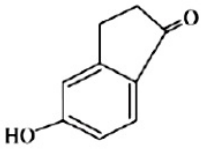
[April .12,2020(I)]

Options:

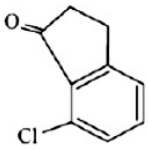
A.



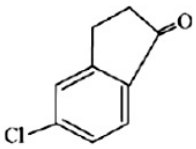
B.



C.

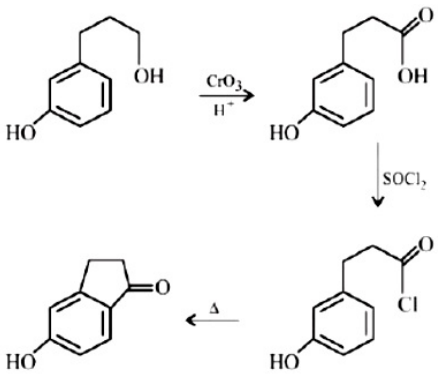


D.



Answer: B

Solution:

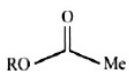


Question111

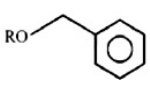
Which of the following derivatives of alcohols is unstable in an aqueous base? [Sep. 05,2020 (I)]

Options:

A.



B.



C.

D. RO − CM e_3

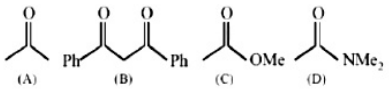
Answer: A

Solution:

Esters are hydrolysed in basic medium (saponification), so it is unstable in aqueous base.

Question112

The increasing order of the acidity of the α -hydrogen of the following compounds is:



[Sep. 05,2020 (I)]

Options:

A. (D) < (C) < (A) < (B)

B. (B) < (C) < (A) < (D)

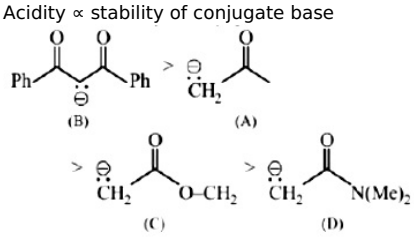
C. (A) < (C) < (D) < (B)

D. (C) < (A) < (B) < (D)

Answer: A

Solution:

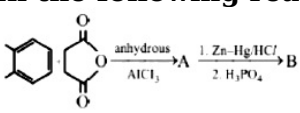
Solution:
Acidity ∝ stability of conjugate base



Thus increasing order of acidity is D < C < A < B.

Question113

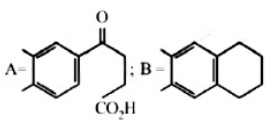
In the following reaction sequence the major products A and B are:



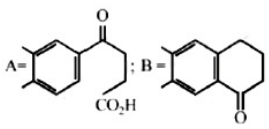
[Sep. 05,2020 (I)]

Options:

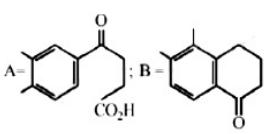
A.



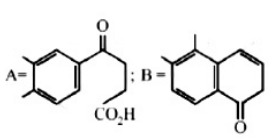
B.



C.



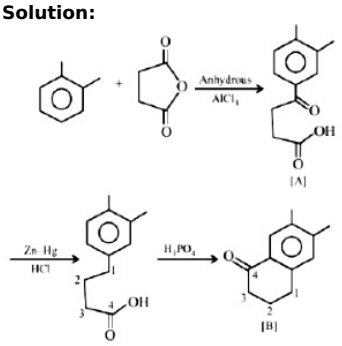
D.



Answer: B

Solution:

Solution:

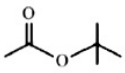


Question114

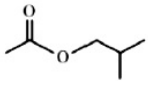
An organic compound (A) (molecular formula $C_6H_{12}O_2$) was hydrolysed with dil. H_2SO_4 to give a carboxylic acid (B) and an alochol (C). 'C' gives white turbidity immediately when treated with anhydrous $ZnCl_2$ and conc. HCl. The organic compound (A) is :
[Sep. 04, 2020 (I)]

Options:

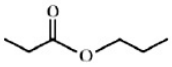
A.



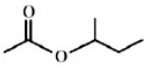
B.



C.

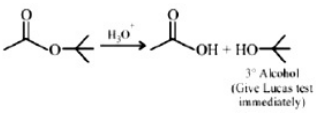


D.



Answer: A

Solution:

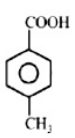


Question115

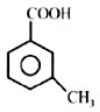
[P] on treatment with Br_2 / FeBr$_3$ in CCl_4 produced a single isomer $C_8H_7O_2Br$ while heating [P] with sodalime gave toluene. The compound [P] is:
[Sep. 04, 2020 (I)]

Options:

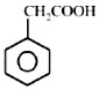
A.



B.



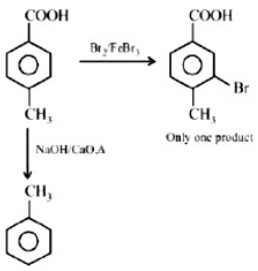
C.



D.

Answer: A

Solution:



Question116

An organic compound [A], molecular formula $C_{10}H_{20}O_2$ was hydrolyzed with dilute sulphuric acid to give a carboxylic acid [B] and an alcohol [C]. Oxidation of [C] with $CrO_3 - H_2SO_4$ produced [B]. Which of the following structures are not possible for [A]?
[Sep. 03,2020 (I)]

Options:

A. $CH_3 - CH_2 - \underset{CH_3}{\overset{}{CH}} - OCOCH_2\overset{CH_3}{\underset{}{CH}} - CH_2CH_3$

B. $CH_3 - CH_2 - \underset{CH_3}{\overset{}{CH}} - COOCH_2 - \overset{CH_3}{\underset{}{CH}} - CH_2CH_3$

C. $CH_3CH_2CH_2COOCH_2CH_2CH_2CH_3$

D. $(CH_3)_3 - C - COOCH_2C(CH_3)_3$

Answer: A

Solution:

$$CH_3 - CH_2 - \underset{CH_3}{\overset{}{CH}} - OCOCH_2 - \underset{(A)}{\overset{CH_3}{\underset{}{CH}}} - CH_2CH_3 \xrightarrow{H_2SO_4(dil.)} CH_3 - CH_2 - \underset{CH_3}{\underset{(C)}{CH}} - OH + HOOC - CH_2 - \underset{(B)}{\overset{CH_3}{\underset{}{CH}}} - CH_2 - CH_3 \xrightarrow{CrO_3/H^+} CH_3 - CH_2 - \underset{CH_3}{\overset{}{C}} = O$$

Question117

Consider the following molecules and statements related to them :
(1) (B) is more likely to be crystalline than (A)
(2) (B) has higher boiling point than (A)
(3) (B) dissolves more readily than (A) in water
Identify the correct option from below:
[Sep. 03,2020 (II)]

Options:

A. (1) and (2) are true

B. (1) and (3) are true

C. only (1) is true

D. (2) and (3) are true

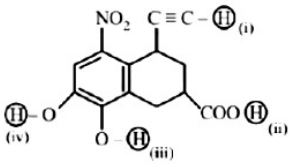
Answer: 0

Solution:

Solution:
(a, b, d) Molecule (A) shows intramolecular H -bonding while molecule (B) shows intermolecular H-bonding. Due to presence of intermolecular H-bonding it has more b. pt. than molecule (A). Molecule (B) also shows intermolecule H − bonding with water which makes it more soluble than A. (B) is crystalline solid while (A) is liquid at room tempertature because of weaker intramolecular hydrogen bonding.

Question118

Arrange the following labelled hydrogens in decreasing order of acidity:



[Sep. 02, 2020 (II)]

Options:

A. (ii) > (i) > (iii) > (iv)

B. (iii) >(ii) > (iv) > (i)

C. (ii) > (iii) > (iv) > (i)

D. (iii) >(ii) > (i) > (iv)

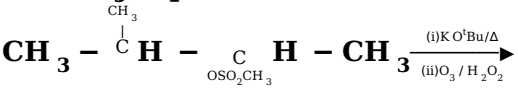
Answer: C

Solution:

Solution:
Acidic strength ∝ Stability of conjugate base General order of acidic strength is
$R-COOH > Ph-OH > R-C\equiv CH$
In between (iii) and (iv), (iii) is more acidic due to $-M$ effect of $-NO_2$
Thus, decreasing order of acidity is (ii) >(iii) > (iv) > (i)

Question119

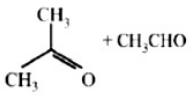
The major products of the following reaction are:



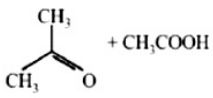
[Sep .06,2020(I)]

Options:

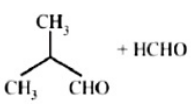
A.



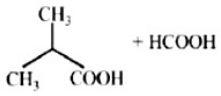
B.



C.

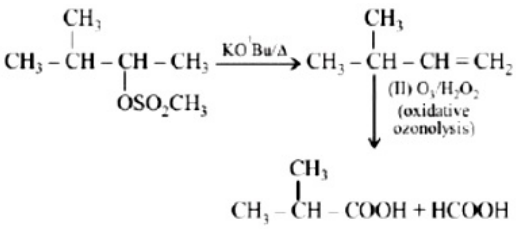


D.



Answer: B

Solution:



Question120

The correct match between Item - I (starting material) and Item - II (reagent) for the preparation of benzaldehyde is:

Item - I	Item - II
(I) Benzene	(P) HCl and $SnCl_2$, H_3O^-
(II) Benzonitrilequinoline	(Q) H_2, Pd – $BaSO_4$, S and
(III) Benzoyl Chloride	(R) CO, HCl and $AlCl_3$

[Sep. 06, 2020 (U)I]

Options:

A. (I) – (Q), (II) – (R) and (III) – (P)

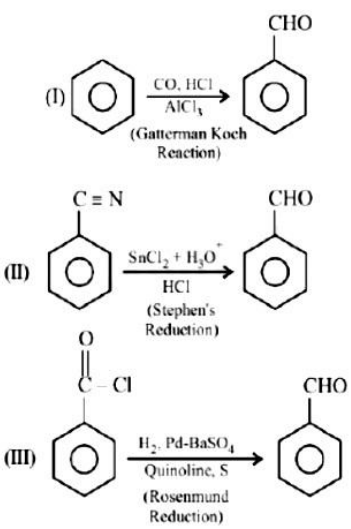
B. (I) – (P), (II) – (Q) and (III) – (R)

C. (I) – (R), (II) – (P) and (III) – (Q)

D. (I) – (R), (II) – (Q) and (III) – (P)

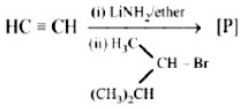
Answer: C

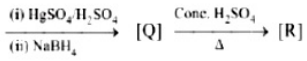
Solution:



Question121

The major product [R] in the following sequence of reactions is :

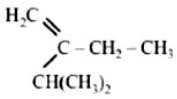




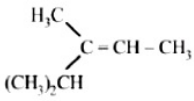
[Sep .04 ,2020(II)]

Options:

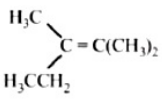
A.



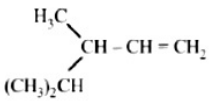
B.



C.

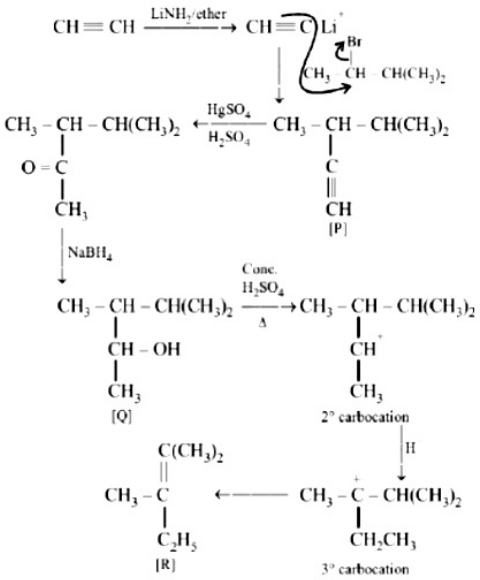


D.



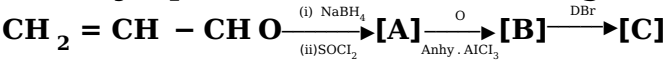
Answer: C

Solution:



Question122

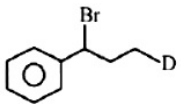
The major product [C] of the following reaction sequence will be:



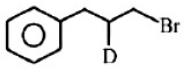
[Sep .04 ,2020(II)]

Options:

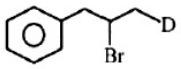
A.



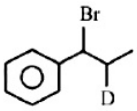
B.



C.

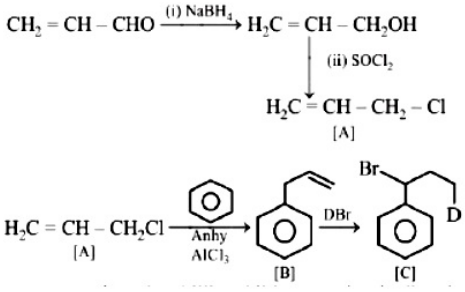


D.



Answer: C

Solution:



Question123

The increasing order of the reactivity of the following compounds in nucleophilic addition reaction is:
Propanal, Benzaldehyde, Propanone, Butanone
[Sep. 03 ,2020(II)]

Options:

A. Benzaldehyde < Butanone < Propanone < Propanal

B. Butanone < Propanone < Benzaldehyde < Propanal

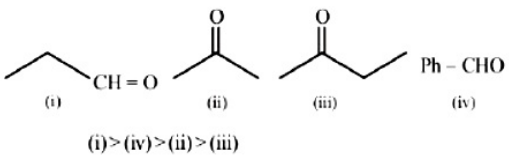
C. Propanal < Propanone < Butanone < Benzaldehyde

D. Benzaldehyde < Propanal < Propanone < Butanone

Answer: B

Solution:

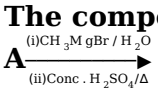
Solution:
Rate of Nucleophillic addition reaction is directly proportional to the $-I$ and $-M$ effect of the substituents present in the substrate. Ketones are less susceptible to the nucleophillic addition, due to the presence of alkyl (R) group which has + I effect. Thus reactivity order is

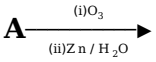


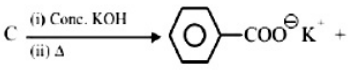
(i)>(iv)>(ii)>(iii)

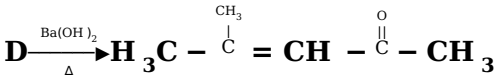
Question124

The compound A in the following reactions is :







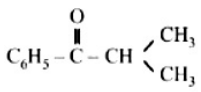


[Sep. 03, 2020 (II)]

Options:

A. $C_6H_5-\overset{O}{\overset{\|}{C}}-CH_3$

B.

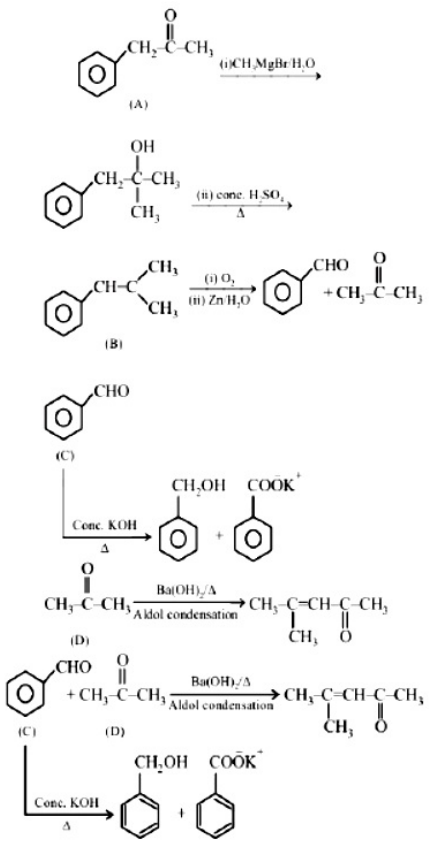


C. $C_6H_5-CH_2-\overset{O}{\overset{\|}{C}}-CH_3$

D. $C_6H_5-\overset{O}{\overset{\|}{C}}-CH_2CH_3$

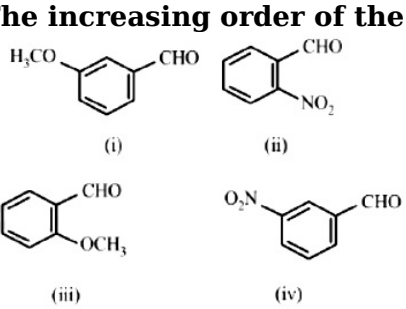
Answer: C

Solution:



Question125

The increasing order of the following compounds towards HCN addition is:



[Sep. 02, 2020 (I)]

Options:

A. (i) < (iii) < (iv) < (ii)

B. (iii) < (iv) < (i) < (ii)

C. (iii) < (i) < (iv) < (ii)

D. (iii) < (iv) < (ii) < (i)

Answer: C

Solution:

$-I$ effect of NO_2 increases reactivity towards nucleophilic addition reaction with HCN.- OCH_3 group is electron donating due to resonance effect which decreases the reactivity towards nucleophillic addition.

Question126

In the following reaction

Aldehyde+Alcohol $\xrightarrow{HCl}$ Acetal

Aldehyde Alcohol

HCHO ^{t}BuOH

CH_3CHO MeOH

The best combination is:

[Jan .12 ,2019(I)]

Options:

A. CH_3CHO and BuOH

B. HCHO and MeOH

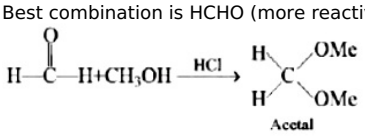
C. CH_3CHO and MeOH

D. HCHO and BuOH

Answer: B

Solution:

Best combination is HCHO (more reactive aldehyde) and MeOH (less sterically hindered alcohol).



Question127

The major product of the following reaction is:

$R-C\equiv N \xrightarrow[(ii)H_2O]{(i)AlH(i-Bu)_2}$

[Jan .09 ,2019(I)]

Options:

A. RCOOH

B. RCHO

C. RCH_2NH_2

D. RCONH$_2$

Answer: C

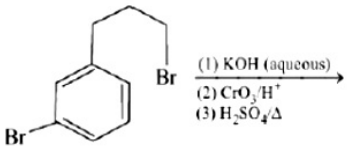
Solution:

$$R-C\equiv N \xrightarrow[(ii)H_2O]{(i)\ AlH(i-Bu)_2} R-CHO$$

The reduction of nitriles to aldehydes can be done using DIBAL $-H$ [AI H (1 $-$ Bu)]

Question128

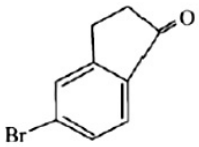
The major product of the following reaction is:



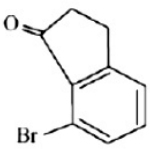
[Jan .09 ,2019(I)]

Options:

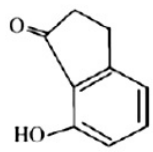
A.



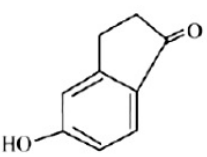
B.



C.



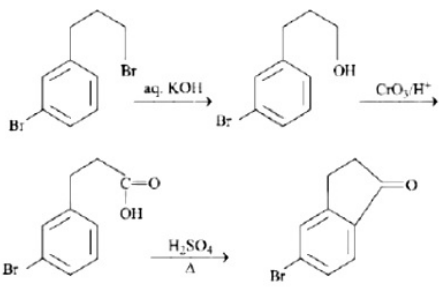
D.



Answer: A

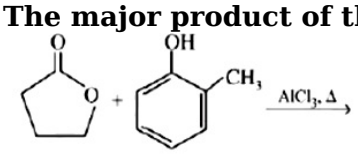
Solution:

For the given reaction condition, the major product is:



Question129

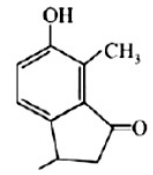
The major product of the following reaction is:



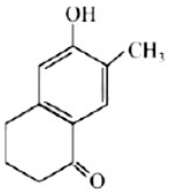
[Jan .09 ,2019(II)]

Options:

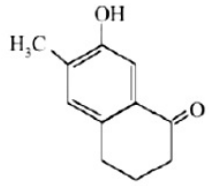
A.



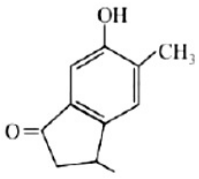
B.



C.



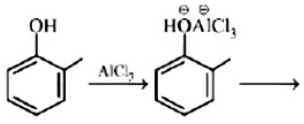
D.



Answer: C

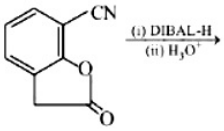
Solution:

Reaction involved:



Question130

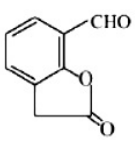
The major product of the following reaction is:



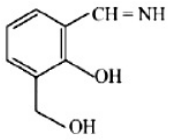
[Jan. 12, 2019 (I)]

Options:

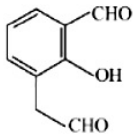
A.



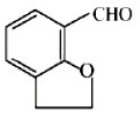
B.



C.



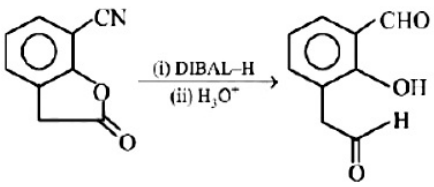
D.



Answer: C

Solution:

Dissobutyl aluminium hydride, commonly abbreviated as DIBAL-H is a reducing agent for some specific functional groups. It reduces $-C \equiv N$ to $-CH = NH$ (amines) which are easily hydrolysed to - CHO. It also reduces lactones to aldehydes.

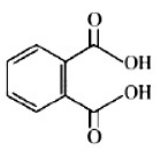


Question131

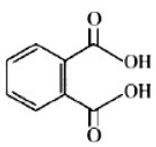
Among the following four aromatic compounds, which one will have the lowest melting point? [Jan. 12, 2019 (I)]

Options:

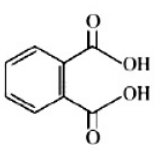
A.



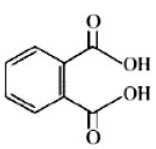
B.



C.



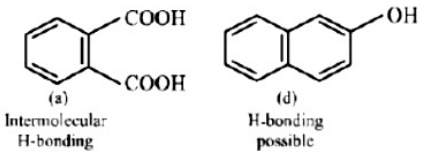
D.

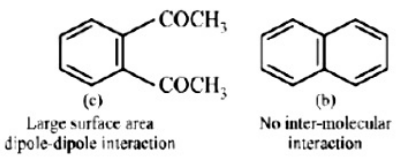


Answer: D

Solution:

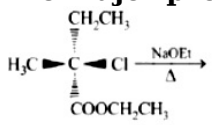
The force of attraction between the molecules affects the melting point of a compound. Polarity increases the intermolecular force of attraction and as a result increases the melting point.





Question132

The major product of the following reaction is:



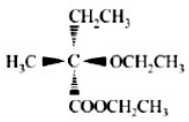
[Jan. 12, 2019 (II)]

Options:

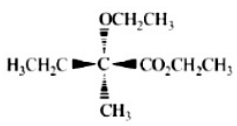
A. $CH_3CH_2\underset{\underset{CO_2CH_2CH_3}{|}}{C}=CH_2$

B. $CH_3-\underset{\underset{C}{|}}{\overset{CO_2CH_2CH_3}{|}}=CHCH_3$

C.



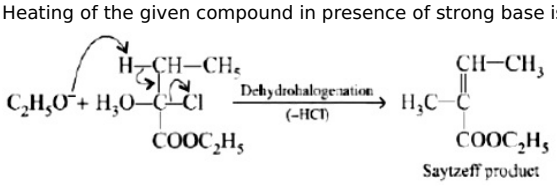
D.



Answer: B

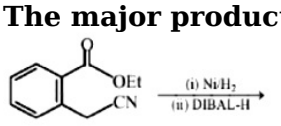
Solution:

Heating of the given compound in presence of strong base is favoured for elimination reaction resulting in more stable alkene.



Question133

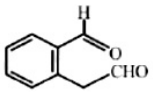
The major product of the following reaction is:



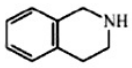
[Jan. 11, 2019 (I)]

Options:

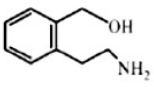
A.



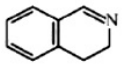
B.



C.

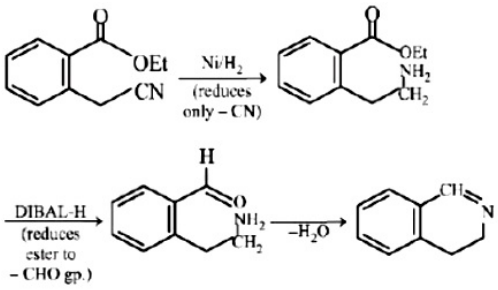


D.



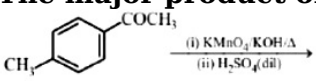
Answer: D

Solution:



Question134

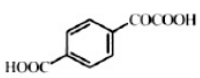
The major product of the following reaction is:



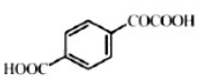
[Jan. 11, 2019 (I)]

Options:

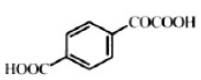
A.



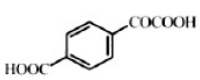
B.



C.



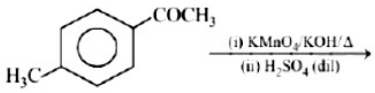
D.

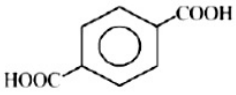


Answer: C

Solution:

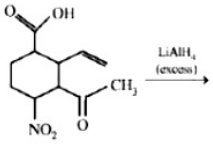
Solution:
Alkaline $KMnO_4$ is a strong oxidising agent and oxidises $-CH_3$ as well as $-CO$ group to $-COOH$.





Question135

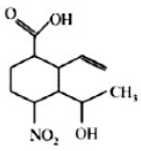
The major product obtained in the following reaction is:



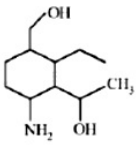
[Jan. 11, 2019 (II)]

Options:

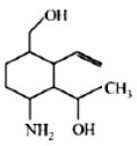
A.



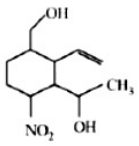
B.



C.



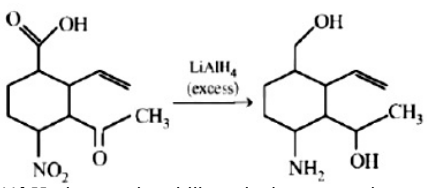
D.



Answer: C

Solution:

Solution:



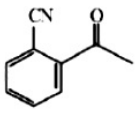
LiAl H_4 is a nucleophilic reducing agent, hence it will reduce $-COOH$ to CH_2OH, $-CO$ to $-CHOH$ and $-NO_2$ to NH_2 but does not reduce C = C linkage.

Question136

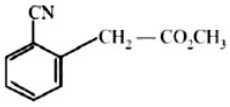
Which of the following compounds reacts with cthylmagnesium bromide and also decolourizes bromine water solution?
[Jan. 11, 2019 (II)]

Options:

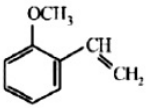
A.



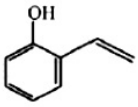
B.



C.



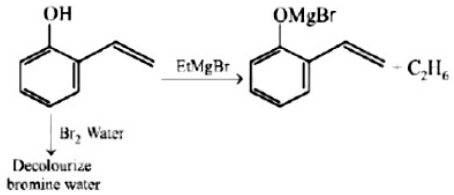
D.



Answer: D

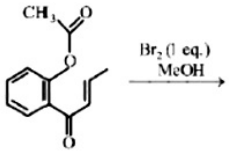
Solution:

Solution:



Question137

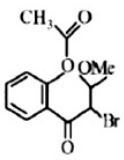
The major product obtained in the following conversion is:



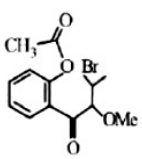
[Jan. 11, 2019 (II)]

Options:

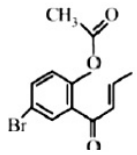
A.



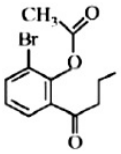
B.



C.



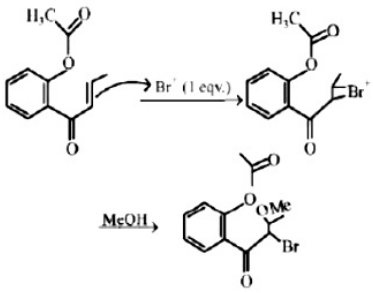
D.



Answer: A

Solution:

Solution:

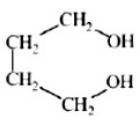


Question138

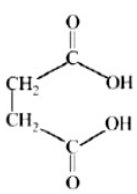
Which dicarboxylic acid in presence of a dehydrating agent is least reactive to give an anhydride?
[Jan. 10, 2019 (I)]

Options:

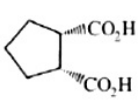
A.



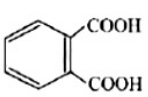
B.



C.



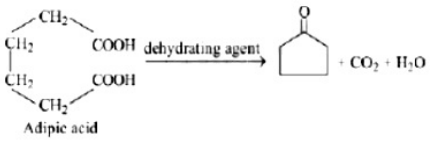
D.



Answer: A

Solution:

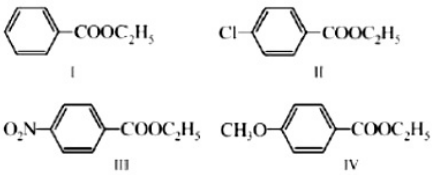
Solution:



Adipic acid does not form anhydride.

Question139

The decreasing order of ease of alkaline hydrolysis for the following esters is



[Jan. 10, 2019 (I)]

Options:

A. I I I > I I > I V > I

B. I I I > I I > I > I V

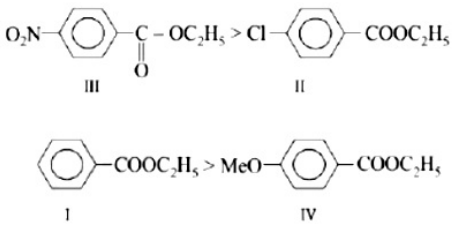
C. I V > I I > I I I > I

D. I I > I I I > I > I V

Answer: B

Solution:

Solution:
Rate of reaction ∝ Electrophillicity of carbonyl carbon, so E. W.G increases the rate, while E.R.G decreases the rate

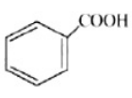


Question140

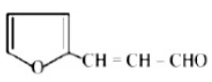
An aromatic compound 'A' having molecular formula $C_7H_6O_2$ on treating with aqueous ammonia and heating forms compound 'B'. The compound 'B' on reaction with molecular bromine and potassium hydroxide provides compound ' C ' having molecular formula C_6H_7N. The structure of 'A' is:
[Jan. 10, 2019 (II)]

Options:

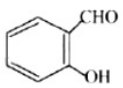
A.



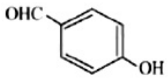
B.



C.



D.



Answer: A

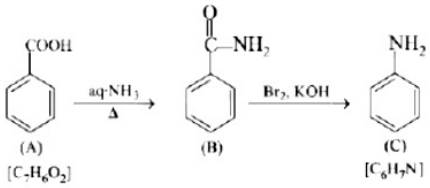
Solution:

Solution:

$$\underset{(C_7H_6O_2)}{A} \xrightarrow[(ii)\,heat]{(i)\,Aq.\,NH_3} B \xrightarrow{Br_2\,KOH} \underset{(C_6H_7N)}{C}$$

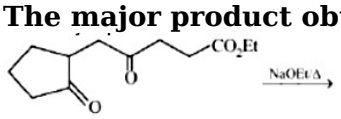
going backward, compound C is obtained from B by Br_2 and KOH (Hoffmann bromamide reaction), so B must be an amide ($-CONH_2$) and C an amine $-NH_2$ or $C_6H_5-NH_2$. Thus A should be benzoic acid, C_6H_5-COOH or $C_7H_6O_2$

Reaction involved:



Question141

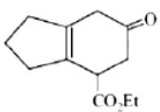
The major product obtained in the following reaction is:



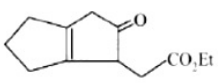
[Jan. 10, 2019 (II)]

Options:

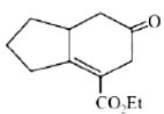
A.



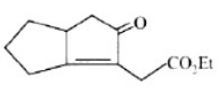
B.



C.



D.

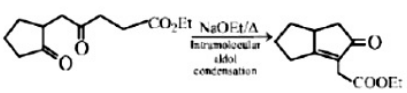


Answer: D

Solution:

Solution:

Reaction involved:



Question142

The correct decreasing order for acid strength is:
[Jan. 9, 2019 (I)]

Options:

A. $NO_2CH_2COOH > FCH_2COOH > CNCH_2COOH > ClCH_2COOH$

B. $FCH_2COOH > CNCH_2COOH > NO_2CH_2COOH > ClCH_2COOH$

C. $CNCH_2COOH > NO_2CH_2COOH > FCH_2COOH > ClCH_2COOH$

D. $NO_2CH_2COOH > CNCH_2COOH > FCH_2COOH > ClCH_2COOH$

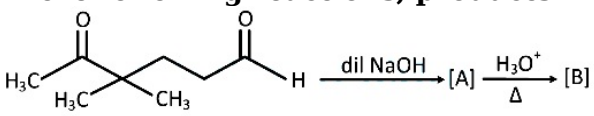
Answer: D

Solution:

Solution:
The acidic strength of a compound or an acid depends on the inductive effect $(-I)$. Higher the $(-I)$ effect of a substituent higher will be acidic strength. Now, the decreasing order of $(-I)$ effect of the given substituents is $NO_2 > CN > F > Cl$
$\therefore$ The correct decreasing order of acidic strength amongst the given carboxylic acids is:
$NO_2CH_2COOH > CNCH_2COOH > FCH_2COOH > ClCH_2COOH$

Question143

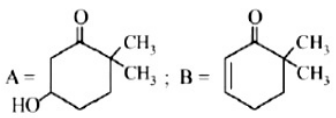
In the following reactions, products A and B are:



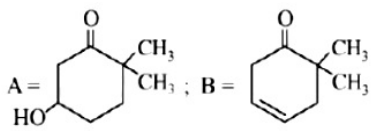
[Jan. 12, 2019 (I)]

Options:

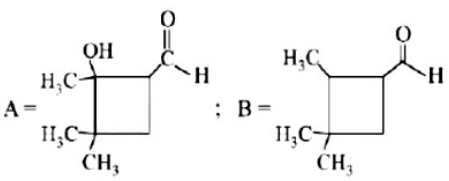
A.



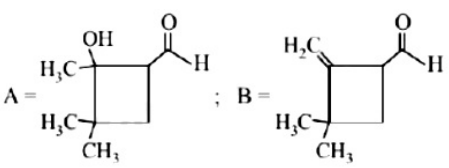
B.



C.

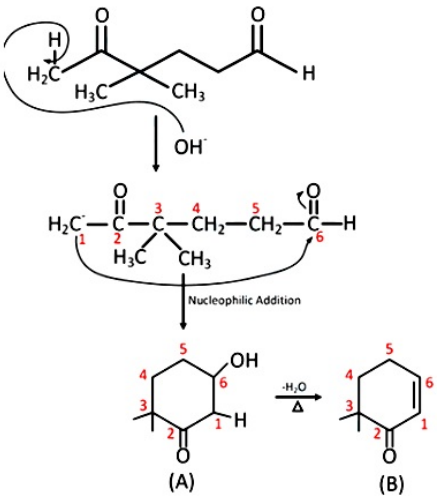


D.



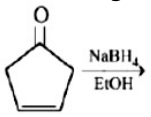
Answer: A

Solution:



Question144

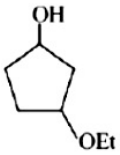
The major product of the following reaction is:



[Jan. 12, 2019 (II)]

Options:

A.



B.

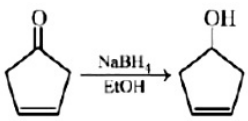
C.

D.

Answer: B

Solution:

Solution:



$NaBH_4$ does not reduce the double bond but can reduce keto group ($X = O$) into $-OH$ group.

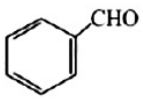
Question145

The aldehydes which will not form Grignard product with one equivalent Grignard reagents are:

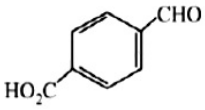
[Jan. 12, 2019 (II)]

Options:

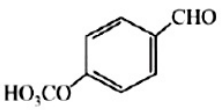
A.



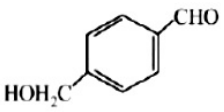
B.



C.



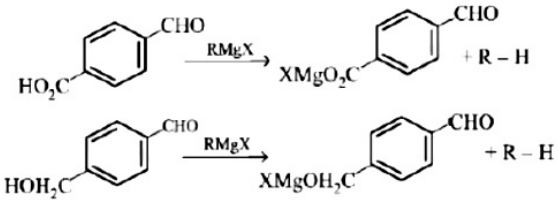
D.



Answer: A

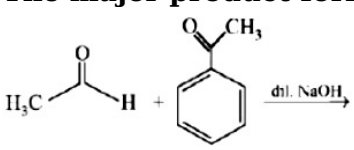
Solution:

Grignard reagent will not react with aldehydes if it has a functional group which contains acidic hydrogen. Thus options (B) and (D) have $-COOH$ and $-CH_2OH$ respectively which contain acidic H-atom. Therefore, acidbase reaction occurs.



Question146

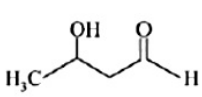
The major product formed in the following reaction is:



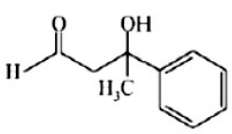
[Jan. 9, 2019 (II)]

Options:

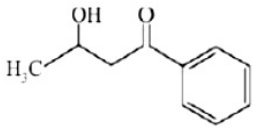
A.



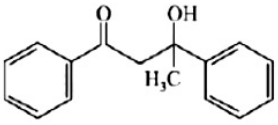
B.



C.



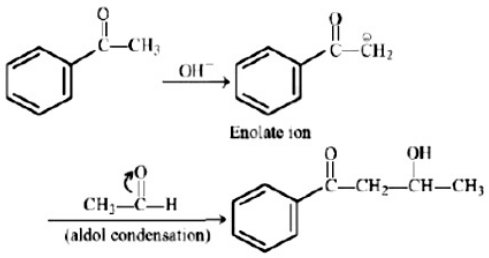
D.



Answer: C

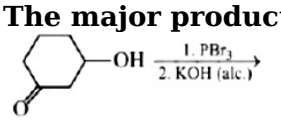
Solution:

Reaction mechanism involved:



Question147

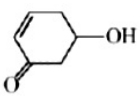
The major product of the following reaction is:



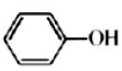
[April .09 ,2019(I)]

Options:

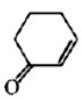
A.



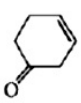
B.



C.

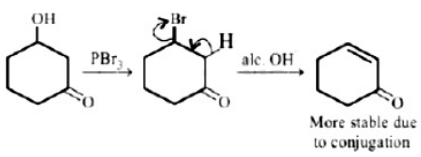


D.



Answer: C

Solution:



Question148

In the following reaction
Carbonyl compound +M eOH ⇌ H Cl ⇌ acetal
Rate of the reaction is the highest for:
[April .09 ,2019(II)]

Options:

A. Acetone as substrate and methanol in excess.

B. Propanal as substrate and methanol in stoichiometric amount.

C. Propanal as substrate and methanol in excess.

D. Acetone as substrate and methanol in stoichiometric amount.

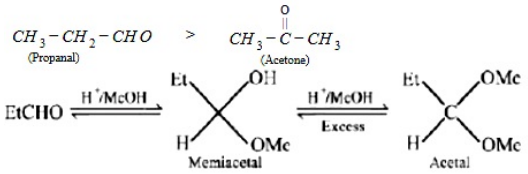
Answer: C

Solution:

Solution:

$CH_3-\underset{\text{(Acetone)}}{\overset{\overset{O}{\|}}{C}}-CH_3$ CH_3-CH_2-CHO (Propanal)

Generally, aldehydes are more reactive than ketones in nucleophilic addition reactions. ∴ Rate of reaction with alcohol to form acetal and ketal is



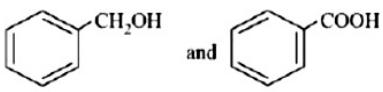
Question149

Major products of the following reaction are :

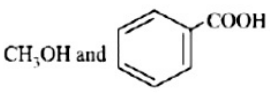
[April 10, 2019 (I)]

Options:

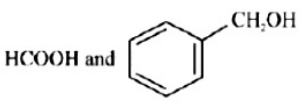
A.



B.



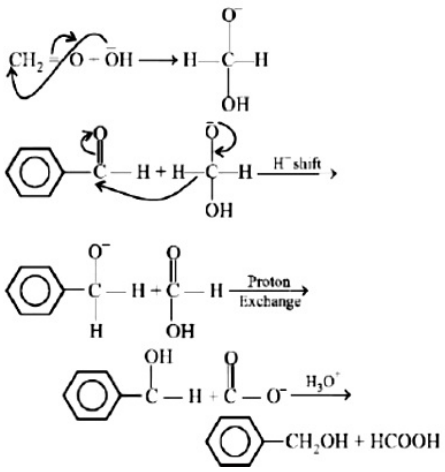
C.



D. CH_3OH and HCO_2H

Answer: C

Solution:

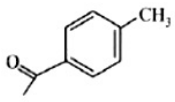


Question150

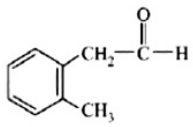
Compound A($C_9H_{10}O$) shows positive iodoform test. Oxidation of A with $KMnO_4$ / KOH gives acid B($C_8H_6O_4$). Anhydride of B is used for the preparation of phenolphthalein. Compound A is: [April 10, 2019 (II)]

Options:

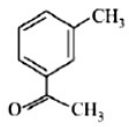
A.



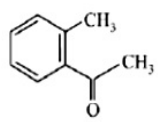
B.



C.



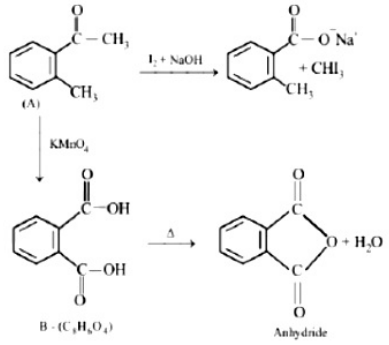
D.



Answer: D

Solution:

Solution:
(i) Since compound A($C_9H_{10}O$) contains relatively very low H as compared to C, so it must contain a benzene ring.
(ii) Further the oxidation product B($C_8H_6O_4$) of A is a dicarboxylic acid which forms anhydride on heating, hence the acid is phthalic acid which is further confirmed by the fact that it is used in the preparation of phenolphthalein when condensed with phenol in presence of conc. H_2SO_4 So the given compound A corresponds to option (4).

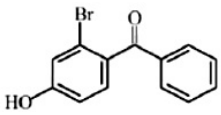


Question151

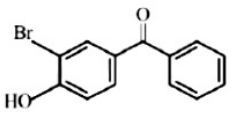
p-Hydroxy benzophenone upon reaction with bromine in carbon tetrachloride gives:
[April 9, 2019 (II)]

Options:

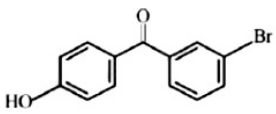
A.



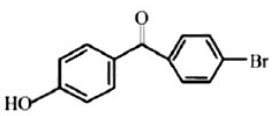
B.



C.

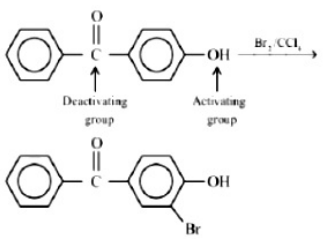


D.



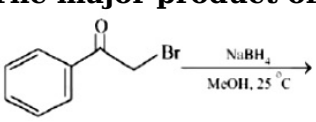
Answer: B

Solution:



Question152

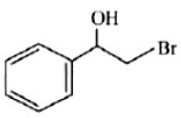
The major product of the following reaction is:



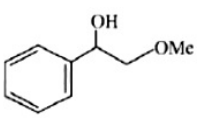
[April 8, 2019 (I)]

Options:

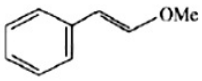
A.



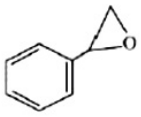
B.



C.

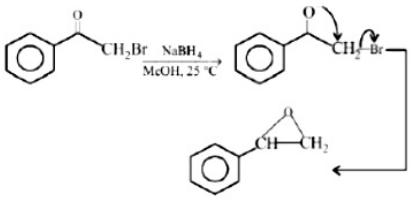


D.



Answer: D

Solution:

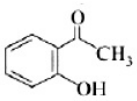


Question153

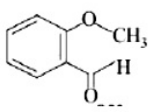
An organic compound neither reacts with neutral ferric chloride solution nor with Fehling solution. It however, reacts with Grignard reagent and gives positive iodoform test. The compound is:
[April 8, 2019 (I)]

Options:

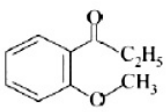
A.



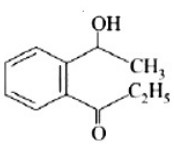
B.



C.

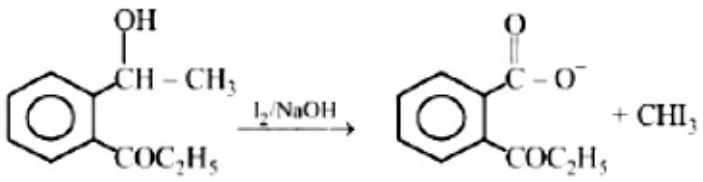


D.



Answer: D

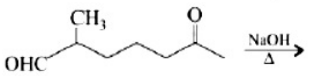
Solution:



Test Observation	Reason
Reaction with tre Grignard reagent	Electrophilic centre or acidic hydrogen is present
Fehling solution test -ve	CHO group is absent
Neutral $FeCl_3$ test	phenolic group is absent
Iodoform test CH_3 is present -ve	$-COCH_3$ or $-CH(OH)-$

Question154

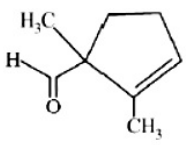
The major product obtained in the following reaction is:



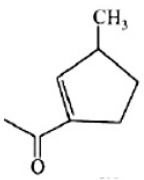
[April 8, 2019 (II)]

Options:

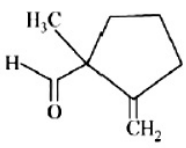
A.



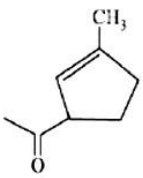
B.



C.

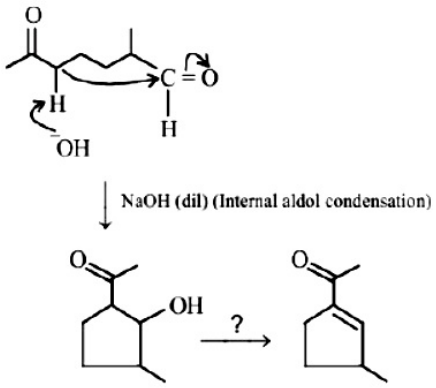


D.



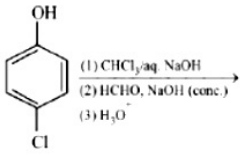
Answer: B

Solution:



Question155

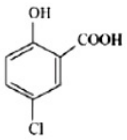
The major products of the following reaction are :



[April 12, 2019 (I)]

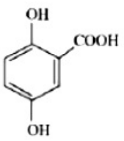
Options:

A.



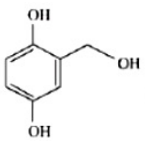
and Methanol

B.



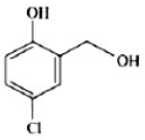
and Methanol

C.



and Formic acid

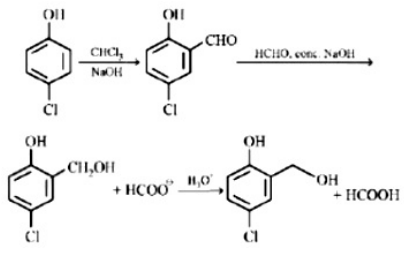
D.



and Formic acid

Answer: D

Solution:



Question156

The major product of the following reaction is:

$CH_3CH = CHCO_2CH_3 \xrightarrow{LiAlH_4}$

[April 12, 2019 (I)]

Options:

A. $CH_3CH_2CH_2CO_2CH_3$

B. $CH_3CH = CHCH_2OH$

C. $CH_3CH_2CH_2CH_2OH$

D. $CH_3CH_2CH_2CHO$

Answer: B

Solution:

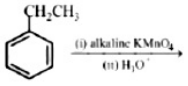
Solution:

$LiAlH_4$ reduces esters to alcohols but does not reduce C − C

$CH_3CH = CH - CO_2Me \xrightarrow{LiAlH_4} CH_3CH = CHCH_2OH$

Question157

The major product of the following reaction is:



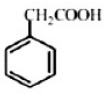
[April 12, 2019 (I)]

Options:

A.

B.

C.

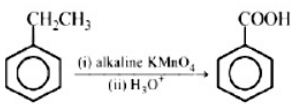


D.

Answer: A

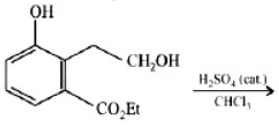
Solution:

Alkaline $KMnO_4$ converts  with a benzylic hydrogen into benzoic acid.



Question158

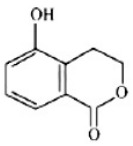
The major product of the following reaction is:



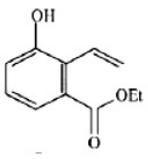
[April 12, 2019 (II)]

Options:

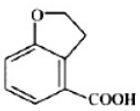
A.



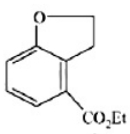
B.



C.

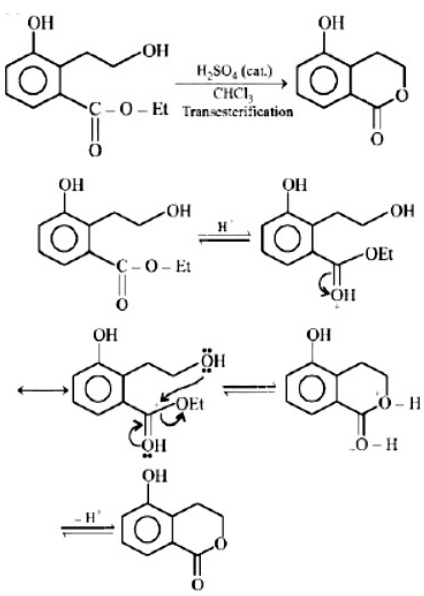


D.



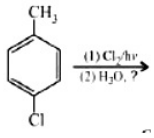
Answer: A

Solution:



Question159

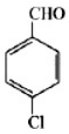
The major product of the following reaction is:



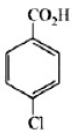
[April 8, 2019 (II)]

Options:

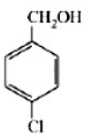
A.



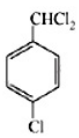
B.



C.

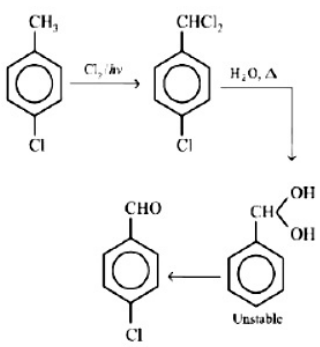


D.



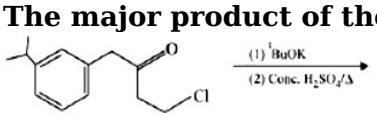
Answer: A

Solution:



Question160

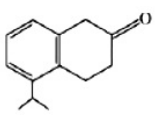
The major product of the following reaction is:



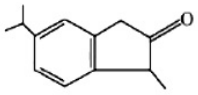
[April 8, 2019 (II)]

Options:

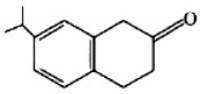
A.



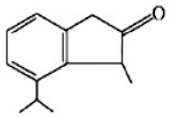
B.



C.

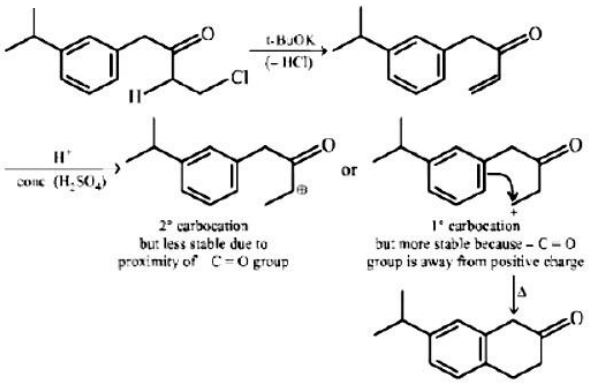


D.



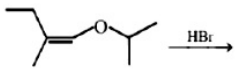
Answer: C

Solution:



Question161

The total number of optically active compounds formed in the following reaction is:



[Online April .15 ,2018(II)]

Options:

A. Zero

B. Six

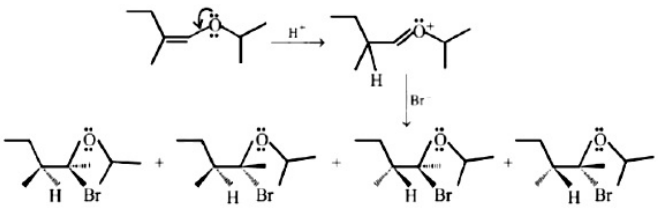
C. Four

D. Two

Answer: C

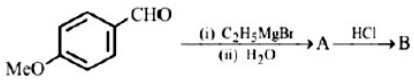
Solution:

The total number of optically active compounds formed is four. The product has two chiral C atoms. Thus, it has $2^n = 2^2 = 4$ stereoisomers.



Question162

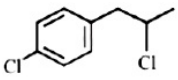
The major product B formed in the following reaction sequence is:



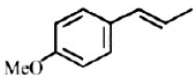
[Online April 16, 2018]

Options:

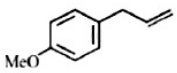
A.



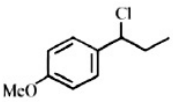
B.



C.

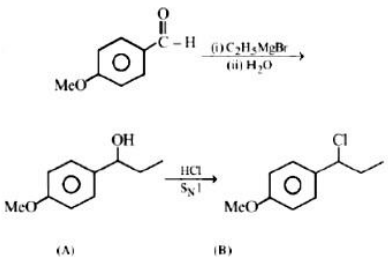


D.



Answer: D

Solution:



Question163

Which of the following compounds will most readily be dehydrated to give alkene under acidic condition?
[Online April 16, 2018]

Options:

A. 4-Hydroxypentan-2-one

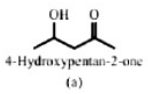
B. 3-Hydroxypentan-2-one

C. 1 -Pentanol

D. 2-Hydroxycyclopentanone

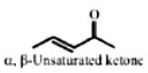
Answer: A

Solution:



4-Hydroxypentan-2-one
(a)

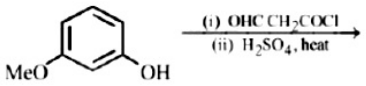
will most readily be dehyderated to give unsaturated ketone ⟶



α, β-Unsaturated ketone

Question164

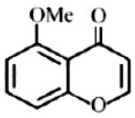
The major product of the given reaction is:



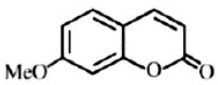
[Online April 16, 2018]

Options:

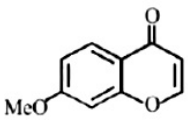
A.



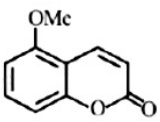
B.



C.



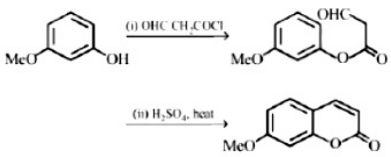
D.



Answer: B

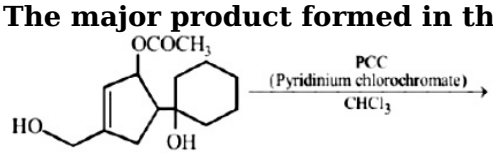
Solution:

Acid chloride is more reactive than aldehyde. Hence, phenolic $-OH$ will react with $-COCl$ group first to form ester. This is followed by cyclisation in presence of conc. sulfuric acid.



Question165

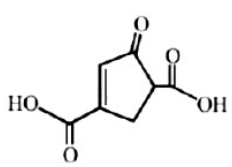
The major product formed in the following reaction is:



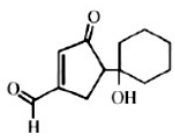
[Online April 15, 2018 (II)]

Options:

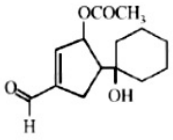
A.



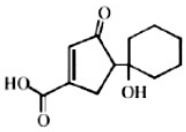
B.



C.



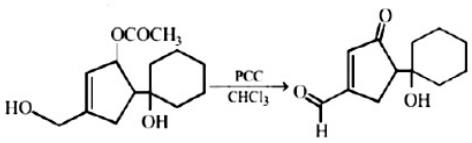
D.



Answer: B

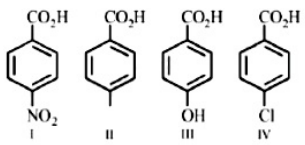
Solution:

PCC oxidizes primary alcohols to aldehydes and secondary alcohols to ketones. In the above reaction, $OCOCH_3$ group is hydrolyzed to secondary alcohol which is then oxidised (with PCC) to ketone.



Question166

The increasing order of the acidity of the following carboxylic acids is:



[Online April 15, 2018 (II)]

Options:

A. $III < II < IV < I$

B. $I < III < II < IV$

C. $IV < II < III < I$

D. $II < IV < III < I$

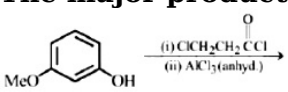
Answer: A

Solution:

Solution:
The increasing order of the acidity of the carboxylic acids is III < II < IV < I. In aromatic acids, electron withdrawing groups like $-Cl$, $-CN$, $-NO_2$ increases the acidity, whereas electron releasing groups like $-CH_3$, $-OH$, $-OCH_3$, $-NH_2$ decreases the acidity.

Question167

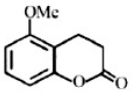
The major product of the following reaction is



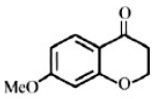
[Online April 15, 2018 (I)]

Options:

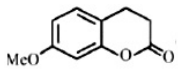
A.



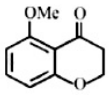
B.



C.



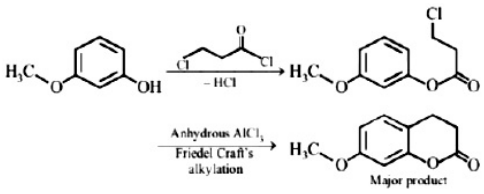
D.



Answer: C

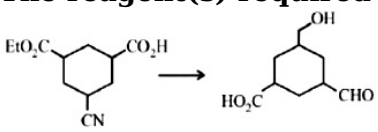
Solution:

Solution:
Since acid chloride is more reactive than alkyl halide, so COCl group will react first.
In the second step, Friedel Craft's alkylation occurs in a position that is ortho to alkoxy group and para to methoxy group. Both methoxy and alkoxy groups are ortho para directing groups.



Question168

The reagent(s) required for the following conversion are:



[Online April 15, 2018 (I)]

Options:

A. (i) N aBH $_4$, (ii) Raney N i / H $_2$, (iii) H $_3O^+$

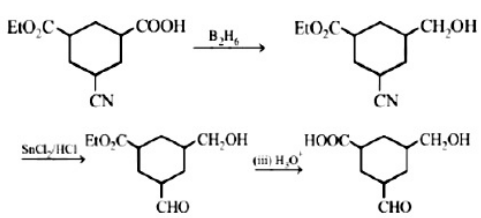
B. (i) LiAI H $_4$. (ii) H $_3O^+$

C. (i) B_2H_6, (ii) DI BAL − H , (iii) H $_3O^+$

D. (i) B_2H_6, (ii) $SnCl_2$ / H Cl , (iii) H $_3O^+$

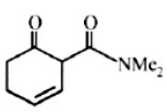
Answer: D

Solution:



Question169

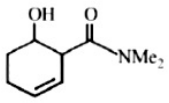
The main reduction product of the following compound with N aBH $_4$ in methanol is:



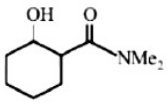
[Online April 15, 2018 (I)]

Options:

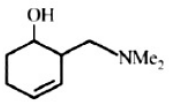
A.



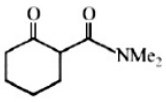
B.



C.



D.



Answer: A

Solution:

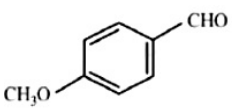
Solution:
Sodium borohydride reduces ketonic group to alcohol, but not the amide group and C = C double bond.

Question170

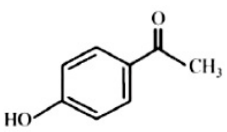
A compound of molecular formula $C_8H_8O_2$ reacts with acetophenone to form a single cross-aldol product in the presence of base. The same compound on reaction with conc. NaOH forms benzyl alcohol as one of the products. The structure of the compound is:
[Online April 9, 2017]

Options:

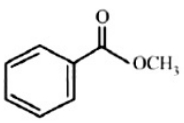
A.



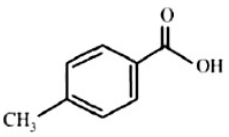
B.



C.

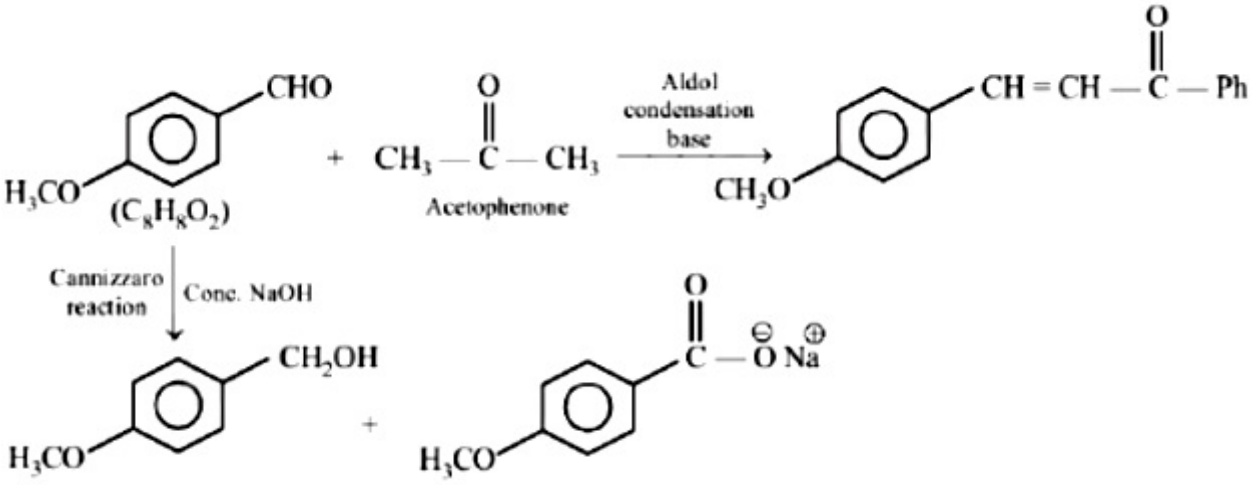


D.



Answer: A

Solution:



Question171

Sodium salt of an organic acid 'X' produces effervescences with conc. H_2SO_4, 'X' reacts with the acidified aqueous $CaCl_2$ solution to give a white precipitate which decolourises acidic solution of $KMnO_4$, 'X' is :
[2017]

Options:

A. C_6H_5COONa

B. $HCOONa$

C. CH_3COONa

D. $Na_2C_2O_4$

Answer: D

Solution:

$$\underset{X'}{Na_2C_2O_4} + \underset{(conc.)}{H_2SO_4} \rightarrow Na_2SO_4 + CO\uparrow + CO_2\uparrow + H_2O$$

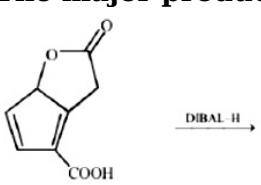
$$\underset{X'}{Na_2C_2O_4} + CaCl_2 \rightarrow \underset{(white\ ppt.)}{CaC_2O_4}\downarrow + 2NaCl$$

$$5CaC_2O_4\downarrow + 2K\underset{(purple)}{MnO_4} + 8H_2SO_4 \rightarrow$$

$$K_2SO_4 + 5CaSO_4 + \underset{(colourless)}{2MnSO_4} + 10CO_2 + 8H_2O$$

Question172

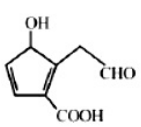
The major product obtained in the following reaction is :



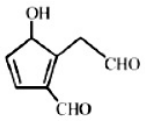
[2017]

Options:

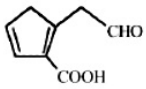
A.



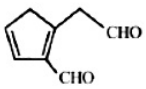
B.



C.



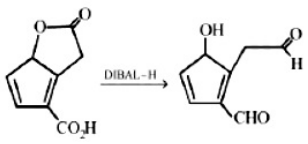
D.



Answer: B

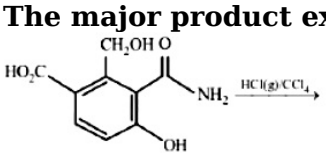
Solution:

DIBAL-H is a reducing agent. It reduces both ester and carboxylic group into an aldehyde at low temperature.



Question173

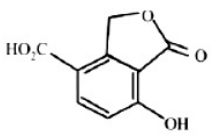
The major product expected from the following reaction is:



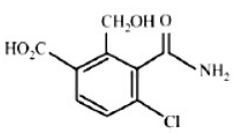
[Online April 8, 2017]

Options:

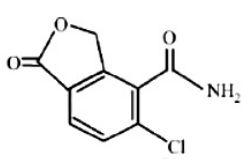
A.



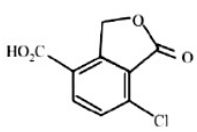
B.



C.

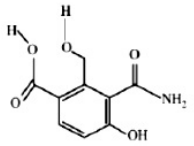


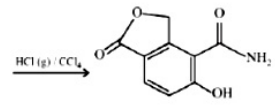
D.



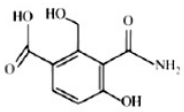
Answer: C

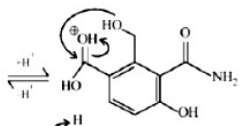
Solution:

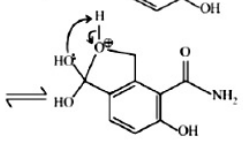


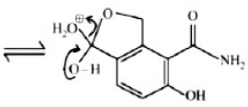


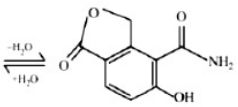
Mechanism :





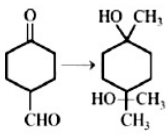






Question174

The correct sequence of reagents for the following conversion will be:



[2016]

Options:

A. $[Ag(NH_3)_2]^+OH^-$, H^+ / CH_3OH , CH_3MgBr

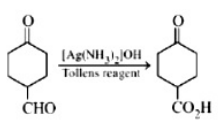
B. CH_3MgBr, H^+ / CH_3OH , $[Ag(NH_3)_2]^+OH^-$

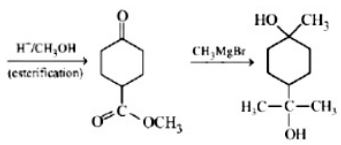
C. CH_3MgBr, $[Ag(NH_3)_2]^+OH$, H^+ / CH_3OH

D. $[Ag(NH_3)_2]^+OH^-$, CH_3MgBr, H^+ / CH_3OH

Answer: A

Solution:





Question175

The correct statement about the synthesis of erythritol ($C(CH_2OH)_4$) used in the preparation of

PETN is:
[Online April 10, 2016]

Options:

A. Thy synthesis requires three aldol condensations and one Cannizzaro reaction.

B. Alpha hydrogens of ethanol and methanol are involved in this reaction.

C. The synthesis requires two aldol condensations and two Cannizraro reactions.

D. The synthesis requires four aldol condensations between methanol and ethanol.

Answer: A

Solution:

Solution:
The pentaerythritol is typically produced via a basecatalyzed reaction of acetaldehyde with excess formaldehyde. The aldol condensation of three moles of formaldehyde with one mole of acetaldehyde is followed by a crossed Cannizzaro reaction between pentaerythritol, the intermediate product, and formladehyde to give the final pentaerythritol product and sodium formate as a byproduct. These reactions are shown below

$$CH_3CHO \xrightarrow[\text{(three Aldol condensation)}]{} C(CH_2OH)_3CHO$$

$$C(CH_2OH)_3CHO \xrightarrow[OH^-]{HCHO} C(CH_2OH)_4 + HCOONa$$

Question176

Bouveault-Blanc reduction reaction involves:
[Online April 9, 2016]

Options:

A. Reduction of an acyl halide with H_2 / Pd

B. Reduction of an anhydride with $LiAlH_4$

C. Reduction of an ester with Na / C_2H_5OH

D. Reduction of a carbonyl compound with Na / Hg and HCl .

Answer: C

Solution:

The Bouveault reduction is a reaction in which an ester is reduced to primary alcohol using absolute cthanol and sodium.

$$R-\overset{O}{\overset{|}{C}}-OR \xrightarrow{Na/C_2H_5OH} RCH_2OH + ROH$$

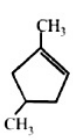
Bouveault-Blanc reduction.

Question177

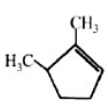
Which compound would give 5 - keto -2 - methylhexanal upon ozonolysis?
[2015]

Options:

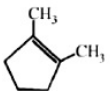
A.



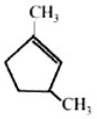
B.



C.

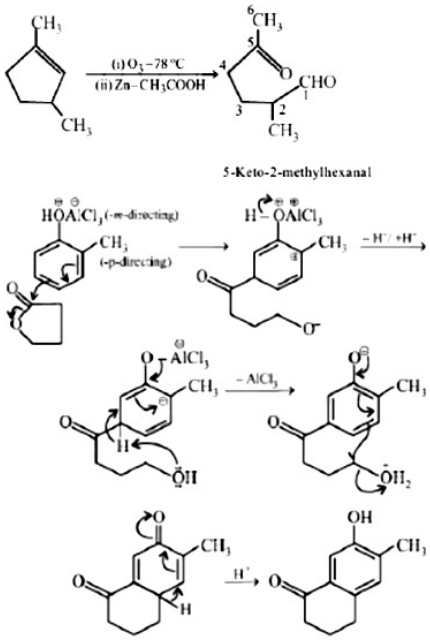


D.



Answer: D

Solution:



Question178

In the reaction sequence
$2CH_3CHO \xrightarrow{OH^-} A \xrightarrow{\Delta} B$; the product B is :
[Online April 11, 2015]

Options:

A. $CH_3 - CH_2 - CH_2 - CH_2 - OH$

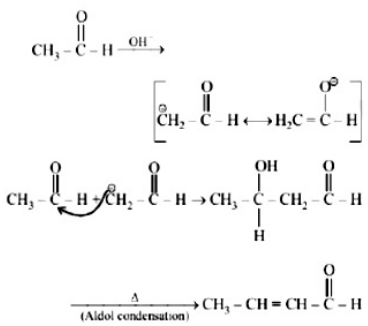
B. $CH_3 - CH = CH - CHO$

C. $CH_3 - CH_2 - CH_2 - CH_3$

D. $CH_3 - \overset{O}{\overset{\|}{C}} - CH_3$

Answer: B

Solution:



Question179

In the presence of a small amount of phosphorous, aliphatic carboxylic acids react with chlorine or bromine to yield a compound in which α -hydrogen has been replaced by halogen. This reaction is known as:
[Online April 10, 2015]

Options:

A. Wolff-Kishner reaction

B. Rosenmund reaction

C. Etard reaction

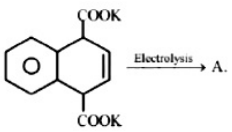
D. Hell - Volhard - Zelinskyreaction

Answer: D

Solution:

α -Substitution is occaured when a carboxylic acid having α -hydrogens is treated with chlorine or bromine in presence of small amount of red phosphorous. This reaction is commonly known as HVZ reaction. $R-CH_2COOH + X_2 \xrightarrow{P} R\underset{X}{\underset{|}{C}}H - COOH + HX\,(X = Cl, Br)$

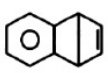
Question180



A is:
[Online April 10, 2015]

Options:

A.



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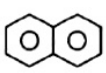
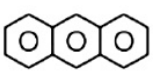
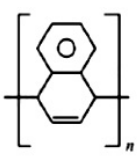


C.

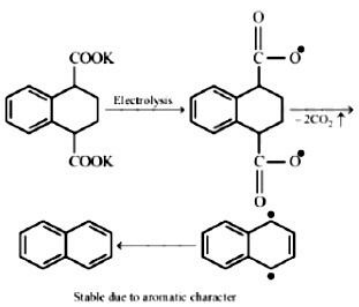


D.

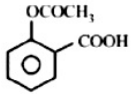


Answer: B

Solution:



Question181



is used as :
[Online April 10, 2015]

Options:

A. Analgesic

B. Insecticide

C. Antacid

D. Antihistamine

Answer: A

Solution:

Solution:
Drugs which relieve pain are called analgesics drugs. Analgesics are of two types (i) Narcotics and (ii) Nonnarcotics. Aspirin (acctylsalicylic acid) is a non-narcotic analgesic.

Question182

Which one of the following reactions will not result in the formation of carbon-carbon bond?
[Online April 9, 2014]

Options:

A. Reimer-Tieman reaction

B. Friedel Craft's acylation

C. Wurtz reaction

D. Cannizzaro reaction

Answer: D

Solution:

Solution:
Cannizzaro's reaction is a disproportionation reaction of aldehyde in which one molecule of aldehyde reduces to alcohol whereas other oxidises to salt of carboxylic acid
$C_6H_5CHO + KOH \longrightarrow C_6H_5CH_2OH + C_6H_5COOK$

Question183

Which is major product formed when acetone is heated with iodine and potassium hydroxide?
[Online April 9, 2014]

Options:

A. Iodoacetone

B. Acetic acid

C. Iodoform

D. Acetophenone

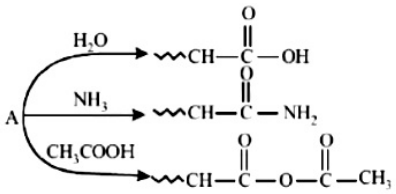
Answer: C

Solution:

Solution:
$CH_3COCH_3 + 3I_2 + 4KOH \longrightarrow CHI_3 + CH_3COOK + 3HI + 3H_2O$

Question184

An organic compound A, C_5H_8O; reacts with H_2O, NH_3 and CH_3COOH as described below:



A is:
[Online April 11, 2014]

Options:

A. $CH_3CH = \underset{\underset{CH_3}{|}}{C} - CHO$

B. $CH_2 = CH \underset{\underset{CH_3}{|}}{C} H - CHO$

C. $CH_3 - CH_2 - \underset{\underset{CH_3}{|}}{C} = C = O$

D. $CH_3 - CH_2 - \underset{\underset{CH_2}{||}}{C} - \underset{\underset{H}{|}}{C} = O$

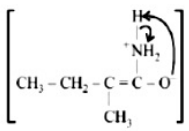
Answer: C

Solution:

Given compound A is $CH_3 - CH_2 - C = \underset{\underset{CH_3}{|}}{C} = O$

Reactions given are as following :

$$CH_3 - CH_2 - \underset{\underset{CH_3}{|}}{C} = C = O \xrightarrow{NH_3}$$



$$CH_3 - CH_2 - \underset{\underset{CH_3}{|}}{CH_2} - \overset{\overset{O}{||}}{C} - NH_2$$

$$CH_3 - CH_2 - \underset{\underset{CH_3}{|}}{C} = C = O \xrightarrow{H_2O} CH_3 - CH_2 - \underset{\underset{CH_3}{|}}{CH} - COOH$$

$$CH_3 - CH_2 - \underset{\underset{CH_3}{|}}{C} = C = O \xrightarrow{CH_3COOH} CH_3 - CH_2 - \underset{\underset{CH_3}{|}}{CH} - \overset{\overset{O}{||}}{C} - O - \overset{\overset{O}{||}}{C} - CH_3$$

Question185

Tischenko reaction is a modification of
[Online April 11, 2014]

Options:

A. Aldol condensation

B. Claisen condensation

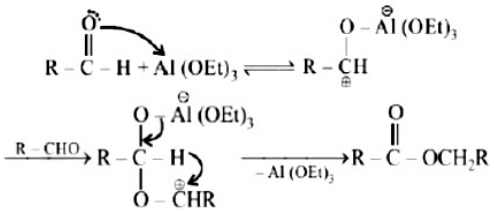
C. Cannizzaroreaction

D. Pinacol-pinacolon reaction

Answer: C

Solution:

Tishchenko reaction is a modification of Cannizzaro's reaction. This reaction involves disproportionation of an aldehyde lacking a hydrogen atom in the alpha position in the presence of an alkoxide. The reaction product is an ester. Catalysts are aluminium alkoxide or sodium alkoxide. In Cannizzaro's reaction the base is sodium hydroxide and the oxidation product is a carboxylic acid and the reduction product is an alcohol.



Question186

In the reaction, $CH_3COOH \xrightarrow{LiAlH_4} A \xrightarrow{PCl_5} B \xrightarrow{Alc \cdot KOH} C$ the product C is:
[2014]

Options:

A. Acetaldehyde

B. Acetylene

C. Ethylene

D. Acetyl chloride

Answer: C

Solution:

$$CH_3COOH \xrightarrow{LiAlH_4} \underset{(A)}{CH_3CH_2OH} \xrightarrow{PCl_3} \underset{(B)}{CH_3CH_2Cl} \xrightarrow{Alc.KOH} \underset{(C)}{CH_2 = CH_2}$$

Question187

Phthalic acid reacts with resorcinol in the presence of concentrated H_2SO_4 to give:
[Online April 12, 2014]

Options:

A. Phenolphthalein

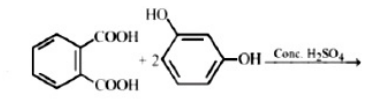
B. Alizarin

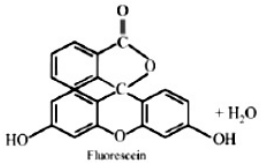
C. Coumarin

D. Fluorescein

Answer: D

Solution:





Question188

Formaldehyde can be distinguished from acetaldehyde by the use of :
[Online April 9, 2013]

Options:

A. Schiff's reagent

B. Tollen's reagent

C. I_2 / Alkali

D. Fehling's solution

Answer: C

Solution:

Only acetaldehyde and methyl ketones give iodoform test.

Question189

Clemmensen reduction of a ketone is carried out in the presence of : [Online April 22, 2013]

Options:

A. $LiAlH_4$

B. Zn - Hg with HCl

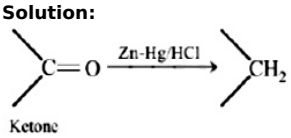
C. Glycol with KOH

D. H_2 with Pt as catalyst

Answer: B

Solution:

Solution:

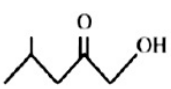


Question190

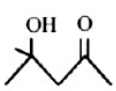
Which of the following is the product of aldol condensation? [Online April 23, 2013]

Options:

A.

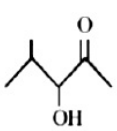


B.



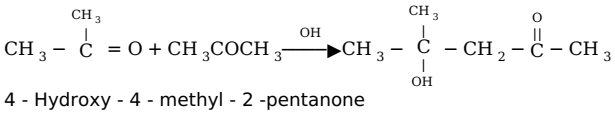
C.

D.



Answer: B

Solution:



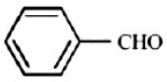
4 - Hydroxy - 4 - methyl - 2 -pentanone

Question191

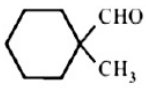
Cannizaro's reaction is not given by:
[Online April 25, 2013]

Options:

A.



B.



C. CH_3CHO

D. HCHO

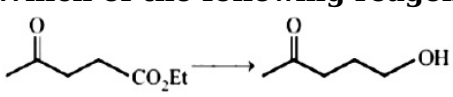
Answer: C

Solution:

Solution:
Only those aldehydes which do not have α -H atom undergo Cannizaro's reaction. Hence CH_3CHO will not undergo Cannizaro's reaction as it has $3\alpha H$ atoms.

Question192

Which of the following reagent(s) is/are used for the conversion?



[Online April 25, 2013]

Options:

A. glycol / $LiAlH_4$ / H_3O^+

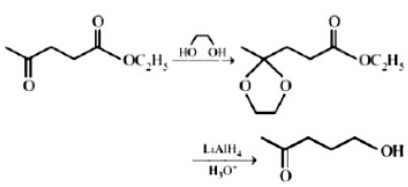
B. glycol / NaH / H_3O^+

C. $LiAlH_4$

D. $NaBH_4$

Answer: A

Solution:



Question193

An organic compound A upon reacting with NH_3 gives B. On heating B gives C. C in presence of KOH reacts with Br_2, to give $CH_3CH_2NH_2$, A is :
[2013]

Options:

A. CH_3COOH

B. $CH_3CH_2CH_2COOH$

C. $CH_3-\underset{\underset{CH_3}{|}}{CH}-COOH$

D. CH_2CH_2COOH

Answer: D

Solution:

Reaction (III) is a Hofmann bromamide reaction. Hence, C should be $CH_3CH_2CONH_2$ which can be obtained from $CH_3CH_2COO^-NH_4^+$(B) Thus (A) should be CH_3CH_2COOH

$$\underset{(A)}{CH_3CH_2-COOH} \xrightarrow{NH_3} \underset{(B)}{CH_3CH_2COO^-NH_4^+} \xrightarrow{\Delta} \underset{(C)}{CH_3CH_2CONH_2} \xrightarrow[KOH]{Br_2} CH_3CH_2NH_2$$

Question194

Monocarboxylic acids are functional isomers of: [Online April 23, 2013]

Options:

A. Ethers

B. Amines

C. Esters

D. Alcohols

Answer: C

Solution:

Mono-carboxylic acids are functional isomers of esters. e . g.,

$\underset{\text{Acetic acid}}{CH_3COOH}$ $\underset{\text{Methyl formate}}{HCOOCH_3}$

Question195

lodoform can be prepared from all except : [2012]

Options:

A. Ethyl methyl ketone

B. Isopropyl alcohol

C. 3-Methyl 2-butanone

D. Isobutyl alcohol

Answer: D

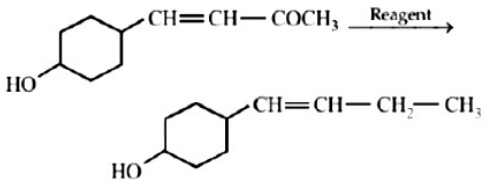
Solution:

Solution:
lodoform test is given by methyl ketones, acetaldehyde and methyl secondary alcohols. Isobutyl alcohol is a primary alcohol except ethanol, C_2H_5OH , primary alcohols do not give haloform test. Hence does not give positive iodoform test.

$CH_3-\underset{\underset{CH_3}{|}}{CH}-CH_2-OH$

Question196

In the given transformation, which of the following is the most appropriate reagent?



[2012]

Options:

A. NH_2NH_2, OH

B. Zn − Hg / HCl

C. Na, Liq NH_3

D. $NaBH_4$

Answer: A

Solution:

Solution:
Aldehydes and ketones can be reduced to hydrocarbons by the action (i) of amalgamated zinc and concentrated hydrochloric acid (Clemmenson reduction), or (ii) of hydrazine (NH_2NH_2) and a strong base like NaOH, KOH or potassium tert-butoxide in a high-boiling alcohol like ethylene glycol or triethylene glycol (Wolf-Kishner reduction) - OH group is acid-sensitive, so Clemmenson reduction can not be used.

Question197

Among the following the order of reactivity towards nucleophilic addition is [Online May 7, 2012]

Options:

A. $CH_3CHO > CH_3COCH_3 > HCHO$

B. $HCHO > CH_3CHO > CH_3COCH_3$

C. $CH_3CHO > HCHO > CH_3COCH_3$

D. $CH_3COCH_3 > CH_3CHO > HCHO$

Answer: B

Solution:

(b) Presence of alkyl group in carbonyl compounds decreases their reactivity towards nucleophilic addition. Further greater the number of such groups lesser will be the reactivity towards nucleophilic addition, thus correct order is
$HCHO > CH_3CHO > CH_3COCH_3$

Question198

The reaction, $CH_3CHO \xrightarrow{Zn(Hg)\ /\ Conc.\ HCl[H]} CH_3CH_3$ is [Online May 12, 2012]

Options:

A. Cannizzaro's reaction

B. Rosenmund reduction

C. Wolf-Kishner reduction

D. Clemmenson reduction

Answer: D

Solution:

Solution:
The reaction given is a Clemmenson reduction.

Question199

Tollen's reagent and Fehling solutions are used to distinguish between [Online May 26, 2012]

Options:

A. acids and alcohols

B. alkanes and alcohols

C. ketones and aldehydes

D. n -alkaens and branched alkanes

Answer: C

Solution:

Solution:
All aldchydes show reaction with Tollen's reagent and Fehling solutions, but ketones do not show this reaction.
Note :- Benzaldehyde do not give reaction with Fehling solution.

Question200

Which of the following on heating with aqueous KOH, produces acctaldehyde? [2009]

Options:

A. CH_3CH_2Cl

B. $CH_2Cl\,CH_2Cl$

C. CH_3CHCl_2

D. CH_3COCl

Answer: C

Solution:

$$CH_3CHCl_2 \xrightarrow{aq\cdot KOH} CH_3CH(OH)_2 \xrightarrow{-H_2O} CH_3CHO$$

Question201

In Cannizzaro reaction given below $2PhCHO \xrightarrow{:\bar{O}H} PhCH_2OH + PhC\bar{O}_2$ the slowest step is: [2009]

Options:

A. the transfer of hydride to the carbonyl group

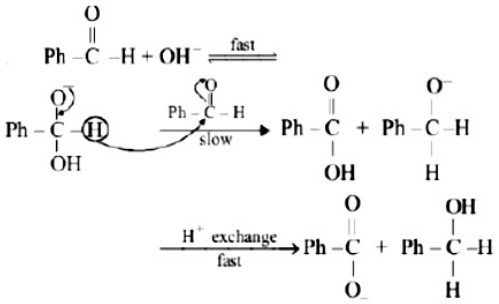
B. the abstraction of proton from the carboxylic group

C. the deprotonation of $PhCH_2OH$

D. the attack of: OH^- at the carboxyl group

Answer: A

Solution:



Question202

A liquid was mixed with ethanol and a drop of concentrated H_2SO_4 was added. A compound with a fruity smell was formed. The liquid was:
[2009]

Options:

A. HCHO

B. CH_3COCH_3

C. CH_2COOH

D. CH_3OH

Answer: C

Solution:

Fruity smell is due to ester formation which is formed between ethanol and acid.

$$CH_3COOH + C_2H_5OH \xrightarrow{\text{Conc. } H_2SO_4} CH_3COOC_2H_5 + H_2O$$

Question203

The increasing order of the rate of HCN addition to compound A to D is
(A) HCHO
(B) CH_3COCH_3
(C) $PhCOCH_3$
(D) PhCOPh
[2006]

Options:

A. D < C < B < A

B. C < D < B < A

C. A < B < C < D

D. D < B < C < A

Answer: A

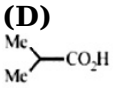
Solution:

(a) Note: Addition of HCN to carbonyl compounds is nucleophilic addition reaction. The order of reactivity of carbonyl compounds is Aldehydes (smaller to higher) > Ketones (smaller to higher). Therefore, $HCHO > CH_3COCH_3 > PhCOCH_3 > PhCOPh$
Note: The lower reactivity of ketones is due to presence of two alkyl group which show + I effect. The reactivity of ketones decreases as the size of alkyl group increases.

Question204

The correct order of increasing acid strength of the compounds
(A) CH_3CO_2H
(B) $MeOCH_2CO_2H$
(C) CF_3CO_2H

(D)



[2006]

Options:

A. D < A < B < C

B. A < D < B < C

C. B < D < A < C

D. D < A < C < B

Answer: A

Solution:

Solution:
The correct order of increasing acid strength is
$(Me)_2CH\,COOH < CH_3COOH < MeOCH_2COOH < CF_3COOH$
Note: Electron withdrawing groups increase the acid strength whereas electron donating groups decrease the acid strength.

Question205

Reaction of cyclohexanone with dimethylamine in the presence of catalytic amount of an acid forms a compound if water during the reaction is continuously removed. The compound formed is generally known as
[2005]

Options:

A. an amine

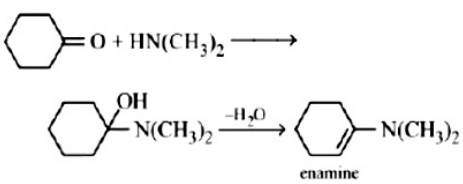
B. an imine

C. an enamine

D. a Schiff's base

Answer: C

Solution:



Question206

Among the following acids which has the lowest pK value?
[2005]

Options:

A. CH_3CH_2COOH

B. $(CH_3)_2CH - COOH$

C. $HCOOH$

D. CH_3COOH

Answer: C

Solution:

$pK_a = -\log K_a$; $HCOOH$ is the strongest acid and hence it has the highest K_a or lowest pK_a value.

Question207

On mixing ethyl acetate with aqueous sodium chloride, the composition of the resultant solution is
[2004]

Options:

A. $CH_3COCl + C_2H_5OH + NaOH$

B. $CH_3COONa + C_2H_5OH$

C. $CH_3COOC_2H_5 + NaCl$

D. $CH_3Cl + C_2H_5COONa$

Answer: C

Solution:

There is no reaction hence the resultant mixture contains $CH_3COOC_2H_5 + NaCl$.

Question208

Acetyl bromide reacts with excess of CH_3MgI followed by treatment with a saturated solution of NH_4Cl gives
[2004]

Options:

A. 2 -methyl-2-propanol

B. acetamide

C. acetone

D. acetyl iodide

Answer: A

Solution:

$$CH_3-\overset{O}{\overset{\|}{C}}-Br \xrightarrow[\text{(ii) Saturated } NH_4Cl]{\text{(i) } 2CH_3MgI} CH_3-\underset{\substack{\text{2-Methyl-2-propanol}}}{\overset{\overset{CH_3}{|}}{\underset{\underset{CH_3}{|}}{C}}}-OH$$

Question209

Which one of the following is reduced with zine amalgam and hydrochloric acid to give the corresponding hydrocarbon?
[2004]

Options:

A. Acetamide

B. Acetic acid

C. Ethyl acetate

D. Butan-2-one

Answer: D

Solution:

It is Clemmensen's reduction

$$\underset{\text{Butane-2-one}}{CH_3-\overset{O}{\overset{\|}{C}}-CH_2-CH_3} \xrightarrow[\text{Conc HCl}]{Zn-Hg} \underset{\text{Butane}}{CH_3CH_2-CH_2CH_3}$$

Question210

Which one of the following undergoes reaction with 50 % sodium hyroxide solution to give the corresponding alcohol and acid?
[2004]

Options:

A. Butanal

B. Benzaldehyde

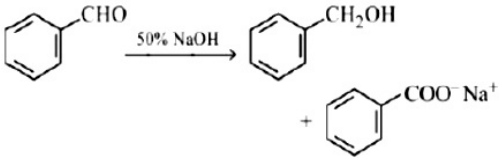
C. Phenol

D. Benzoic acid

Answer: B

Solution:

This reaction is known as cannizzaro's reaction. In this reaction benzaldehyde in presence of 50% . N aOH undergoes disproportionation reaction and form one mol of benzyl alcohol (reduced product) and one mole of sod. benzoate (oxidation product)



Question211

When $CH_2 = CH - COOH$ is reduced with $LiAlH_4$, the compound obtained will be
[2003]

Options:

A. $CH_2 = CH - CH_2OH$

B. $CH_3 - CH_2 - CH_2OH$

C. $CH_3 - CH_2 - CHO$

D. $CH_3 - CH_2 - COOH$

Answer: A

Solution:

Solution:
Lt can reduce COOH group but not the double bond.
4

$$CH_2 = CH - COOH \xrightarrow{LiAlH_4} CH_2 = CH - CH_2OH$$

Question212

$CH_3CH_2COOH \xrightarrow[\text{red P}]{Cl_2} A \xrightarrow{\text{alc. KOH}} B$. What is B?
[2002]

Options:

A. CH_3CH_2COCl

B. CH_3CH_2CHO

C. $CH_2 = CHCOOH$

D. $ClCH_2CH_2COOH$

Answer: C

Solution:

$$CH_3CH_2COOH \xrightarrow[\text{red P}]{Cl_2} CH_3CHClCOOH \xrightarrow[-HCl]{\text{alcK OH}} \underset{\text{Acrylic acid}}{CH_2 = CHCOOH}$$

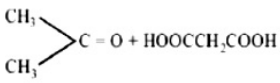
Question213

On vigorous oxidation by permanganate solution. $(CH_3)_2C = CH - CH_2 - CHO$ gives
[2002]

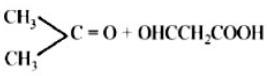
Options:

A. $CH_3 - \overset{\overset{OH}{|}}{\underset{CH_3}{C}} - \overset{\overset{OH}{|}}{CH} - CH_2CHO$ gives

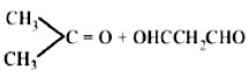
B.



C.



D.



Answer: B

Solution:

Double bond is leaved and oxidised to $-COOH$, $-CHO$ is also oxidised to $-COOH$

$$(CH_3)_2C = CHCH_2CHO \xrightarrow{KMnO_4} (CH_3)_2CO + HOOCCH_2COOH$$
